

UNIVERSITY OF READING

***AN INVESTIGATION INTO THE INTERACTION BETWEEN POTENTIAL
BUILDING CLIENTS AND CONSTRUCTION PROFESSIONALS***

By

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ABSTRACT

This research investigates the interaction process between building clients and construction professionals. The context of the interaction is the first meeting between the parties to discuss a potential construction project. The objective of the research was to determine whether clients, with differing levels of construction experience, and construction professionals, from different disciplines (architects, quantity surveyors, consulting engineers and contractors), exhibit distinctive interaction characteristics, both in terms of how they interact and the subject matter of their interactions.

In order to test a number of hypotheses about the interactions an experimental procedure was developed. This involved arranging a series of interviews between the different client types and the construction professionals. 44 interviews were conducted with each one being recorded and then transcribed. Additional data was collected in the form of participant questionnaires and personality tests. Transcripts were coded using systems developed for this investigation, using measures of nature of interaction and subject matter. Processing and analysis of the data was conducted using ethnographic computer software and programs written specifically for this research project. A database was created from the interview data which allows selective retrieval of segments of interviews. The database comprises of approximately 215,000 words, with 58,000 codes assigned to text segments.

The results of the analysis are presented in both quantitative and qualitative forms, and show that there are significant differences in the interactions. In interviews between inexperienced clients and professionals the professionals make the greater contributions, dominating the clients. There is a reversal of the roles when experienced clients interact with professionals, with the clients assuming the dominant position. In addition the results show that in interviews between inexperienced clients and professionals, the four professional disciplines emphasise different factors. All professionals raise issues relating to primary factors such as time, cost and quality. However, the discussion of other building factors was more specific to a particular professional discipline. Finally, the research also concluded that the element of personality differences in interviews was an influential factor in determining whether their outcome was perceived as successful by the participants.

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1.0 INTRODUCTION

1.1 INTRODUCTION

In this introductory chapter a number of areas will be considered in an attempt to provide a description of the research conducted.

The chapter begins by considering the general background to the research topic. This is followed by a statement of the research aim and objective, and a statement of the research hypotheses.

Finally the structure of the thesis is described to provide the reader with information on the general framework within which the research has been presented.

1.2 BACKGROUND TO THE RESEARCH

↘ "Building is about getting it right for the client because he's the only man who matters at the end of the day."

The above statement made during a 'building debate' (Building (1981)), puts forward an important issue which merits further consideration. One party who is involved in any construction project, irrespective of organisational or contractual arrangements, is some form of client. In many instances the client is just a name on a contract, and his existence tends to be overlooked, with the professional project team leader acting as a '*surrogate client*' (Walker (1989)).

The construction industry is a service industry, offering its services to clients for an appropriate remuneration. ↘ The greatest problem, particularly if the client has no previous experience, is the selection of an appropriate service to satisfy his requirements. One only has to look at a publication such as the NEDO pamphlet, "Thinking About Building" (NEDO (1985)) as an indication of just how many procurement options there are. It lists four main alternative methods with nine sub-classifications.



In addition to this there are also many different ways of procuring professional services, such as using multidisciplinary firms or employing a project manager. The industry increasingly offers a wider range of services to clients considering obtaining buildings.

The term client covers a very diverse range of parties, who can range from an individual requiring an extension on his house, small businesses building premises for their own use, large multinational corporations and property developers who build buildings as their prime business function.

Having reached a decision that they need a building the client has to make an approach to the industry.

Glaser (1972) puts forward the concept of '*comparative shopping*' stating:

"When there are many experts to choose from, and many types and sub-types of them, the layman can, over a period of time and many trials, shop comparatively provided he is not hooked by a particular one."

  The small industrial client who has never built before, and perhaps will only be involved in a building project once in his lifetime, is not in a position to confidently indulge in such an activity. However, a client with previous experience of building will be more able to conduct such a shopping exercise. Based upon his previous experience he may in fact have professionals who he prefers to employ.

Assuming that the client has conducted his shopping exercise the next stage will be an approach to a particular professional for advice.

The growth in procurement options has increased the services that professionals offer to clients. Their shopping list has been extended. The historical first point of contact has been the architect, but this is no longer always the case. However, whoever the client approaches they will begin the process of establishing a professional-client relationship.

The professionals who offer their services to the client come from different backgrounds, partly influenced by the historical development of their profession, but also influenced by their education and training.

Mintzberg (1983b) highlights the following problem facing clients when selecting professionals:

"No two professionals are equally skilled. So the client who is forced to choose among them - to choose in ignorance, since he seeks professional help precisely because he lacks specialised knowledge to help himself - is exposed to a kind of Russian Roulette."



The issue to consider here is that if professionals skills are not equal one needs to consider how professionals go about defining an appropriate solution to clients' problems.

Mintzberg (1983b) also comments on this issue stating that:

"The professional confuses the needs of his clients with the skills he has to offer them. He simply concentrates on the program he favours to the exclusion of all others - perhaps because he does it best or simply enjoys it most."

With a number of different construction professionals offering advice services to clients this variation of skills may lead to the client being offered the professional's preferred program. If the client were to approach a number of professionals from different disciplines he may be offered different solutions, or programs, for his problem.

Having considered the two parties involved in the process: clients and professionals, one needs to investigate the interaction process between them.

Both parties have a part to play in the interaction procedure if the objective is to achieve an appropriate solution. Canter and Brown (1981) make the following comments on the roles of clients and professionals. On clients they state:

"The client has unique information on the events and their causes which it is necessary for the professional to use as the starting point in his investigation."

With regard to professionals they say:

"All professional groups require accounts from their clients, couched in ordinary language as the starting point for their professional services."

This research seeks to examine the issues raised in this section.

1.3 RESEARCH OBJECTIVES

The aim of this research is:



Problem Statement

To investigate the interaction process between clients and construction professionals during the early stages of a project's development."

The major objective of the research is to determine whether different types of clients and construction professionals exhibit different interaction characteristics, both in terms of how they interact and the subject matter of their interactions.

This process involves two parties: a client and some form of construction professional. To understand this process one needs to develop an understanding of the characteristics of both parties, and the interaction which takes place between them.

Therefore the research seeks to test the following four hypotheses:



- 1. The way in which potential building clients and construction professionals interact is a function of the client's previous experience of construction.**

2. **Inexperienced clients tend to be dominated by the professionals they are interacting with who determine the interaction process.**
3. **Experienced clients tend to dominate the professionals they are interacting with and determine the interaction process.**
4. **The interaction process between inexperienced clients and construction professionals is determined by the professional discipline of the professional with whom they are interacting.**

1.4 THESIS FORMAT

The thesis is presented in a number of chapters which logically develop the issues being addressed in relation to this investigation. One method considered appropriate to illustrate the interaction process studied was the use of graphical profiles to portray the interaction. Another factor which affects the thesis format is the unstructured data collection method that was adopted which needs to be clearly explained with examples. In addition the use of computer programs to process data creates large amounts of quantitative information. Therefore the graphical representations, and a detailed explanation of the data processing methods adopted, are included as appendices.

Chapter two reviews literature in relation to building clients, and discusses a number of critical areas concerning the client's role in the early stages of establishing his need for a building and defining his requirements in a project brief. The chapter concludes with a series of definitions of client types, developed from the literature review, and summarises important client factors.

Chapter three discusses construction professionals from four selected disciplines. Literature relating to the historical development, education, and social status of the selected professions is reviewed. In addition an analysis of data on subjects studied by the professionals is conducted. Advice offered to clients by professional institutions is reviewed, and the chapter concludes by defining the boundaries of the research investigation and states the research

hypotheses to be tested.

Chapter four describes the development of the research methodology adopted to test the research hypotheses. A number of data collection, processing and analysis methods are discussed, with the method selected being described and detailed.

Chapter five presents the results obtained from the data collected in both quantitative and qualitative formats. Results are presented in the form of text only, with the reader being referred to appropriate appendices to study graphical representations of the data.

Chapter six states the conclusions of the research, including presenting results of the analysis in the context of the defined hypotheses to determine if they are supported. Finally, suggestions for further research are made.

References lists published material cited in the thesis.

Bibliography presents a list of publications not cited in the thesis, but which have been collected and inspected during the research. Although they are not cited directly in the thesis they have helped to shape the researcher's ideas and views on the subject. Their inclusion may also assist other researchers interested in areas related to this investigation.

Appendix One provides information on the case studies conducted in the data collection phase of the research, including detailing a system of participant identifiers which are used to refer to participants throughout the thesis.

Appendix Two presents an example of the processing and analysis of a set of data relating to one participant in a selected case study.

Appendix Three provides a listing of the coding system developed and used to code interview transcripts.

Appendix Four presents graphical profiles relating to the interaction process in interviews, and provides supplementary information to support the results in textual format presented in chapter five.

Appendix Five presents graphical profiles relating to the sentence context analysis of interviews, and provides supplementary information to support the results in textual format presented in chapter five.

2.0 BUILDING CLIENTS

2.1 INTRODUCTION

The purpose of this chapter is to illustrate the diverse levels of client experience with regard to their level of involvement in construction projects. This, in turn, affects their initial approach and subsequent interaction with construction professionals when seeking advice.

Four areas are examined in this chapter, which relate to the process by which clients go about the process of procuring new buildings. Firstly, the phase in which clients establish a need for a building and begin defining their requirements is discussed. Secondly, the critical role of client representative is considered. Thirdly, the process of developing the client's ideas through to the production of a set of requirements, the project brief, is reviewed, including considering key client requirements which need to be defined in the brief. In the final area the important consideration of client experience is investigated, with definitions of different client types being presented.

2.2 ESTABLISHING THE NEED TO BUILD

Before a client organisation makes a decision that they need to build a building it will be necessary for them to go through a process to establish the need, (Goodacre *et al* (1982a), Graham (1983)), which is likely to involve some form of feasibility study being carried out (Salisbury (1990)). During this study a detailed investigation of the client's organisation will be conducted to establish the key criteria and clearly define the problems to be solved. This study may be carried out by a person within the company or, if the client feels he does not have someone capable of doing this, he may employ an outside consultant, possibly an architect. Some of the larger accountancy practices also offer a feasibility study service to companies considering making changes to their business activity (Fearfield and McCredie (1988)). Indeed, the outcome of such a study might be that a new building may not be the most appropriate solution to the client's needs.

Other consultants may be used, and one option, explored by Canter and Canter (1982), is that of using an environmental psychologist to assist in identifying the client's requirements. An interesting point raised in the Canters work is that it is rare for the users of the environment, the clients, to call in the psychologist directly. They are normally called in by another professional. An example given is that of a design brief, in which they were involved. Their role was to produce a brief for a company's in-house architects which would draw upon advice from each of the 12,000 employees. This investigation was carried out in parallel to a design exercise being conducted by an architectural practice. There was no contact between the psychologist and the external architect. The approach of the psychologist, employed by senior management, was to involve groups of people in exercises to establish components of the organisation and their relationships, and to rate optional interiors and exteriors of the proposed building. From this a summary of spatial relationships and an appearance profile for the building was produced.


In contrast to this the external architects carried out their own process of design development. When their design was presented the Canters made the following comments on it:

"...they did not even recognise the names of the component parts of the organisation, which we had learnt from the workforce, let alone comprehend the spatial relationships we had summarised."

The outcome of the work was that the idea of a new building was shelved, which led to a reorganisation of the company being conducted. This example raises a very important point that the most appropriate solution to a client's perceived need may be to not build at all, making the 'establishing need' phase a very important one.

However, if the client does not invest sufficient time and resources in this initial study, and it is not conducted by a sufficiently knowledgeable person, either in-house or an external consultant, then he is less likely to discover the most appropriate solution to his needs (CIOB (1980), Goodacre *et al* (1982b), Graham (1983), Higgin and Jessop (1965)).

Having made a decision that a building is the most appropriate solution to the client's problem the next stage is to begin defining roles and responsibilities relating to the proposed project. Before seeking advice from external consultants the client organisation needs to establish its own role in the project. A critical role which needs to be established and defined is that of a client representative, to represent the organisation in its dealings with outside parties (Baden Hellard (1988), CIRIA (1987), Mackinder and Marvin (1982), NEDO (1985)).

 In the early stages of developing the client's project, discussions will have to be conducted where the client representative and a construction professional work together to establish the specific requirements for the client's building (NEDO (1988)). In this situation the client will have to communicate information about his company to a construction professional. Each individual will be in possession of unique information. The client will have an in-depth knowledge about his own company and the construction professional will provide input from his knowledge and experience of the construction industry. Therefore an interactive process begins with each party contributing their area of expertise and knowledge to produce a solution which satisfies the client and is considered by the construction professional to be an appropriate answer. The amount of time and effort spent on this process is likely to be related to: the complexity and size of the proposed project, and the client's previous experience of such situations. (Shah (1990)).

Particularly with the inexperienced client, and primarily because of his lack of knowledge about the construction industry, there is a tendency for the onus of responsibility for eliciting requirements from the client being placed upon the professional (Newman *et al* (1981)). Conversely expert clients are in a position to take the responsibility of defining their own requirements based upon their own previous experience. Abbott (1988) refers to this as, '*preprofessionalization*', where expert clients aid in their own diagnosis. As a result of access to their own in-house professional expertise, they have some grasp of the work of the professions whose aid they seek.

A number of factors contribute to the selection of a client representative. Higgin and Jessop (1965) define the role of '*internal sponsor*', suggesting that this should be an architect or surveyor inside the client organisation. Large client organisations, who build frequently, are likely to have in-house professionals to perform this role (NEDO (1988), Turner (1990)). However, the inexperienced client is unlikely to have in-house construction professionals to fulfil this role. Therefore an alternative approach needs to be considered with an appropriate person being identified to adopt the internal sponsor or client representative role. Salisbury (1990) uses the title '*briefing officer*' for this role, stressing that:

"He needs to be a person of the right calibre, knowledgeable about the special nature of the organisation, with the capacity to coordinate, adjudicate and communicate."

Salisbury goes on to present a job description of the briefing officer detailing areas such as: purpose, operations and responsibilities, education, qualifications and experience. Problems may be encountered if the client representative does not have a sufficiently high level of status in the organisation (Newman *et al* (1981), O'Reilly and Brewer (1985)). In addition, he should also be given sufficient authority to make decisions, be able to devote enough time to the project and be the single point of client contact with external advisors (Glaser (1972), Hudson *et al* (1991), NEDO (1988), Turner (1990)).

The client representative has a crucial role to play in any construction project. Key characteristics of the role have been defined, which should apply to all representatives.

However, the greatest variable, which is likely to influence their interaction with construction professionals, is their previous experience of being involved in building projects.

2.4 THE BRIEFING PROCESS

Before a final choice is made on how to proceed further with the building process a procedure has to be implemented to determine the precise requirements of the client in relation to the creation of his solution. This stage is the '*briefing*' process, which is a critical phase in the project's development. If it is not carried out correctly, it may lead to future

uncertainty, misunderstanding and poor standards (NEDO (1978), Ratcliffe and Poulson (1985)).

O'Reilly (1987), in a guide to briefing published by the Building Research Establishment (BRE), makes the following observation:

✓ "Defining requirements, and their communication to others is the root of good briefing. Value for money depends on this being done. Deciding on a final design or other solution before making a full assessment of the clients' and users needs and problems may prove very costly."

✓ O'Reilly then states that the attributes of a good brief are: clarity, priorities, consistency, completeness, realism, relevance, logical structure and presentation, flexibility and scope.

A director of IDC is quoted in an article in Contract Journal, by Swan (1987), concerning the great variation of initial approaches from potential clients:

"Some come in with the brief on the back of a cigarette packet, others with a pile of documents to rival St Paul's epistle to the Romans."

These views are confirmed in the report by NEDO (1988) which states that the level of detail initially provided by clients is very variable.

The briefing process is considered to be very much a two-way procedure and the client has an important part to play in it. The standard of the service that the client receives relates to the amount of effort expended by him in establishing a good brief at the start (NEDO (1978)). Some clients may feel that they can walk away after employing a professional to produce a building for them. Blackmore (1990) describes this as the, '*hands off...leave it to the expert*' approach, suggesting that:

"...this type of attitude...goes a long way towards explaining the large number of unsatisfactory buildings around us."

Bernard Hodgson, of Bovis, made the following statement on this point regarding the client's role after he has commissioned a building (Building (1981)):

" He hasn't the right to expect....that he can go away to the Bahamas for a couple of years and expect his project to become a finished reality."

In the same article Len Connor, then chairman of the Association of Project Managers, commented:

"....the briefing process begins when the client begins to think about his project and does not end until everything in the building is in place."

These views are supported, in particular, by Walker (1980) in his comments on the importance of the integration of the client and the process of building provision, and by NEDO (1983) with regard to the essential contribution necessary from clients to making a success of their projects.

An RICS pilot study, reported by Graham (1983), found that a disappointingly high percentage of clients' briefs were not sufficiently explicit. In fact, 53 percent of clients' briefs were rated as being fair or poor. This led to poor tender information and poor site performance, with consequent delay and expense. Therefore it is widely agreed that a clear and well defined brief is crucial from the outset so that the following phases of the process of procuring a building are more likely to be successful. It can also contribute to reducing conflict as the project develops further (Baden Hellard (1988), Gardiner and Simmons (1992)).

The level of experience of the client will influence the nature of the briefing process. Expert clients have standard briefs which cover both building aspects and procurement philosophies (NEDO (1988)). However, briefing for the inexperienced client is more problematic. Higgin and Jessop (1965) state that one area of difficulty for them is exploring and reconciling conflicting internal needs.

2.4.1 Defining Client Requirements

Briefing concerns the definition of client requirements for a particular project. O'Reilly (1987) states three areas which a good brief should provide a balanced statement of: *aims* (ends, goals, objectives), *resources* (people, finance, time) and *context* (historical, environmental, legal). Blackmore (1990) quotes conclusions reached by The Cambridge Building Forum that:

"...the factor which most affects profitability is the incompetence of many clients in establishing their requirements..."

A number of publications state lists of factors which need to be considered when a client is formulating his brief and finalising his requirements (Bennett (1983), Bennett and Flanagan (1983), CIRIA (1987), CSSC (1988), Goodacre *et al* (1982a, 1982b), Mackinder and Marvin (1982), O'Reilly (1987), Salisbury (1990), Walker (1989)). Other publications relate specific factors to the selection of appropriate procurement systems (Barnes (1988), CIRIA (1985a, 1985b, 1985c, 1985d), Franks (1990), Masterman (1992), NEDO (1985), Turner (1990)). From this published material three primary factors emerge, which are stated most frequently: time, cost and quality. However, there are many other issues which need to be discussed at this stage. Decisions made on other factors will clearly have implications relating to one or all of the three primary factors stated above. For instance a client may decide that he must have marble wall panels internally. Delivery of such a special material may have timescale implications, the cost will be higher than more conventional materials and the quality requirement is also likely to be high, both in terms of the material itself and the workmanship of fixing it in position. To concentrate the contents of a brief on a statement of these three primary factors alone is clearly insufficient. As Masterman (1992) states, time, cost and quality remain the primary criteria but do not reflect more subtle, numerous and important secondary criteria. One such decision might be whether the building or the process housed within it are of primary importance to the client (Rimmer (1990)). In addition, the ranking of client priorities will depend upon the type of project and the type of client (Rowlinson and Newcombe (1984), Salisbury (1990)).

Before discussing factors which influence how client organisations interact with members of the construction industry, one needs to consider such clients as organisations in their own right. Walker (1989) illustrates a general model of an organisation as an open system consisting of a system of: 'input' (information, energy, material), 'transformation' (by people and/or machines) and 'output' (products and/or services). Therefore the organisation receives input from, and returns its output to its environment, the society in which it functions. In addition there are a number of external environmental influences: political, legal, institutional, sociological, technological and economic, which will affect the way in which an organisation is able to function (Hancock (1987), Mintzberg (1983a), Walker (1980)). Having outlined the organisational system, and its environmental influences, the way in which the organisation is managed should also be considered. Walker (1989) defines a management system of an organisation comprising of four interacting sub-systems: 'organisation', 'behavioural', 'technical' and 'decision-making', and states:

"The implication of this scenario is that analysis of the technical system will produce a systematic picture of the task and task relationships of an organisation to which the other sub-systems relate."

Therefore organisations, irrespective of whether their output is product (eg. cars) or service (eg. banking, accountancy) oriented, will have their own customers who consume their output. Consequently an organisation will possess an expertise in a particular area, and will develop specific skills and generate its own knowledge-base, possibly in a professional discipline in its own right; such as accountancy, legal practice or health care. If one considers an organisation to be such a professional discipline, then its claim to authority, or expertise in a particular area, is substantially based upon its ability to manifest its specialist knowledge in its interactions with its clients (Schön (1983)).

Clearly every organisation develops an expertise in a particular area and should be considered as 'experienced' in that field. In the context of this research the experience of a client organisation is important when considering their building requirements. The way in which

they function, and how they are able to communicate their building objectives to construction professionals (Schön (1983)), will heavily influence how the client organisational system and the construction process system are integrated. As Walker (1989) states:

"There are...two systems involved, that of the client and that of the construction process, and they become joined temporarily for the duration of the project. The construction process becomes a temporary sub-system of the client's organisation..."

Having established that organisations are experienced in their own field of work it is now necessary to consider in more detail how such organisations, when contemplating becoming customers of the construction industry, are likely to interact with its professional representatives, concentrating in particular on the organisation's level of construction experience.

2.5.1 Client Construction Experience

Client organisations are undoubtedly diverse in terms of their construction-related expertise. Blackmore (1990) suggests that there is no one definition of '*a client*' as such, and quotes John Brandenburger, a founder member of Ove Arup, as saying:

"clients are simply an assorted collection of men and women seeking advice from a member of one or more of the professions."

However, most of the literature devoted to classifying clients tends to concentrate on their prime business functions. A survey by Newman *et al* (1981) produced a list of 18 client types, such as: private commercial, industrial, developers, leisure, education, hospitals and public authorities, and divided some of these into more specific sub-groups. For example, the public sector includes hospital boards, health authorities, central government and local authorities. There are also different client sectors, primarily with the distinction between public and private sectors. Although the public sector is concerned with a wide range of construction work the main difference is that, in the vast majority of cases, the public sector authorities employ in-house professionals to assist and monitor project development. Such

clients are therefore experienced in construction. They do, however, have very distinct characteristics. Many of these are caused by the need for public accountability so there is a tendency to use forms of contract, such as traditional tendering, where direct comparisons can be made (Hancock (1987), Turner (1990)).

The level of experience of clients will greatly influence the method they use to appoint some form of advisor to assist in the development of their building requirements (Hillebrandt (1984), Morledge (1987)). For example, large client organisations who have built before, or build frequently, can use past experience, or may even employ in-house advisers with construction expertise (Masterman (1992)). Most problems arise with a client who has little or no previous experience of building, and has no in-house expertise in this area to assist him in his decision-making process (NEDO (1983), Sidwell (1982)).

In this situation the client organisation, having reached a decision that a building is required, seeks to procure construction-related services from the market place. Winch (1989) uses the term '*project coalition*' to describe the formation of a temporary organisation involving both the client and professionals, within which transactions have to be conducted. The work of Williamson (1975) is relevant to this situation, as it examines the organisation of economic activity within and between the two alternative ways of conducting transactions: markets and hierarchies. He suggests that organisations arise because they lower the costs of transactions, and sees society as a network of transactions. Such transactions are conducted either in a market or within an organisation (a hierarchy), with the mode used being dependent upon: the information available and the costs to transacting parties of adding to that information should they require more. Therefore transactions are brought within the hierarchical structures of organisations when the market mode is no longer efficient, or organisations are set up to transact within themselves business that might alternatively have been conducted by separate parties contracting between themselves in market terms.

Williamson (1975) puts forward an '*organisational failures framework*', which attempts to assess the efficacy of completing related sets of transactions across a market or within a firm. The transaction mode adopted depends upon a condition that Williamson calls, '*information impactedness*', which:

"...exists in circumstances in which one of the parties to an exchange is much better informed than is the other regarding underlying conditions germane to the trade, and the second party cannot achieve information parity except at great cost."

This condition is derived from two pairs of factors: human and environmental. Human '*bounded rationality*' is paired with environmental '*uncertainty / complexity*', and human '*opportunism*' with '*number of parties*' in the environment. When these pairs of factors are joined together conditions of greater or lesser '*information impactedness*' occur which lead to a market or hierarchy situation. Both of these pairs of factors will now be discussed.

Bounded rationality was originally defined in the work of Simon (1957) as:

"The capacity of the human mind for formulating and solving complex problems is very small compared to the size of the problems whose solution is required for objectively rational behavior in the real world."

Therefore the limitations of mental capacity, skills and language lead to each party in a transaction operating within its own bounded rationality. For example, a client at an early stage in the development of his project, and with no previous experience of constructing buildings, will be limited in terms of his mental capacity and language relating to defining his requirements for a building and communicating them to another party.

Uncertainty / complexity is the environmental factor paired with bounded rationality. If a client were able to specify precisely at the outset of his project his requirements, and possesses full rationality, then he would be in a position to stipulate to construction professionals all actions required to achieve his objective. However, it is virtually impossible to determine every alternative decision taking into account varying circumstances and the nature of the parties involved in the transaction. Therefore *bounded rationality*, confronted with *uncertainty / complexity*, results in *information impactedness*.

Human *opportunism* concerns the manipulation of information to self-advantage. A party in a transaction may present information in a favourable form, or may resort to misrepresentation. If such opportunistic events occur in a situation where there are a small *number of parties* in the transaction situation *information impactedness* will result. If there were a large number of parties in a particular situation opportunist inclinations would be frustrated because of greater choice.

Therefore having considered the human and environmental factors, and their relationships, it can be seen that it is the relative cost of overcoming information impactedness that determines whether transactions are conducted through markets or within organisations.

For the purposes of this research, within the context of considering client construction experience, one needs to consider how client organisations conduct their transactions in relation to their building needs. As has been previously discussed in this section, large client organisations may have in-house construction expertise to draw upon, leading to a greater proportion of transactions being conducted within their organisations, as opposed to in the market, particularly with regard to defining requirements and the selection of a procurement route. However, the client with no previous construction experience, and therefore limited rationality and a higher degree of uncertainty in the situation, will need to conduct their transactions with construction professionals in the market for professional services to establish a *project coalition*.

2.6 DEFINING LEVELS OF CLIENT CONSTRUCTION EXPERIENCE

The next area to consider is that different levels of client construction experience exist. Higgin and Jessop (1965) state that when the client decides to build decisions made during the earliest phase will determine the sorts of approaches made to members of the building industry. They go on to distinguish between levels of sophistication of clients and categorise them into the following sectors:

- (1) **SOPHISTICATED** - "a person or organisation who knows a good deal, usually from experience, about the building process and of the contributions of the various members of the building team."
- (2) **NAIVE** - "the organisation which has not built before, or not for some time, or the individual who knows little or nothing of building."

With regard to the naive client they suggest that he will seek some advice, but his initial move is made from a point of some ignorance. Because of his limited construction experience he has no choice but to approach the construction market for assistance (Williamson (1975)). Whatever his decision, it will have an important effect upon the nature of the building team that follows, and upon the pattern of communications it will develop. This point is supported by NEDO (1978) who state that the inexperienced client will be influenced in his choice by his first point of contact with the industry.

② In their report, comparing the contractual arrangements in the USA and UK construction industries, Nahapiet and Nahapiet (1984) considered that the needs of clients are likely to be influenced by two important characteristics:

- ②
- (i) Whether they are primary or secondary constructors.
 - (ii) Their level of project experience.

Their definitions of primary and secondary constructors are as follows:

- (1) **PRIMARY** - "those clients, such as property developers, whose main business and primary income derive from constructing buildings."

- (2) **SECONDARY** - "those for whom expenditure on constructing buildings is a small percentage of their total turnover and for whom buildings are necessary in order to undertake some other business activity, such as manufacturing."

These definitions, of client characteristics, cannot be directly related to the level of experience of particular clients, which is why the level of project experience has been included as the other essential characteristic. Client experience is defined by the Nahapiets as the client having constructed two or more buildings previously.

For example, one might consider the case of a client such as a large airport authority. Using Nahapiets' defined characteristics they would be categorised as a secondary constructor as their expenditure on buildings would be low when compared with their total turnover. However, their level of project experience is likely to be high, in specialist areas such as new terminal buildings and other associated works. This could be contrasted with a small company who are planning to expand their operations by constructing a new building, who would also be secondary constructors but would have no previous project experience. Their approach to procuring a new building would have to be a more cautious one.

Newman *et al* (1981), from their survey of the briefing process, also put forward a series of client types as follows:

(a) **Once in a lifetime / inexperienced.**

"...a group of clients who usually require a fairly small building and in many cases this is the only time they commission an architect...characterised by their lack of knowledge about the total building process, the architect's role in this and what is required of them during briefing."

(b) **Regular / repeat.**

"...large or small organisations regularly commission the same private architects...initially have little knowledge about briefing, but gain this through the experience of working with the same architect."

(c) **Expert.**

"...client who has detailed knowledge not only about his requirements for a building but also about the building process."

(d) **Special.**

"...clients who require a building which is special in some way...usually large, prestigious."

Bennett and Flanagan (1983) suggest a classification of clients into the following 5 types:

- (a) Public and private sector clients who commission building work only once in their life.
- (b) Public and private sector clients who commission building work infrequently, say, every 4-5 years.
- (c) Public and private sector clients who have a large ongoing development programme.
- (d) Public and private sector clients who have a large ongoing development programme and have in-house consultants to provide professional services.
- (e) International private sector companies based overseas who wish to commission a UK building.

It can be seen that certain distinctions need to be made in the level of experience of potential building clients. A number of definitions have been put forward by authors such as Higgin and Jessop (1965), Nahapiet and Nahapiet (1984), Newman *et al* (1981) and Bennett and Flanagan (1983). An important issue to raise at this point is that to categorise a client as experienced cannot solely be based upon the premise that they have previous experience of building alone. The critical factor in such a case is whether a client organisation have previous experience of a particular type of building. Once again using the example of an airport authority, they may have built up an enormous amount of expertise over the years in

the construction of airport terminal buildings. However, faced with the requirement for a new corporate head office building, the level of previous expertise, within their organisation, of this type of building would be limited in comparison to that of producing terminals.

Having considered the established classifications of clients, and considered the factors which determine this classification, definitions of client type, for the purposes of this research are presented. This classification is based on that presented by Nahapiet and Nahapiet (1984), with some revisions and additions.

Therefore it is proposed that the classification of clients should be based upon the following two characteristics:

- (i) Whether they are primary or secondary constructors.
- (ii) Their level of construction experience.

The definitions of constructors are:

- (A) **SECONDARY** - "Clients for whom expenditure on constructing buildings is a small percentage of their total turnover, and for whom buildings are necessary in order to undertake a specific business activity, such as manufacturing."
- (B) **PRIMARY** - "Clients such as property developers, whose main business and primary income derive from constructing buildings."

Levels of construction experience are defined as:

- (1) **INEXPERIENCED** - "No recent and relevant experience of constructing buildings, with no established access to construction expertise."
- (2) **EXPERIENCED** - "Recent and relevant experience of constructing certain types of buildings, with established access to construction expertise either in-house or externally."

The words, '*certain types*' have been incorporated into the definition of 'EXPERIENCED' because of the previously discussed issue of building up expertise relating to a specific building type. The definitions of construction experience have been derived, partly from Higgin and Jessop's (1965) concept of sophisticated and naive client sectors, but also take into account the previous discussion concerning client access to construction expertise.

When these two characteristics are considered together the following four alternative client types are produced:

- (A1) **SECONDARY INEXPERIENCED**
- (A2) **SECONDARY EXPERIENCED**
- (B1) **PRIMARY INEXPERIENCED**
- (B2) **PRIMARY EXPERIENCED**

† These classifications will be discussed in more detail in the following sub-sections, with the exception of primary inexperienced. An organisation whose main business and primary income derive from constructing buildings are very unlikely to have no relevant and recent access to construction expertise. The case study material used by the Nahapiets (1984) shows no evidence of clients classified as primary inexperienced. Therefore this classification is excluded from further discussion.

It must be acknowledged that these categories cannot encompass 'all' clients. The objective of making such a classification is to establish some critical datum points.

2.6.1 The Secondary Inexperienced Client

A number of reports and articles have highlighted the difficulties encountered by inexperienced clients when approaching the construction industry for advice (Bennett (1983), Bennie (1985), Building (1983), NEDO (1983), Newman *et al* (1981)). At the beginning of his study of the construction industry in the United States, Glaser (1972) makes the following observation on the interaction between laymen (inexperienced clients) and experts (subcontractors):

"We live in a society of laymen who devotedly bow to the wisdoms and whims of experts by complying with their orders and following their advice. The patsys (laymen), the know nothings, turn to the experts, the know-it-alls, for help, service and work. The patsys have no training and little experience and the experts have both...The patsy will give, in short, the expert power over their working relationship."

The following comments are made by Moore (1985) in an article looking at changes in contractual arrangements available to clients:

"...many clients remain ignorant of the industry's abilities to meet their demands....and while the client is being offered the opportunity to achieve improved performance, there is still a gap in the industry's attempt to educate the inexperienced client."

These quotations present viewpoints which relate to: the client / professional relationship, the problem of communicating information and advice on the various services the construction industry has to offer to potential clients, in particular the inexperienced ones. In addition, considering Williamson's '*organisational failures framework*' (Williamson (1975)), such clients possess limited construction information within their own organisations and exhibit limited rationality and a high degree of uncertainty. Therefore they have no alternative but to approach the construction market to obtain professional services.

When the inexperienced client makes the decision that he needs a building he then needs to find advice on the people he requires to assist him in obtaining the building (Swan (1987)). Higgin and Jessop (1965) state that this move is made from a point of almost complete ignorance. This initial move for advice also affects the client in that he will be considerably influenced in his choice of method by his first point of contact with the industry (Goodacre *et al* (1982b), NEDO (1978, 1988)). The report by NEDO (1978) gives figures from its survey of clients that 25 percent had been approached by the industry and 13 percent had approached the industry themselves. There is no indication as to how the remaining 62 percent made their contact with the industry.

The most common first approach point to the construction industry, by the inexperienced client, is to an architect (NEDO (1983, 1988)). Indeed, the client may identify this contact informally via other business contacts (Glaser (1972), Higgin and Jessop (1965)). For example, a business acquaintance may recommend an architect who has previously designed a building for them. The danger here is that this point of contact may lead to the client getting a similar building to his business acquaintance using the same method. However, this may not be the most appropriate solution as the two clients may have very different sets of building requirements. If such a process were followed the client may be satisfied with the completed building simply because it was the only option presented to him.

The above point, concerning client satisfaction, is supported by a report by NEDO (1974) which estimated that over half of the 20,000 or so clients, who each year obtain industrial or commercial buildings, had no experience of the construction industry during the previous five years. The report also conducted a survey of 2,936 factory and office clients which showed that nearly one in five were dissatisfied with the service they had received from the industry. This would produce a figure of 2,000 dissatisfied inexperienced clients per annum.

This fact can be considered from two different viewpoints in connection with the figure of 2,000 dissatisfied inexperienced clients. Firstly, the real figure could be less than 2,000 because the client dissatisfaction could be unfounded due to his inexperience. He may have got the best service possible from the industry, but because of his inexperience he did not realise it (NEDO (1978)). Secondly, the figure could be an underestimate of dissatisfaction.

✓ The client could have been satisfied with the outcome of his project through a lack of knowledge of any other alternatives. If he had known about other alternatives, with potentially different outcomes, he may have then been dissatisfied (NEDO (1974)).

2.6.2 The Secondary Experienced Client

Many business organisations require some form of premises within which they perform their business function. They may range from multinational companies to small industrial concerns. Therefore their prime business function is not solely related to constructing buildings.

Newman *et al* (1981), in their client category of regular/repeat, described earlier in this chapter, state that this type of client may regularly commission buildings of the same type with the major variable being the size of the project. This point can be illustrated by reference to the auto centre company, case study 2, who took part in the research interviews for this project. They have built up an expertise in building tyre and exhaust centres over a number of years and have developed a brief detailing building requirements for their type of building, with the one main variable being the size of the building, ranging from 3,000 to 15,000 square feet of floor area. Such clients build up an in-house expertise of a type of building engaging external professionals on a long-term basis to work on projects with them, in addition to having in-house experts (CSSC (1990)). Therefore much of the development of their projects, particularly in the early stages, is conducted within their own organisations. Because of their previous experience they exhibit high degrees of rationality and certainty, and are not as dependent on the construction market, as the inexperienced client, to conduct their transactions (Williamson (1975)).

However, secondary experienced clients need to understand the limitations of their own construction expertise. For example, when faced with a new type of building to construct, the client may need to investigate different methods and standards and identify new professionals outside of their previous area of experience. In such a situation clients may find themselves in a relatively inexperienced situation. However, experience gained in another type of building may prove advantageous in terms of a level of understanding of the building process as well as established contacts with construction professionals. One major

disadvantage could be that the client may adopt an identical approach to obtaining their building, based upon their previous experience. Such an approach may be inappropriate in the situation where a different type of building is required. For example, an architect with years of experience of designing airport terminal buildings may not be the most appropriate person to design a new corporate head office building. The following comment, resulting from a survey by Bresnen and Haslam (1991) of construction clients, confirms this point:

"...a process of habituation may have occurred by which traditionally selected arrangements, having served their purpose, are re-selected in preference to the uncertainty and disturbance that may ensue with a departure from normal practice."

Therefore it is important that secondary experienced clients recognise the boundaries of their construction expertise. Should a requirement arise for a building type outside of their normal scope of work, the approach which they adopt should not necessarily follow their historically established procedures.

2.6.3 The Primary Experienced Client

There has been a large growth in institutional investment, over the last decade, in property. Organisations such as pension funds and insurance companies now invest large capital sums in property development. Such organisations will employ professionals with experience of construction to represent them in looking after their interests in any projects that they are involved in, selecting staff and defining authority (Salisbury (1990)). They will go to great lengths to achieve their exact requirements (NEDO (1983)).

It is from this particular area that dissatisfaction with the established traditional approaches to buying design and construction has led to certain alterations being proposed. The British Property Federation (BPF), which consists of large property development companies, published its own manual, (BPF (1983)), in 1983 which lays down a procedural system to be followed. This manual is an example of a system, produced by a client dominated body, that lays down procedures for the construction industry to follow. Prior to this, clients who have approached the industry have had various established alternatives from which to choose.

Bennett and Flanagan (1983) put forward the following point to illustrate what, in effect, clients who approached the industry for its products were told:

"Here is the pitch, all the guidelines are marked out and this is the rule book - let the game (battle) commence."

It was the large clients dissatisfaction with the pitch, guidelines and rule book put forward by the construction industry that led to them producing their own set of rules. These large clients are fortunate enough to be in a position where they can put forward such changes (Building Contractor (1987)). They have the purchasing power to influence the industry. A recent example of this is that of Olympia and York, developers of Canary Wharf in London, who decided to take direct control of the management of their major tower building, switching from Management Contracting to the Construction Management approach (New Builder (1990)).

In addition, primary experienced clients possess construction management and control expertise and, with the assistance of in-house professionals, have a clear understanding of their contribution to the process. This includes their ability to produce comprehensive briefs and prioritizing their objectives, along with a desire for detailed, consistent and continuing involvement throughout the project (Masterman (1992), NEDO (1988)).

2.7 SUMMARY

The first area discussed in this chapter was that of the client establishing a building need. These early activities are considered to be crucial to the success of a project in that they will have a major influence upon how the project develops in the future (Cherns and Bryant (1984)). The client has an important role to play in his project and therefore needs to invest sufficient time to these activities as well as participating actively in the process.

The importance of the selection and contribution of a client representative has been established. Also personal characteristics that such a person should possess have been identified. The role, responsibilities and expertise of the client representative must be

understood and acknowledged by both the external professionals and the client organisation which he is representing.

The production of a clear and concise brief is crucial to the success of any construction project. Both the client and professionals need to contribute their knowledge and expertise to its production. In the brief essential project factors should be explicitly stated at both a primary: time, cost, quality, and secondary level.

The final area relates to the concept of previous client experience in relation to construction projects. Many authors have acknowledged that a range of clients exist and certain classifications of client types have been produced. This diversity of clients undoubtedly affects the nature of clients interaction with professionals during the early phases of the procurement of their buildings. At one end of the client spectrum the secondary inexperienced client has the greatest need for assistance. However, this type of client is fairly easily identified. Perhaps the greatest diversity comes within the client category secondary experienced. Many of these clients are likely to build up expertise in procuring a particular type of building to house their operations, with size of facility being the main variable. This leads to clearly defined requirements with possible long-term contact with professional advisors. However, should such a client produce a requirement for a different type of building the defined standards, processes and professional advisors may no longer be appropriate. Therefore previous experience of a type of building is a key concept. The most specific client classification is that of primary experienced. Taking property developers as an example of such a client, their prime business function is to build buildings, normally of a particular type, such as offices. They will have clearly defined requirements and procedures, including the appointment of professional advisors.

Considering Williamson's '*organisational failures framework*' (Williamson (1975)), all clients, irrespective of previous construction experience, interact with the construction market in pursuit of their building objectives. However, they differ in the degree to which they use the market. The cost to small secondary inexperienced clients of conducting transactions within their own organisation is likely to be prohibitive, and therefore they must seek information from the market. Conversely, both secondary experienced and primary

experienced clients have detailed information available to them, and are therefore able to define precisely their building requirements and the professional services they need within their organisation, before approaching the market.

Therefore the most influential factor with regard to the client's role in a construction project is that of previous experience of the construction process.

Having discussed building clients in this chapter the following tentative hypothesis is presented:

"The nature of the interaction process between clients and construction professionals is determined by the clients' previous experience of involvement in construction projects."

3.0 CONSTRUCTION PROFESSIONALS

3.1 INTRODUCTION

The purpose of this chapter is to investigate the roles of the different construction professionals. It focuses, in particular, on the factors which influence their interaction with potential clients, with the varying levels of previous experience defined in the preceding chapter.

A number of areas relating to each profession will be considered in this chapter. Its major objective is to identify differences between professional groups which influence their behaviour when advising potential clients. Firstly, the historical development of each profession is examined. Secondly, the nature of the education system followed by the professions is considered. The third area investigated is that of social status with regard to role expectation, the definition of what constitutes professional work and the professionals views of themselves and of others. The advice offered to potential clients by the different professions is examined in terms of advice services available from the various professional institutions, as such institutions lay down rules and procedures for their professional members to follow. In addition other published guidance for clients, and its dissemination, is discussed. Finally the boundaries of this research investigation are discussed and defined.

On any construction project a number of professionals from different disciplines will be brought together to produce a building which is intended to satisfy their clients' requirements. Each professional will have a specialised input to the project which will be influenced by various factors. Certain rules and procedures which have developed over time will govern the way in which the different professionals will react to a project in terms of the specific information which people within the profession deal with as part of their particular role (Canter (1974)). For example it might be expected that the architect would concentrate on the aesthetics and functional use of space (Derbyshire (1972)), the quantity surveyor giving cost advice, the engineer considering structural elements and foundations and the contractor looking at the practical aspects of constructing the building and also managing the construction process (Canter (1974), Derbyshire (1972)). Therefore each profession has

a certain area of expertise to offer. Factors that contribute to such expertise are: apparent competence, relevant education, special training and experience, history of success in solving problems, seniority, status and prestige (McGuire (1969), Simons *et al* (1970), Strong (1968), Tedeschi and Lindskold (1976)).

Four professional disciplines will be considered in this chapter: architects, quantity surveyors, consulting engineers and contractors. Other professions could be considered such as, accountants, building surveyors and services engineers. Accountants may be involved in the early stages advising clients on financial issues but are unlikely to possess sufficient expertise in construction matters to assist the client in detail. The building surveyors traditional function relates to providing expertise on structural matters and refurbishment, mainly relating to existing buildings (Woodward (1991)). The role of services engineers, both mechanical and electrical, is becoming more prominent as services installed in buildings become more sophisticated (C.S.S.C. (1988)). However, unless a building is heavily serviced, such as a laboratory facility, the services engineer is unlikely to be appointed as the primary client advisor.

Therefore the four professional disciplines have been selected as they represent the main construction parties which a potential client is likely to approach for initial advice (Hewitt (1985)). For example, the RIBA '*plan of work*', (R.I.B.A. (1973)), defines the functions and responsibilities of the selected four disciplines, which confirms their prominence and importance in the situation under investigation in this thesis.

3.2 HISTORICAL DEVELOPMENT OF THE PROFESSIONS

The following sections examine the history of the development of the four professions being investigated. After each professional group has been examined individually a summary is presented raising issues concerning how these professionals fit into the structure of the construction industry today with particular reference to their interaction with potential clients.

3.2.1 Architects

Up to the middle of the eighteenth century it was common practice for the client or his architect to employ each building craft directly. Also it was not unusual for the architect to combine the functions of designer and contractor, where he would be involved in a profit or loss in connection with the provision of materials, labour and supervision (Higgin and Jessop (1965)). In contrast to their role in the traditional system today the architect was commonly responsible for the organisation of building work as well as its design. At this time fashionable architects ranked alongside fashionable artists (Jenkins (1961)).

In 1791 self-consciousness within the architectural profession led to the forming of a club and a suggested registration of architects. At this time, in response to the demands of the wealthy classes, architects considered themselves to be solely concerned with design and supervision only. Organisation of the actual building process could be viewed as a chore, and a waste of artistic talent, that could be delegated to others (Bowley (1966)). In 1834 the Institute of British Architects was founded, received its charter in 1837, and in 1866 became, by Royal Command the Royal Institute of British Architects (RIBA). In its Address and Regulations of 1835 the main principles of the institute were outlined as being:

"...for facilitating the acquirement of architectural knowledge, for the promotion of the different branches of science connected with it, and for establishing a uniformity and respectability of practice in the profession."

The separation between design and construction was increased when in 1887 a supplementary charter of the RIBA laid down that no member could hold a profit-making position in the building industry. This move precluded architects from working for building contracting organisations in senior positions. At this time they also produced a scale of fees, to be charged to cover the cost of their services, in terms of a percentage of the project value. The charter also included proposals for a system of examinations and courses of education for all those entering the profession, and before the first world war architecture became an organised profession with recognised schools and examinations.

This step was in line with other professions, but helped to create a problem in the relationships between architects and engineers. At the end of the eighteenth century the increased use of materials such as iron and the requirements of industrial buildings meant that engineers became more involved in design, with the architect having to take a reduced role, perhaps being used only to deal with the appearance of buildings. The development of modern building methods made architects technically dependent upon engineers.

The architectural profession went through a period of substantial growth between 1910 and 1940, with RIBA membership increasing from 2,300 to 8,800. After the second world war there was an urgent demand to replace lost building stock. At this time the public sector was a large growth area, with large public authorities emerging such as the National Health Service in 1948, and a number of industries being nationalized in 1949. Between 1939 and 1948 the number of RIBA members working for local authorities increased by 25 percent.

In the 1960's a growing number of technicians and unqualified assistants were employed by architects, and the Society of Architectural and Associated Technicians (S.A.A.T.) was established in 1965 with the blessing of the RIBA.

In the 1980's a number of changes have become apparent. The RIBA revoked its 1887 supplementary charter, allowing architects to be involved in building companies in a profit-making capacity. Therefore the historical barrier between the architect as designer, and the contractor as constructor was removed, freeing architectural professionals to link with contractors, and other professionals, to offer combined services to clients. This relationship can take the form of multidisciplinary practices and package deal, or design and build, organisations.

Also the growth of alternative procurement methods now being offered to clients, in addition to the traditional approach to obtaining buildings, such as management contracting and construction management, involve architects and builders as part of a team working together, with other professionals, using their individual skills, for the benefit of the client. For example in the design and build method architects can find themselves no longer playing their traditional role of team leader, but being in a supporting role to, and being managed by, the

contractor (Building (1985), Chappell (1991), Robinson (1987)).

There is still criticism of architects that they lack a professional understanding of management and their practical knowledge is less than it should be (Canter (1974), Hillebrandt (1984), NEDO (1983), Powell (1980), Turner (1990)). The developer Stuart Lipton has commented that architects are, on one hand, trained to do many tasks but, on the other hand they are not really equipped to do 'all' tasks (Architects Journal (1986a)). Hammond (1982), writing on the theme of professional project management, suggests that architects should be concerned with design, assembly of components and understanding the economics of the construction process, and that they are generally not in a position to interpret a client's brief or supervise the construction project from its inception.

The architect no longer holds the exclusive position of client advisor, team leader and manager of construction projects (C.S.S.C. (1988)). Within traditionally arranged projects the architect is still the 'lead consultant', but the proliferation of other procurement methods has led to the architect having to accept differing roles and responsibilities, as well as relinquishing some responsibilities to others. Potential clients seeking advice today may, therefore, consider an approach to an architect as one of a number of options open to them as opposed to being the 'only' option.

3.2.2 Quantity Surveyors

The surveying profession appears to have established itself in the early eighteenth century, although its roots can be traced back to the seventeenth century after the great fire of London in 1666. The volume of work forced architects to focus their attention on design, and therefore a create a need for the measurement function to be conducted by others. The tradesmen employed to carry out the building work: bricklaying, carpentry, plumbing, felt at a disadvantage in relation to the architect, and employed 'measurers' to measure their work and negotiate their payment with the architect. This led to the architects themselves employing measurers to act on their behalf (Higgin and Jessop (1965)).

The next major development was prompted by the outbreak of the Revolutionary and Napoleonic Wars at the end of the eighteenth century, when the '*contracting in gross*' method was introduced. Because of the necessity for speed, coupled with the size of projects, contracts were made with single builders to undertake to build the whole building (Thompson (1968)). A number of builders would be invited to tender for a particular job of work. To produce an estimate for the work each building contractor would produce a bill of quantities, with the production being carried out by a measurer. However, builders soon realised that this method was uneconomical and would be improved if one surveyor was employed, for a particular job, to produce just one bill of quantities, which could be priced by each builder.

Eventually this procedure was revised in that the client appointed directly a surveyor to produce tender documents, and paid for the service directly. Hence the quantity surveying profession became an established part of the general organisation of building work. Surveyors also built up a position as independent experts to be consulted in the case of disputes.

Builders still needed to employ people skilled in surveying disciplines and this led to a separation between surveyors employed by builders and their independent professional counterparts. It appears that before the first world war the independent quantity surveyor began to regard himself as being socially and professionally superior to surveyors employed by builders (Bowley (1966)).

The first representative body, The Institution of Surveyors (forerunner to the RICS), was founded in 1868. In 1881 it received a charter and became the Surveyors Institution, by which name it continued to be known until 1930 when it adopted the title Chartered Surveyors Institution. It was followed by the Quantity Surveyors Association in 1904. In 1907 the RICS instituted the '*contractors rule*' which prohibited its members from being employed by construction firms. This formalised the division, within the profession, between builders and independent quantity surveyors. In 1922 the RICS absorbed the Quantity Surveyors Association, but there was still no place for quantity surveyors employed by builders. Then in 1938 the Institute of Quantity Surveyors (IQS) was founded to represent

builders quantity surveyors. However, unlike the RICS, the IQS was open to all surveyors whoever they were employed by.

The quantity surveying profession, which historically was involved in the compilation of bills of quantities, pricing, agreeing progress of works and settling final accounts, had little involvement in early design decisions. An increasing awareness of total costs, and the growth of large client organisations in the 1940's and 1950's, particularly in the public sector, led to the quantity surveyor becoming involved in new functions such as preliminary estimating, cost planning, value for money in alternative designs and, more recently, life cycle costing.

As Powell (1980) states:

"New concern to predict costs as well as account for them, together with direct appointment of quantity surveyors by sponsors, brought the profession closer to initial decisions about projects, and in doing so enhanced its professional influence."

After over half a century of separation, between professional and builders quantity surveyors, in 1967 the RICS abandoned their '*contractors rule*' which helped to promote a more unified profession. The next stage in the unification process came in March 1983 when the IQS merged with the RICS to form one common body, with a laid-down procedure of examinations and experience for surveyors to follow to obtain full membership.

The quantity surveyors role is still changing today. As Bennett (1986) states, the historical role of the quantity surveyor has been as a lateral coordinator between designers and constructors. This put them in a position to seek to acquire wider management responsibilities. In many of the new procurement methods quantity surveyors are frequently found working as part of a team alongside architects and contractors. In a design and build situation quantity surveyors are very often employed as client advisors to monitor cost aspects of a project (Architects Journal (1986a), Roberts (1986)). [Quantity surveyors have attempted to extend their role, and a number of practices are now promoting themselves as

project managers to act as the client's agent throughout the whole life-cycle of their project (Sparkes (1985)). To provide education and training in the skills necessary for project management, courses have been established such as the RICS backed Diploma in Project Management run by the College of Estate Management (Birchall and Newcombe (1985), Parker (1986b)).

The quantity surveyors role as an independent, neutral advisor has grown in scope and status (N.E.D.O. (1988)). Blackmore (1990) suggests that in the design team they often, '*act as the client's watchdog*', and goes on to clarify their position by stating that:

"It is better for the QS to be regarded as the 'conscience' of the whole project team, ensuring that no member of it, or the client, overlooks the financial implications of his or her actions."

Traditionally the relationship between clients and quantity surveyors has been established following the appointment of an architect. Their primary role has been that of financial managers. However, the emergence of varied procurement systems has provided an opportunity for quantity surveyors to extend their repertoire of services, such as client representative and overall project manager, to offer to clients directly (Luder (1986), R.I.C.S. (1986)).

3.2.3 The Engineer

If one looks at the period of the industrial revolution, the rapid growth of industrialisation and the introduction of new materials led to the establishment of the engineer as an important member in the process of producing a building (Dolan (1979)).

The work of the engineer was increased substantially, not just by their involvement in building structures, such as factories, but in their work on new roads, bridges, the substantial growth of the canal system and, later, the emergence of the railways.

The Institution of Civil Engineers (ICE) was founded in 1818, under the presidency of Thomas Telford, and received its Royal Charter in 1828. The definition of civil engineering

contained in the charter stated that the society was formed for:

"...promoting the acquisition of that species of knowledge which constitutes the profession of a civil engineer, being the art of directing the great sources of power in nature for the use and convenience of man".

Although it was founded to promote the activities of all branches of the profession, some specialist engineers considered that the public, and their own status, would be better served by the formation of separate bodies. At the same time, and unlike the architectural and quantity surveying professions, highly skilled engineers were allowed to be partners in commercial firms, thus gaining a more direct involvement with the practical nature of the industry. Robinson-Palmer (1928) defined the characteristics of an engineer as being:

"...a mediator between the Philosopher and the working Mechanic, and like an interpreter between two foreigners, he must understand the language of both".

Thus the link with commercial firms allowed engineers to maintain links with the more practical side of work as well as being able to continue with the development of specialised theoretical knowledge. Following the establishment of the ICE a number of other specialist associations began to appear, and as the process of specialisation progressed the ICE began to limit itself specifically to construction works such as roads, bridges, tunnels and so on. One such specialist association is the Institution of Mechanical Engineers which was established in 1847, with the famous engineer George Stephenson as its first president. It was followed by the Association of Consulting Engineers (ACE) in 1912, which is not a professional institution but a trade association representing engineers from varying disciplines such as civil, mechanical, electrical, structural and public health. The Concrete Institute, which was founded in 1908, became the Institution of Structural Engineers in 1923. This Institution became incorporated by Royal Charter in 1934.

New types of buildings and the introduction of new materials such as cast iron from around 1800, and mild steel after 1870, meant that the role of the engineer in the design of buildings increased substantially. At the end of the eighteenth century the buildings which utilised iron extensively were designed by engineers. Also innovations in structure and designs for novel and industrial buildings tended to originate with engineers or builders rather than architects. The new methods mostly came from the adaption of techniques originating in bridge building, where performance criteria were deemed to be more important than appearance. An architect might be called in to improve the appearance of a building.

No professional rules prevented engineers being principals of engineering or building firms. But, as Bowley (1966) states, responsibility for design by engineers tended to be separated from responsibility for carrying out the design. When an engineer designed a building the pattern of relations between client, engineer-designer and contractor was essentially the same as that between client, architect and contractor.

At the beginning of the nineteenth century some engineers were of the opinion that there was no place for architects in factory or workshop building for the engineering industry. It was an engineering problem and an engineering job. Bowley (1966) also states that at this time one engineer suggested that modern buildings were essentially engineering problems, and that the engineer, not architect, should be in charge. If architects were required they should be subordinate to engineers. Opinions such as this caused disagreements about the demarcation of professional roles.

Between the wars there came the evolution of new experts in the engineering field. The provision of services in buildings such as central heating, lifts and lighting increased in importance and complexity. Lifts in particular were an important invention in the trend towards the development of multi-storey buildings. This trend led to architects becoming more dependent upon engineers. In fact engineers became essential in the provision of commercial buildings and flats, an area previously dominated by architects. The increasing complexity in the field of services also meant that architects needed the assistance of experts in that specific area. Various developments in the engineering aspects of design and erection of buildings have greatly intensified the importance of engineering techniques at every stage.

The increased importance of engineering knowledge also affects the expertise required in building firms, and there is an advantage for such firms if they have qualified engineers working for them.

It is interesting to look at how the engineering profession today has different roles in building and civil engineering. In civil engineering the engineer adopts the role of team leader, or client's representative, with responsibility for design and execution. When involved in a building project he acts as a specialist consultant under the direction of an architect or, perhaps, some form of project manager.

A major report into the engineering profession in the United Kingdom, chaired by Sir Monty Finniston, published its findings in 1980 (Department of Industry (1980)). It suggested that engineers were not being properly utilised and placed the onus upon engineers themselves to better understand their role in the industry, and to develop their leadership skills. It states:

"...they must learn the art of leadership instead of falling into a subordinate place like well-schooled butlers."

The active involvement of engineers in all phases of projects was also emphasised, along with the adoption of policies relating up-to-date technical knowledge to commercial objectives and customer needs.

Two distinctive roles have emerged for the consulting engineer, firstly in civil engineering projects and, secondly, in building projects. In civil engineering the engineer fulfils the role of client representative. In large public organisations engineers may be employed in-house, or alternatively private practices may be employed. The engineer's responsibilities will cover the overall design and management of the project on the client's behalf. They will deal directly with contractors carrying out the construction work, reporting back to the client.

In building projects the engineer's relationship to the client has traditionally been a secondary one, with them working under the auspices of the team leader, normally the architect.

Therefore the structural engineer's prime responsibility would be to carry out work relating to his or her specific discipline: site investigation, foundation and building structure design.

Today as many projects become more technically complex a number of engineers may be employed by clients for their advice on specific areas such as heating and ventilation, air conditioning, electrical installation, and structural elements such as foundations and building frames. A number of consulting engineering practices now also offer wider project management services to clients (ACE (1987), Tietz (1987b)). Therefore the engineering profession is now well established as an integral member of any professional team involved in the production of a building. Such project management services are forcing engineers to become more commercially aware as well as developing greater customer awareness.

The engineer has historically been seen as contributing to the design of building projects in specific areas, being managed on the client's behalf by another professional, usually the architect. Three factors have contributed to changes in this historical position. The first relates to the importance of site factors. Firstly, land is a finite resource which leads clients who wish to be located in popular locations, such as central London, to consider building on sites which are not ideal in terms of their precise locations, surroundings and ground conditions. This increases the importance of the engineer in providing detailed advice on issues such as site investigation, site access and traffic generation. The second factor relates to the growth in procurement options. As the options have been extended the role of engineers and their interaction with others has changed (Tietz (1987b)). Finally the growth of multidisciplinary practices, such as Ove Arup, have increased the prominence of the engineer, and led to them offering a range of services, such as overall project management, to clients.

3.2.4 Builders / Contractors

If one looks back to the middle of the seventeenth century master builders quite frequently designed and built specific projects themselves. This was followed by a movement from separate trades to the '*contracting in general*' approach established at the end of the eighteenth century (Cowan (1977), Higgin and Jessop (1965)). The Builders Society, forerunner to the Chartered Institute of Building (CIOB), was founded in 1834, and its aims

were described by Dolan (1979) as being:

"to uphold and promote reputable standards of building through friendly intercourse, the useful exchange of information and greater uniformity and respectability in business."

In Britain the greatest period of growth, in the building industry, occurred in the nineteenth century. Between 1851 and 1901 the number of persons occupied in the industry increased from 390,000 to 953,000. Also at this time new types of industrial and commercial buildings required the development of new techniques of building. In 1884 the Builders Society was incorporated and became the Institute of Builders (I.O.B.).

The general builder organising the complete job was well established. It was often convenient for the general builder to specialise in some areas, and subcontract work in other trades. New materials and methods adopted in the nineteenth century led to the establishment of new specialist firms, such as in the fields of patent glazing and supply and erection of iron and steel frames. Another early example of specialisation was in early package deals for prefabricated houses. In 1886 there were 23 builders of such houses in the London area.

With the builder fitting into the traditional system in a position where he had no involvement in the design process, this separation led to builders neglecting their education in design as there was no direct incentive for them to study it. Although all of the professions were educated on a common core of knowledge, which they all required, each group tended to become involved in a particular specialism. They also tended to rid themselves of talents more relevant to other groups. By the end of the nineteenth century few builders had a coherent knowledge of aesthetic design. The I.O.B. began to take an interest in education in the 1920's, and in 1924 the institute offered its first examinations.

Between the wars there were different sized building firms in operation. Although the vast majority were those that employed less than ten persons, some larger firms began to emerge, mostly in the speculative building market. Another practice which grew in the inter-war period was the nomination of subcontractors. The practice tended to decrease that part of

the building project that the general builder tendered for and, perhaps more importantly, diminished his ability to control the flow of building operations. There were no such problems for speculative builders as they retained control of the whole project. Large contractors reacted against the use of nomination. An example of this was Bovis who introduced their own management fee form of contract whereby they were employed by clients for a fee, similar to the other professions, as opposed to the more traditional tender situation. This system is still in operation today.

After 1945 the government controlled sector had a large influence on the way forward for the industry. Because of the growth of the public authorities, partly due to the loss in building stock, and their need to satisfy the requirements of public accountability, tendering after the building had been designed was the normal practice. This somewhat stifled the introduction of new forms of contract which affected innovation in building practice. As the technical complexity of building increased a higher degree of specialisation was required.

In the 1950's the government relaxed legislation to control the development of offices. This led to more varied building opportunities and the speculative market was given a chance to grow. Firms were free to try out their own ideas and to organise their work more effectively from a position of total control. At this time the package deal emerged as an alternative to the traditional method. Developers who purchased land involved themselves in a large capital outlay. They therefore required a return on their investment as quickly as possible, and were more flexible in considering alternative methods. Large builders began to offer package deals where they took full responsibility for the whole project, including, on some occasions, finding the site. They emphasised that the client only had to deal with, and pay, one organisation, and that the final cost was certain. In response to rising building costs and higher rates of interest, some authorities tried the package deal method. In 1957 the government attempted to reintroduce fixed price contracts, which provoked criticism by the building industry of the efficiency of the design system as run by architects in particular.

The 1960's saw a boom in high rise building with the government challenging private interests to look at industrialised systems such as concrete panel construction. Between 1964 and 1967 40% of public sector housing was built by industrialised methods, and as output

increased prices fell. Unfortunately the boom was short lived as the market failed to sustain the level at which system building firms could produce at full capacity. The use of prefabrication and standardisation became limited to small components in traditional buildings, such as pre-finished concrete units, complete roof trusses and partitions.

Powell (1980) considers 1973 to be a turning point which marked the beginning of a change of attitudes and activity in building. The crisis in oil had the effect of calling into question much about building activity which previously had been accepted without thought. Between 1973 and 1978 building costs doubled and the prospects for future building activity were not good. Although the traditional tendering arrangement still dominated the industry new methods came to the fore which gave contractors an opportunity to be involved in projects from their earliest stages, rather than having their role restricted to the construction phase only. Such an example of an alternative method is design and build. This form of contract offers clients a single point of responsibility for their whole project, a feature which is attractive to many clients (Bar-Hillel (1987a), Building Contractor (1987), C.C.M.I. (1987)). The contractor is responsible for designing and building. The growth of design and build, which came into prominence in the 1970's, was restricted, to some extent, by the RIBA's code of practice, excluding architects from senior positions in contracting organisations, which has now been amended.

Another major area of change is in the growing trend of client bodies employing construction experts to work alongside architects, quantity surveyors and engineers as part of a project team. The terminology used for such an arrangement is varied and includes construction management, management contracting and management fee systems (Hayes (1985), Reina (1987)). Although there are some variations between these methods, in basic terms they are similar in the respect that the contractor undertakes the management of the construction work for a certain fee. He normally has no direct involvement in the construction work packages, but this can depend upon the precise contractual relationship.

Contracting organisations are now more involved working alongside other professionals from the inception of building projects. The recent developments in systems of building procurement have moved the contractor away from the role of involvement only in the

construction phase of projects, to a position where the contractor is part of the professional team contributing to the development of the design of a building, as well as its construction.

There has been resistance from other professional groups concerning the appointment of contractors on a similar basis to other project team members, with one suggestion being that contractors do not operate at the very highest professional levels (Moore (1985)). The following point, raised by Thornton (1986), illustrates this view:

"The root of the objection is a belief that no building contractor is really concerned about his client's best interests, but is out solely to make as much money as possible."

The alternative procurement options now available have led to the contractor assuming new roles and acquiring new responsibilities. For example in management contracting and construction management the contractor can take over the responsibility for managing the design process from the architect (Building (1985)). The contractors have therefore moved from their traditional role of constructor, with no involvement with the design and limited direct communication with the client, to a position where they offer services, such as design and build, directly to clients.

3.2.5 An Industry Perspective

Having looked at each professional group individually it is now necessary to take an overview of the functioning of the construction industry as a whole to see how the different professions function together.

The Emmerson Report, (Emmerson (1962)), in 1962 considered the relationships between the construction professions and industry. It criticised the lack of liaison between the parties. Emmerson led to the Banwell Report, (Banwell (1964)), which made the following well known statement:

"We consider that the most urgent problem which confronts the construction industry is the necessity of thinking and acting as a whole."

Over the last 20 years the structure of the industry, and the relationships between parties involved in it, have become much more variable. This has led to the historical boundaries of professional group responsibility becoming blurred. For example, the traditional role of the architect as the manager of a construction project has been, in some instances, diminished by the growth in additional '*project management*' services offered by other professions, such as quantity surveyors, multidisciplinary engineers and construction managers (Turner (1990)). This has contributed to a proliferation of alternative routes by which a client may procure a building. The NEDO guide, titled, "Thinking About Building", (NEDO (1985)), outlines the following 4 main procurement paths, within which there are a number of variants:

- | | | | |
|-----|-----------------|---|-------------------------|
| (a) | TRADITIONAL | - | sequential |
| | | - | accelerated |
| (b) | DESIGN & BUILD | - | direct |
| | | - | competitive |
| | | - | develop & construct |
| (c) | DESIGN & MANAGE | - | contractor |
| | | - | consultant |
| (d) | MANAGEMENT | - | management contracting |
| | | - | construction management |

Although each path offers certain specific advantages and disadvantages the same construction professionals are involved. It is only the contractual and organisational relationships which vary. However, this has led to an atmosphere of friction where other professional groups have encroached upon areas historically conducted by one professional, one example being that of the architect's traditional role as project manager. This role is now undertaken by several different professions. Newer procurement routes are also considered by some to be undermining traditional professional service. To illustrate this point the following example is presented. It relates to the procurement of a new laboratory facility by a client, Cambridge University.

Blundell Jones (1987) details the background to the scheme in that it was initially the subject of a competition between a number of architectural firms. All of the schemes exceeded the cost guidelines, but one firm were asked to develop their design further. At this point the

university realised that their funds were limited, and had to cut their budget from £6 million to £4 million. This prompted the alternative of a design and build contractor to be considered. One contractor came in with a proposal of a scheme for £4.03 million and this led to a ballot for members of the university to choose between the two proposals.

The writer of the article states that the short term advantages of cheapness will take precedence over the long term disadvantages to architecture and the built environment, and that "practical" convenience will appear to have been sacrificed to aesthetic criteria. He goes on to suggest that the design and build scheme is designed according to a formula, which is the reason for their cheapness, making the following point:

"The problem is not that.....is a design-build firm, but it allows construction to dominate design, so the tail wags the dog. Construction is always the same, so details can be used over and over again and design fees can be saved because very little design is necessary, only adaptation."

The result of the ballot was that the city's university dons and M.A.'s voted nearly two-to-one in favour of the design build scheme, provoking mixed views within the construction press. A leader article in *Building* (1987) stated that:

"... the vote was a victory for the forces of commercialism over aesthetics."

It also points out that lessons are to be learned in that it is not advisable to assume that rich clients do not care about cash, and that today haute couture design has to compete with chainstore architecture. A director of the Design-Build company is quoted in *Contract Journal* (1987) as saying:

"Our scheme is not the cheap answer but an alternative answer,..and is cheaper because of our integrated approach to design and build."

An article by Steadman (1987) quotes a reader in architecture and fellow of Churchill College describing the design and build scheme as, "a concoction of a building". It also gives the view of the university's deputy director of estate management and building services who stated that it was important that the building was completed at an early date, so as not to lose a £2 million grant towards the project. He considered a design-build solution to be the fastest option. A report in Architects Journal (1987b) includes details of a letter from the Royal Fine Art Commission giving the opinion that the design-build proposal was, "...quite unworthy of such an important site." Also the head of the school of architecture is quoted as saying:

"The scientists believe that they either get this building or nothing - so their voting is regardless of whether it looks good, whether it works and whether it is good for Cambridge. and that is a pity."

The above details illustrate the problems which face different construction professions when attempting to satisfy client requirements. The necessity of satisfying a client with a fixed budget and limited timescale for completion may force aesthetic criteria further down the list of critical factors. In a large survey conducted in 1987 by C.C.M.I. (1987) 89 percent of clients expected to use design and build again.

The traditional procurement system now has to compete with other options, with client interest and use of the alternatives growing (Franks (1990), Masterman (1992)). Within this framework some professionals have relinquished areas of responsibility to others. A client considering building is now confronted with a multitude of services offered by a number of different professions.

3.3 EDUCATION

Any construction professional will be involved in some form of professional education which is likely to be specifically related to their own discipline. The education which they receive will have an influence on the way in which they conduct their work.

The following sub-sections cover the types of educational options available to people wishing to enter construction professions, including an examination of the influence of professional institutions on setting standards for entry. Then the standards of entry requirements necessary to study at degree level in the different professions are described. Finally, the differences in curriculum between different degree courses are explored in order to anticipate the attitudes and priorities which the different professions are likely to bring to interactions with clients.

3.3.1 Type of Education

There are various options open to individuals wishing to become involved in some form of higher education in a construction profession. One consideration is whether the qualifications are to be obtained in part or full-time education. This is likely to be dependent upon qualifications obtained at school and, to a certain extent, the level to which the individual wishes to achieve within a particular profession. The timescale over which an individual wishes to complete his or her studies is another consideration.

The two largest organisations offering part-time education qualifications for construction-related disciplines are the City and Guilds of London Institute (C&G) and the Business and Technician Education Council (BTEC). Both offer technician level courses in different construction disciplines. Entry requirements can be as low as 4 GCSE's with a course duration of up to a maximum of 5 years. Full-time diploma options are also offered. Completion of courses at a satisfactory level will allow entry to degree courses.

The other method of full-time study available to anyone thinking of entering one of the professions is to do a degree course in one of the disciplines. Degree courses are offered by both universities and polytechnics in architecture, quantity surveying, civil engineering and building.

3.3.2 Education Towards Professional Status

As an alternative to studying for a degree, qualifications may be obtained by taking examinations offered directly by the various professional institutions, with the exception of architecture where full membership of the RIBA is only available to individuals educated at degree level.

The pattern of architectural education is, according to Turner and Rushton (1976), still based upon that which evolved out of nineteenth century traditions, a seven year sandwich which includes five years of full-time education. This five year period usually consists of a three year B.Arch. degree followed by a two year Diploma in architecture. The remaining two years are spent doing professional training in a practice, under the supervision of the schools. This seven year period culminates in a professional examination which leads to registration with ARCUK and membership of the RIBA. There is no alternative method, apart from degree courses to become a registered architect. Architectural technicians who are employed by private practices and public services may obtain qualifications on BTEC part-time and full-time courses and become eligible for membership of the British Institute of Architectural Technicians (BIAT).

The RICS has a series of stages which lead to chartered surveyor status. Part-time study normally involves attendance at a college on a day release basis. RICS examinations are offered in three parts, each of one year duration. When each of the levels has been satisfactorily completed a period of satisfactory professional training, the Test of Professional Competence (TPC), has to be completed. For quantity surveyors this period is three years, but for part-time students two of these years can be before the passing of the final examination, leaving only one year's experience to be obtained afterwards. If the TPC is passed Chartered Surveyor status is attained, with the individual having the right to display the letters ARICS after their name.

For consulting engineers The Institution of Structural Engineers organises examinations leading to two grades of membership entry, non-corporate and corporate. Firstly there is the non-corporate Associate-Membership grade. BTEC higher national certificate and diplomas are accepted as satisfying entry requirements to the Associate Membership Examination

along with a satisfactory period of two years experience in structural engineering. The examination takes the form of a six-hour paper, taken on one day, as a test of practical competence. Successful candidates must then provide a summary of four years training and experience before being elected as Associate members. They are elected as Technician engineers and are entitled to use the designation TEng, AMIStructE.

The other level of membership is that of Corporate Member. For those in part-time education the Engineering Council (EC) offers part 1 and part 2 examinations. Full-time degree courses provide exemption from part 1 and 2 examinations. This leads to the part 3 examination which is one seven-hour paper to test professional competence. Following successful completion of the part 3 examination candidates are elected to Corporate Membership, as Chartered Engineers, providing they have at least four years training, practical experience and responsibility as a professional engineer. Then they are entitled to use the designation CEng, MIStructE.

The CIOB provide a series of examinations for those in the industry wishing to qualify as Chartered Builders. However the CIOB does cover a wider range of disciplines than the other construction related institutions previously outlined. Its published guide to membership regulations, CIOB (1986), gives a list of 20 acceptable functions which includes building surveying, design and quantity surveying.

Again many part-time BTEC certificates, full-time BTEC diplomas and B.Sc. degree courses offer exemptions to various levels. The minimum period of study for each of the levels is one year. Following the Licentiate level there is an Associate Examination consisting of eight subject areas. Next there are two levels of member examinations, part I and part II. When these have been successfully completed, and before individuals are admitted to the member class, they must write a report on their professional experience, over a minimum of three years, and pass a professional interview. Then they will be able to use the professional designation MCIOB which, along with the Fellow class (FCIOB), are the only corporate classes allowed to use such a designation.

However, the powers of the CIOB are limited in comparison to other professional institutions in the construction industry. For example architects are more strictly governed by rules and procedures laid down by their professional institutions. The designation "builder" can be used by anyone involved in building work who may be working on projects ranging from small house extensions up to large multi-million pound highly technical projects. Also no formal qualifications are legally required to use such a designation. This leads to a much larger range of levels of education and practical experience within the construction discipline than other professionals in the industry, such as architects, engineers and quantity surveyors.

3.3.3 Entry Requirements to Degree Courses

It has been stated, by Carr-Saunders and Wilson (1933), that the establishment of professional institutions, to lay down rules and procedures, provides a method for regulating access to, and use of, specialised bodies of knowledge. Professional bodies, such as RIBA and RICS, are able to influence standards of educational achievement required to study specific subject areas. This leads to certain minimum levels of entry requirements being established with only people who satisfy the laid-down criteria being admitted to courses.

Jenkinson and Neave (1980) list the following five characteristics which mark the progress towards the recognition of a profession:

- (a) Nation-wide control under a single authority.
- (b) Prolonged higher education.
- (c) Curricular control.
- (d) Closure against unqualified trainees.
- (e) Reserved public occupation status.

Taken together these five characteristics, which are particularly applicable to the UK, ensure that the profession acquires a selection mechanism within higher education itself as well as at the point of entry to professional training.

If one looks specifically at A-level entry requirements to degree courses different levels of entry become apparent. Major professions under the control of professional institutions are

able to set higher entry levels to courses. Although there are a number of alternative methods of entry to degree courses, such as OND and BTEC qualifications, the vast majority of students come from a background of A-levels taken at school. A survey conducted by Bourner and Hamed (1987) showed that in 1983, of the total of honours graduates, the distribution of entry requirements for polytechnics (CNAAs) and universities was as follows:

QUALIFICATIONS	CNAAs (%)	UNIVERSITY (%)
2 or more A-levels	73.5	90.6
1 A-level	6.2	1.1
Graduate	3.4	0.2
Certificate of Education	0.2	0.2
HNC or HND	1.9	1.1
ONC or OND	4.6	1.4
Overseas qualifications	1.3	2.4
Other UK qualifications	8.9	3.1
TOTAL : (%)	100	100
NUMBER OF GRADUATES	(16667)	(56151)

The figures above show that A-levels are the major qualification of entrants to degree courses.

The entry requirement to degree courses is set on a points system relating to A-level grades as follows:

A-LEVEL GRADE	POINTS SCORE
A	10
B	8
C	6
D	4
E	2

The following tables illustrate the different levels of entry requirements to specific degree courses, as well as giving an indication of the span of point scores and the average score. A number of other established professional groups have also been analysed to illustrate how they compare to those in the construction industry.

The first table gives average A-level entry points scores for degree courses at universities and polytechnics, and the second shows the points range for entry to courses.

Average A-level points scores:

<u>COURSE</u>	<u>UNIVERSITY</u>	<u>POLYTECHNIC</u>	<u>COMBINED</u>
ARCHITECTURE	20.2	12.4	16.2
QUANTITY SURVEYING	17.0	12.2	13.2
CIVIL ENGINEERING	19.2	9.8	16.0
BUILDING	18.6	9.6	12.6
MEDICINE	24.2	23.0*	23.8
LAW	23.4	15.0	20.0
ACCOUNTANCY	20.6	12.8	17.5
ESTATE MANAGEMENT	20.2	14.6	16.6

Points range on courses:

<u>COURSE</u>	<u>UNIVERSITY</u>		<u>POLYTECHNIC</u>	
	max	min	max	min
ARCHITECTURE	30	12	20	10
QUANTITY SURVEYING	20	12	18	8
CIVIL ENGINEERING	30	12	16	8
BUILDING	22	16	14	8
MEDICINE	30	18	26*	20*
LAW	30	18	22	8
ACCOUNTANCY	26	14	18	12
ESTATE MANAGEMENT	30	14	18	12

NB : Scores for medicine courses (marked *) are for medical schools not polytechnics.

From the above tables it can be clearly seen that different levels of entry are required to particular degree courses, and there is a wide range of maximum and minimum points scores for both universities and polytechnics.

What is also clear is that the educational system is setting particular standards of entry to professional disciplines. The entry level is related to the status of different professions. For example, from the tables of entry requirements to degree courses, shown above, a hierarchy of levels of entry to different courses is apparent. A ranking in descending order of highest average entry requirement produces the following hierarchy:

<u>COURSE</u>	<u>AVERAGE POINTS</u>
MEDICINE	23.8
LAW	20.0
ACCOUNTANCY	17.4
ESTATE MANAGEMENT	16.6
ARCHITECTURE	16.1
CIVIL ENGINEERING	16.0
QUANTITY SURVEYING	13.2
BUILDING	12.6

This hierarchy, setting levels of entry to degree courses, is likely to affect the type of people who will be attracted to different professions.

3.3.4 Subjects Studied

A factor which can be considered as having an influence upon the way in which professionals carry out their work, and so interact with clients, is the nature of the subjects studied as part of their education. Courses organised for different disciplines place emphasis on certain areas. Syllabi for courses will be influenced by guidelines from professional institutions which will be produced in consultation with industrial representatives from the various professions.

To illustrate this point an analysis of subjects included in degree courses, at polytechnics and universities in the UK, has been conducted. Information on the content of degree courses was obtained from individual university and polytechnic prospectuses and published guides to degree courses, (British Council (1984), Heap (1987), Jamieson (1985), Nicholson (1985)). From these sources details of the subjects studied as part of the different degree courses were extracted and tabulated. A key point to be made is that the analysis is made purely on type of subjects studied without considering the amount of time allocated to each subject. For example, in architecture degree courses a large proportion of time is spent in studio work. Also similar subjects may have different titles. However, an analysis of subject types does give an indication of the scope of study on each course.

For each degree a list of the subjects studied in each separate year of the course was compiled. Therefore if mathematics was studied in each of the three years of a course it was given a rating of 3. When this had been carried out for all of the courses the ratings were added and a ranking was produced with the subject having the highest total rating being ranked first and the lowest rating last. The sample size for the investigation of the different degree courses studied was as follows:

<u>DEGREE</u>	<u>UNIVERSITY</u> (No)	<u>POLYTECHNIC</u> (No)	<u>TOTAL</u> (No)
ARCHITECTURE	15	18	33
QUANTITY SURVEYING	4	15	19
CIVIL ENGINEERING	39	20	59
BUILDING	8	11	19
ALL COURSES	66	64	130

From this sample size a ranking of different subjects was conducted, with the subject having the highest rating, in terms of largest number of occurrences, being ranked first. Other subjects were then ranked in descending order of rating. The number of different subject areas studied on each of the courses were as follows:

Architecture	31 No.	Quantity Surveying	34 No.
Civil Engineering	34 No.	Building	31 No.

The ranking of the top 20 subject areas with their individual ratings are illustrated as follows:

No.	ARCHITECTURE	No.	No.	QUANTITY SURVEYING	No.
1	Design Theory & Practice	97	1	Construction Technology	47
2	Construction Technology	86	2	Law	41
3	History of Architecture	69	3	Measurement & Surveying	40
4	Project / Dissertation	69	4	Mathematics / Statistics	34
5	Studio Work	64	5	Economics	33
6	Structures	63	6	Computing	26
7	Practice	60	7	Construction Economics	23
8	Materials	46	8	Q.S. Practice	19
9	Environmental Science	43	9	Cost Studies	17
10	Management	31	10	Building Services	16
11=	Drawing	29	11	Management	13
11=	Planning	29	12=	Building Technology & Design	11
13=	Landscaping	27	12=	Project / Dissertation	11
13=	Environmental Design	27	14=	Communication	10
15	Computer Studies	24	14=	Contracts	10
16=	Building Services	23	16	Materials	9
16=	Design Philosophy	23	17=	Building Science	6
18	Communication	22	17=	Accounting & Finance	6
19	Sociology	20	17=	Structures	6
20	Architectural Science	19	17=	Land & Development Economics	6

No.	CIVIL ENGINEERING	No.	No.	BUILDING	No.
1	Mathematics / Statistics	145	1	Construction Technology	45
2	Structural Theory	115	2	Mathematics / Statistics	43
3	Materials	99	3=	Materials	37
4	Surveying	87	3=	Building Services	37
5	Computing	77	5	Law	36
6=	Fluid Mechanics	76	6	Structures	35
6=	Hydraulics	76	7	Construction Economics	29
8	Geotechnics	68	8=	Construction Management	24
9	Design & Practice	67	8=	Surveying	24
10	Soil Mechanics	66	10	Building Technology & Design	19
11	Structural Design	65	11	Economics	18
12	Civil Engineering Management	48	12=	Computing	17
13=	Mechanics	38	12=	Measurement / Surveying	17
13=	Geology	38	14=	Building Science	14
15	Construction	37	14=	Accounting & Finance	14
16=	Project / Dissertation	35	14=	Production Management	14
16=	Civil Engineering Drawing	35	14=	Environmental Physics	14
18	Public Works Engineering	33	18=	Engineer in Society	9
19=	Transport Planning	25	18=	Project / Dissertation	9
19=	Electrical Science	25	18=	Industrial Studies	9

Having identified specific areas of study, the next useful step is to illustrate differences and similarities between course content. The figures shown above can be used to produce a graphical representation of main areas of study. The content of these courses is considered by classifying the content within three main areas.

The first area to consider is those subjects which could be encompassed by the heading design, used to classify what would be considered as artistic skills. Dictionary definitions of design and arts are as follows:

DESIGN: "to work out the structure or form of (something) as by making a sketch or plans."

ARTS: "the imaginative, creative and nonscientific branches of knowledge considered collectively".

Subject areas such as design theory and practice, studio work and drawing would be categorised as design disciplines.

The second area is that of management subjects. The dictionary definition of management is as follows:

MANAGEMENT: "the technique, practice or science of managing or controlling....the skilful or resourceful use of materials, time etc."

Subjects such as management, communication and construction economics would come under this heading.

The final area is that of engineering, covering science-based subjects. Again it is useful to consider two dictionary definitions:

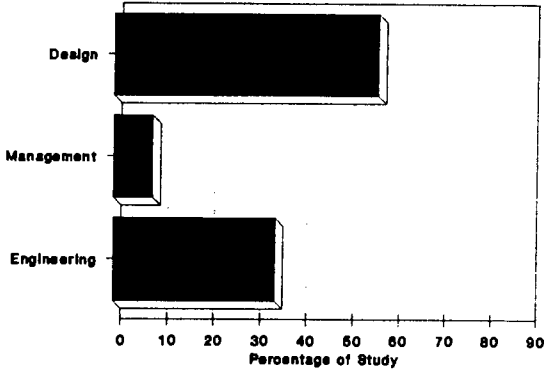
ENGINEERING: "the profession of applying scientific principles to the construction and maintenance of buildings, bridges, roads, etc. (civil engineering)."

SCIENCE: "the systematic study of the nature and behaviour of the material and physical universe, based on observation, experiment and measurement."

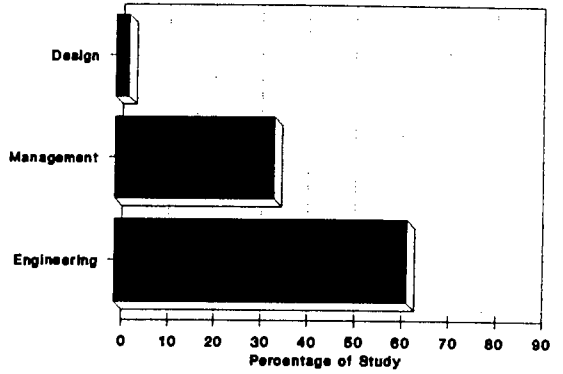
Engineering therefore covers subject areas such as structures, materials, mathematics and computing.

Subject areas listed for each degree course have been classified under the three areas described above. This produces a graphical profile of the percentage of study on each degree course, within each area as shown on the following page:

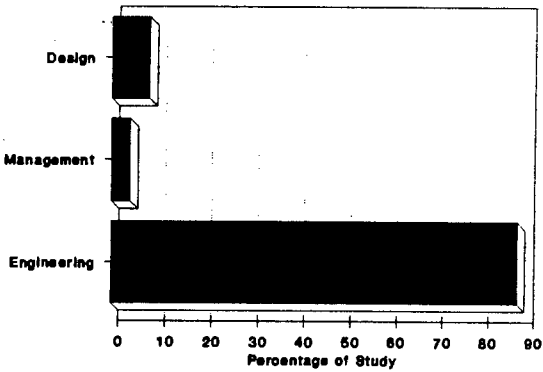
Ratings for Architecture



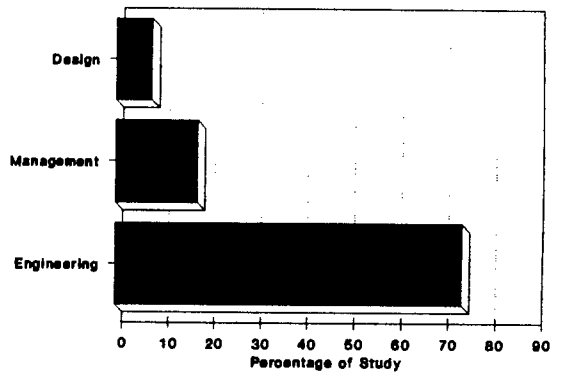
Ratings for Quantity Surveying



Ratings for Civil Engineering



Ratings for Building



Ratings of Degree Course Content

Both the rankings and graphs show that architecture courses place an overriding emphasis upon design or arts related subjects such as design theory and historical aspects. Also projects, dissertations and studio work are highly placed as this type of study makes up a large proportion of time on architecture courses. These design disciplines are supported by the engineering subjects like construction technology and environmental science. Perhaps surprisingly, and particularly taking into account the historical role of the architect as coordinator and overall manager of construction projects, management accounts for a small proportion of the overall subject profile. In addition studies relating to legal matters and economics are not given a major priority.

For quantity surveying high emphasis is placed upon numeracy skills in subjects such as surveying and measurement, and mathematics and statistics. The management content is the highest of the four disciplines analysed. Other highly ranked areas are economics and law, which are important parts of quantity surveyors' work, particularly related to the administration of construction contracts. Construction technology is the highest rated subject area.

On civil engineering courses the vast majority of the course content emphasises theoretical and mathematical aspects such as mathematics, statistics, structures and computing, along with materials studies and practice in surveying. This produces a highly theoretical design orientation to the courses. The management content is the lowest of the four disciplines, and, in a similar manner to architecture, little emphasis is placed on legal studies. Considering the role the engineer takes on civil engineering projects, as the client's professional manager, the omission of legal studies and low emphasis on management is surprising. In this role contractual matters will undoubtedly be an issue.

Finally, building courses have a mixed orientation, with a subject area profile similar to that of civil engineering, except that there is a greater proportion of management. Construction technology has the highest rating as it deals with the practical and physical nature of construction and the methods used, as does an understanding of materials and building services. However, more theoretical subjects such as mathematics, statistics, structures and law are included.

The analysis of the degree courses clearly shows that students studying different construction disciplines have greater emphasis placed upon certain subjects, which relate to that particular professions area of specialisation. Certain subject areas remain common to more than one profession, such as construction technology. Others, such as design theory for architects, and measurement and surveying for quantity surveyors, are more specifically related to a particular profession.

It is perhaps surprising, taking into account the more recent changes to the divisions of responsibility between professions, that the content of degree courses does not appear to have been reviewed to reflect the changes. For example, the consulting engineer moving into project management or package deals would be expected to have a higher degree of skills in management-related areas. The results of a survey on project management, conducted by Stamatis (1990), showed that communication and interpersonal skills are critical.

Having analysed the degree course syllabi certain expectations, with regard to the interaction between professionals and clients can be put forward. The analysis suggests that each profession will place emphasis upon the following areas:

<u>ARCHITECTS</u>	- design
<u>QUANTITY SURVEYORS</u>	- contractual and financial
<u>CIVIL ENGINEERS</u>	- structural
<u>BUILDERS / CONTRACTORS</u>	- construction methods

3.4 SOCIAL STATUS

When considering professionals one has to look at how the different professions have developed, and the background behind their development, with each profession being educated and trained to concentrate on specific areas, as illustrated in the previous section. Elliot (1972) suggests that the title profession is a claim to social standing and recognition, and that professionalism is one method through which the knowledge available to society is

developed and used in the performance of specialised tasks. This leads to certain groups gaining expectations about the role which they have to play in society. They will also develop certain views, both of themselves and other parties who they have an involvement with. These issues will be discussed in the following two sub-sections.

3.4.1 Role Expectation

An individual aspiring to professional status is surrounded by a cluster of expectations about the way he or she should behave in that particular work situation (Elliot (1972), Harré and Secord (1972)). This leads to the establishment of a professional identity for practitioners in a particular field. Also Handy (1981) suggests that there are cultural traditions which have been established over time and shape the role of an individual with regard to their work situation.

Important questions to consider at this point relate to how one actually defines '*professional*'. In relation to this research investigation two areas are of particular interest. Firstly, how professionals conduct their work and, secondly, how they interact with their clients. The view of a number of authors on these issues will now be considered.

Abbott (1988) defines a profession as:

"An organised body of experts who apply esoteric knowledge to a particular case."

Abbott states that the process by which professionals approach a problem involves a procedure beginning with diagnosis and ending with treatment. Diagnosis involves utilising the knowledge base of the professional, with the objective being to identify the right category for the client's problem. This falls into two stages: colligation, where the professional assembles the client's relevant needs into a picture, and classification, where the picture is placed in the appropriate diagnostic category. Mintzberg (1983b) refers to this process as '*pigeonholing*', Simon (1981) considers it to be, "changing existing situations into preferred ones" and Schön (1983) states that the practitioner, "builds up a '*repertoire*' of examples, images, understandings and actions". Abbott (1988) gives an example of a client's demand,

to an architect, for a building. The diagnosis involves determining the client's requirements, with the treatment being the building design, but Abbott does acknowledge that architects are involved with other professional groups, such as engineers, lawyers, accountants and builders, which will affect their autonomy.

The second area to consider is that of the professional-client relationship. An important concept, considered by Glaser (1972) as contributing to this relationship, is '*power symmetry*', which relates to the distribution of power between client and professional in their working relationship. He considers that the professional-client relationship usually favours the professional. However, he goes on to state that it cannot always be assumed that the professional deserves complete power because of his position. He says:

"He may be an 'inexpert expert' facing a knowledgeable layman and his domination may not be just."

Therefore the client can take over the job of expert or control the expert. In this situation the client does not need to be an expert in general but only in relation to his specific case. This view is similar to the idea put forward by Abbott (1988) concerning client differentiation, where expert clients '*preprofessionalize*' their own problems before approaching external professionals. Schön (1983) considers that the normal professional-client relationship takes the form of a win/lose game of control, in which the professional may use his own expert knowledge to enhance his control over the client. Simon (1981) stresses the importance of establishing a relationship between client and professional. Using the example of architecture he states:

"At best the architect becomes teacher and advocate, not simple executor of his client's purposes."

The above discussion raises issues concerning determining the balance of power between parties, which is contributed to, in part, by the client's ability to participate in the diagnostic process.

Previous studies have shown that qualitative differences exist in the concepts held, in relation to a particular environment, by different professional groups (Canter and Walker (1980), Groat (1982)). Canter (1977) states that such differences are the basis for the idea of an individuals environmental role, which he defines as:

"...that aspect of his social or organisational role that is relevant of his dealings with his physical surroundings".

He goes on to suggest that because such a role constrains a persons interactions with the environment they will build up, over time, a conceptualization different from that of those who have a different role in that setting.

Bowley (1966) puts forward an interesting concept that around the time of the first world war the relationships between building owners, the building professions and the builders could be conveniently designated collectively as "*The System*". The system had acquired a strong flavour of social class distinction. In the architects' view the system was hierarchical both socially and in terms of working organisation. The view of the architect produced a hierarchical arrangement with the following structure and comments:

<u>PROFESSIONAL HIERARCHY</u>	<u>COMMENTS</u>
ARCHITECTS	"Members of a profession concerned with a major art, confidants of gentlemen and arbiters of taste. Members of upper middle class elite, regarded themselves as gentlemen."
ENGINEERS	"Closely associated with trade and industry, their training had no cultural significance, they were not artists and they might be industrialists. Not really regarded quite as gentlemen and regarded by architects as social inferiors."
SURVEYORS	"Of all sorts were even more definitely socially inferior."
BUILDERS	"However wealthy or successful, were in trade and small builders little more than glorified craftsmen, 'cap in hand builders'."

This "*system*" in which each specialisation was segregated into a water-tight compartment concerning training and the use of knowledge, led to Bowley (1966) making the following comment:

"It is difficult to see how any system more wasteful of technical knowledge, intellectual ability, and practical and organising experience could have been invented."

Therefore there are some established expectations concerning the professionals' role. In addition the nature of the client with whom the professional is working will influence the professional-client relationship.

3.4.2 Professionals Views

The expectation of a professional role can be considered from two points of view. Firstly, there is the expectation of the professional in terms of what they perceive their particular role

to be, such as how an architect sees his particular role in relation to a specific construction project. Secondly, there is the view of people operating outside particular professions. For example a client, thinking of having a building constructed, with no previous experience of the construction industry, may have certain perceptions about different construction disciplines. The two perceptions of professional role are unlikely to be identical.

It has been illustrated in the previous section, by Bowley (1966), that a certain hierarchy developed relating to the social standing of people involved in different occupations in the construction industry. Higgin and Jessop (1965) conducted a survey in 1965 which looked at how the main occupations in the building process ranked their own, and other occupations in terms of social status and contribution to the building process. A more recent survey, carried out in 1985 by Faulkner and Day (1986), attempted to replicate the 1965 survey and also included additional rankings on subject areas such as leadership qualities, usefulness of information produced and level of education and training.

If the rankings of the professional occupations, in the area of social status, are compared from the three bodies of work the following results are obtained:

<u>RANKING</u>	<u>BOWLEY</u> (c. 1914)	<u>HIGGIN & JESSOP</u> (1965)	<u>FAULKNER & DAY</u> (1985)
1	Architect	Architect (95)	Architect (93)
2	Engineer	Engineer (85)	Quantity Surveyor (73)
3	Surveyors	Quantity Surveyor (79)	Engineer (72)
4	Contractor	Contractor (77)	Contractor (62)

These rankings show that little has changed in over 70 years apart from the lower ranking of the engineer. By comparing the more detailed surveys of 1965 and 1985 the figures show that the difference between engineers and quantity surveyors has been reduced. Also the status of engineers and contractors has fallen more significantly than that of the other two, whose rankings have also decreased.

One of the points emphasised in the 1985 survey is the tendency for members of occupations to rate themselves higher than the ranking given by all of the other occupational groups. If the self-rankings of occupations are excluded the ranking of occupations would be as follows:

<u>RANKING</u>	<u>RANKINGS OF ALL</u>	<u>SELF-RANKINGS EXCLUDED</u>
1	Architect (93)	Architect (93)
2	Quantity (73) Surveyor	Engineer (74)
3	Engineer (72)	Quantity (72) Surveyor
4	Contractor (62)	Contractor (63)

The only change here is the reversal of the rankings of the quantity surveyor and the engineer, albeit marginally, but returns the ranking to the same order as the 1965 survey. The other area in which a comparison can be made between the 1965 and 1985 surveys is in the rankings for contribution to the building process. In the 1965 survey no definition of contribution to the building process is given. The 1985 survey states that this category should be considered to be the contribution from conception to completion. The figures for this category are:

<u>RANKING</u>	<u>HIGGIN & JESSOP</u> (1965)	<u>FAULKNER & DAY</u> (1985)
1	Contractor (92)	Architect (89)
2	Architect (82)	Contractor (77)
3	Engineer (62)	Engineer (65)
4	Quantity (56) Surveyor	Quantity (64) Surveyor

It can be seen that while the ranking for the architect has increased the contractors ranking has dropped considerably. As the opinions of clients were part of the 1965 survey it is

interesting to look at how they rated the different construction occupations from a position outside of direct and continuous involvement with the construction industry. Their rankings were as follows:

<u>RANKING</u>	<u>SOCIAL STATUS</u>	<u>CONTRIBUTION TO THE BUILDING PROCESS</u>
1	Architect (97)	Contractor (82)
2	Engineer (85)	Architect (78)
3	Contractor (82)	Engineer (47)
4	Quantity Surveyor (77)	Quantity Surveyor (42)

For social status, the rankings of architects and engineers are virtually identical to the overall rankings. A reversal of rankings comes in the contractor and quantity surveyor, although the figures do not differ greatly. For contribution to the building process the rankings are identical to the overall ones with only the figures for the rankings being lower than the overall values.

3.5 ADVICE OFFERED TO POTENTIAL CLIENTS

Any client who is considering having a building constructed will, at an early stage, need to consult construction professionals for advice. This initial contact could be with an individual professional, who may have carried out work previously for the client. Alternatively, if the client has no previous experience of dealing with construction professionals he may approach one of the professional institutions for advice on whom to consult.

The following sections discuss the services which different professional bodies offer when approached by clients thinking of building. As part of the research project the institutions were contacted for information on the services they offer. In addition other published sources of client guidance are described.

3.5.1 Professional Institutions

3.5.1.1 RIBA Clients' Advisory Service

The RIBA Clients' Advisory Service (CAS) was formed in 1972 and, quoting from its leaflet "Aid to the Selection of an Architect", (R.I.B.A. (1985)), its function is to:

"act as a marriage-broker between clients and architects."

Its purpose is to assist clients in their selection of architects, initially by providing free lists of suitable practices according to the information provided by the client. Information on the work of individual practices is stored in a computerised data bank, with details such as range of services, past experience and special skills. After a list of suitable practices has been produced the client is advised to visit the architects offices to discuss his needs and ask about previous work carried out, and perhaps arrange to visit such buildings, obtain references from previous clients and to find out details of fees payable.

The leaflet also gives a warning about approaching anyone using a title other than architect such as architectural designer or architectural consultant. It states that they are unlikely to be adequately qualified or trained and that their activities may not be subject to a code of conduct.

3.5.1.2 Royal Institution of Chartered Surveyors (RICS)

The RICS gives advice to potential clients through its information centre. The centre can suggest firms able to advise on topics such as the building of an extension, the rehabilitation of commercial property, plans, specifications and supervision of building work.

Wherever possible the names of at least three firms will be given. An enquirer is not then restricted to any one firm, but can contact several before deciding who should do the work required. The information centre can also supply lists of firms in a particular area.

The publication of a brochure by the RICS, (RICS (1986)), entitled "Warning - Not Using a Chartered Surveyor Can Put You at Risk", has provoked a certain amount of controversy, particularly within the architectural profession. A point which provoked such controversy

was a statement by the RICS secretary-general at the start of the brochure which says:

"Chartered Surveyors, above all other professions, are trained to value, develop, cost, conserve, design, adapt and manage the way we use natural resources and the built environment."

This was seen by some as a non-recognition of the other professionals, such as architects whose main responsibility is in the area of design, who are involved as part of a team in the construction process (Luder (1986)).

3.5.1.3 Association of Consulting Engineers (ACE)

The ACE was established in 1912, and incorporated in 1913. It aims to promote the advancement and usefulness of the profession. Members of the association refrain from soliciting or advertising for work individually and thus rely upon their reputations to secure commissions.

Unless clients are familiar with appropriate consulting engineering firms they are recommended to approach the association for advice. The nature of the project should be given, in confidence if need be, since an appropriate short list of suitable firms can be prepared only in relation to the proposed task. Firms put forward by the association are not given the name of inquirers who can thus approach any or all of the names suggested to them.

When contacted for details of advice services provided the deputy secretary of ACE, Colonel J.C. Peacey, stated:

"Potential clients, both large and small ask us for nominations of suitable firms for work they want done, and we are always ready to oblige with appropriate suggestions. I also deal with many requests, both by phone and in writing, from organisations and members of the public requiring information on procedures, fee scales and numerous other matters, often only indirectly related to consulting engineering."

3.5.1.4 Chartered Institute of Building (CIOB)

The CIOB offers no formal service for those who wish to build. When the CIOB was approached as part of this investigation, for details of their services to clients, their head of information, Peter Harlow, said:

"I cannot recall, over the years, many requests for information from clients. We would respond individually, endeavouring to direct the enquirer into taking the correct steps in obtaining a building."

In October 1980 a guide was published by CIOB, (CIOB (1980)), entitled, "Building For Industry and Commerce - Clients Guide". A working party was set up in November 1978 in response to comment in the NEDO report, "Construction For Industrial Recovery" (NEDO (1978)), that the building industry must assist the client to develop the brief and offer guidance on the ways of using the total expertise of the building industry. The guide seeks to alert those who intend to build, about areas where concern must be shown and where responsibility and decisions must be taken. It takes the client through various sections such as clients interests, investigation of need, client project group, the project team, consultants and contractors, the time and money scale, the brief, design, construction and commissioning. The sections are intended to enable a client to gain a clear understanding of the relative importance of his building project and the priorities which might guide him.

To emphasise the importance of the client's role in the project the guide concludes with the following statement:

"The client has both the first and last word. He originates the project, specifies its essential use and accommodation, duly pays for it and takes over. When occupied the complete building becomes an influence on the client's company for many years."

3.5.2 Other Sources of Client Advice

Various guides which have been published by organisations not directly connected with professional bodies are discussed below.

3.5.2.1 National Economic Development Office (NEDO)

The National Economic Development Office (NEDO) published a guide in 1974, (NEDO (1974)), titled, "Before You Build", which provides guidelines for clients considering building. Although primarily aimed at providing information to clients the guide also identifies the following areas where clients might be blamed for an unsatisfactory project outcome:

- (a) no clear requirements
- (b) no budget
- (c) no timescale
- (d) unpreparedness

In 1983 NEDO published another report, (NEDO (1983)), titled, "Faster Building For Industry". Although primarily concerned with investigating the time taken to construct industrial buildings, one of the stated objectives was to:

"...formulate recommendations for action by client, designer and contractor."

One of the reports findings, relating to the customer's role in the process, is:

"Customers lacked sources of information or impartial advice about the options and alternative courses of option open to them. They had no adequate means for assessing the suitability of any particular type of construction service for their own circumstances. In consequence they did not make the best use of the services the industry had to offer, eg assistance with developing briefs and specifications, various management services, package deals etc."

In response to the findings of this report NEDO produced a guide in 1985, "Thinking About Building" (NEDO (1985)), specifically aimed at providing information for clients. It is subtitled, "A successful business customer's guide to using the construction industry". Aimed at the inexperienced client the guide is presented in a pamphlet format of only 8

pages. It suggests the following major areas which need to be addressed and presents them as "seven steps to success":

1. selection of in-house project executive
2. appointment of principal adviser
3. careful definition of requirements for project
4. realistic determination of project timing
5. selection of appropriate procurement path
6. considered choice of organisation to be employed
7. commitment to a site (or building remodelling) held back until it is professionally appraised

Other information provided in the guide includes details of building timescales and procurement paths. Also a matrix is presented to assist clients in identifying priorities and matching priorities with procurement paths. By answering 9 questions, ranging from project timing to risk avoidance, and entering answers into the matrix the suitability of the different procurement paths can be investigated. The guide does give a warning to clients that the completion of the matrix is not definitive and should be used as a primer for discussion with a principal adviser. Bar-Hillel (1985) suggests that careful reading of the text should help potential customers realise, if nothing else, the complexities of the subject and the need to devote time and effort to making the right decision.

Any client guide can only assist clients if they are made aware of its existence, and are able to obtain copies of it. Copies of this guide are available from NEDO, but the minimum quantity they will supply is 100 copies. Therefore even if a client was made aware of the existence of the guide they are unlikely to require 100 copies. The point from where clients are most likely to obtain copies are from construction professionals. The Building Economic Development Committee (EDC) of NEDO were contacted as part of this research project. They supplied a list of organisations, in the London and South area, who had purchased copies of the guide. This can be summarised by professional groupings as follows:

PROFESSIONAL ORGANISATION	NUMBER
Building Contractors	20
Quantity Surveyors	20
Consulting Engineers	10
Multidisciplinary Practices	8
Architects	6
Project Managers	2
Services Engineers	1
General Practice Surveyors	1
Property Developer	1
TOTAL	69

This list confirms that the source of supply of this guide for potential clients is professionals. However, one of the objectives in the production of the guide was for it to be used as a marketing tool by professionals. Christopher Groom, then secretary of the Building EDC, is quoted as saying, (Pieniazek (1985)):

"We are strongly recommending people within the building industry to include the booklet as part of their basic communication material."

To encourage this the Building EDC provide marketing notes advising professionals to develop more attractive services and to communicate with the client. Therefore the onus for dissemination of the guide to clients is placed upon professionals.

"Faster Building For Commerce" (NEDO (1988)), was the next NEDO publication in this area. Its aim was to build on earlier NEDO research (NEDO (1983)), and to concentrate on issues relating to the speed of commercial buildings. Research findings were presented under a number of headings: project times, timescales, customers, organisation, briefing, design, main contractors, resources on site, subcontractors, operatives, public utilities and statutory approvals. As well as the main body of the report three additional items are included. The

first two are plastic dials to estimate good and average construction times. The third is a small booklet titled, "Guidelines For Action", which is a summary of the main report. Its contents concentrate on giving lists of guidelines on two main areas. The first is titled, "Hallmarks of a Good Customer", emphasising the following points:

1. be committed
2. define your role and equip yourself to carry it out
3. determine priorities and expectations and set a realistic time frame and price
4. get the brief right
5. don't tinker
6. ask for a thorough site survey
7. keep the project moving

The second list of guidelines titled, "Six Key Steps to Improve the Industry's Performance", consists of the following advice:

1. make clear recommendations
2. provide leadership
3. provide clear terms of business
4. set clear objectives
5. use information technology
6. safeguard the customers interests

It is aimed at both clients and professionals, and is available from NEDO, which raises again the point of effective dissemination, particularly to clients, or customers as they are referred to in this report.

3.5.2.2 Construction Industry Research and Information Association (CIRIA)

CIRIA have produced a number of client guides concerning a number of issues relating to building procurement. Its publication titled, "Practical advice for the client intending to build" (CIRIA (1987)), offers advice under 6 main headings:

1. Obtaining advice (from people, commissioning methods)
2. Client decisions (issues requiring client participation)
3. Practical advice (on building process)
4. Further information (other publications, addresses)
5. Checklist (summary of main points of guide)
6. Terminology (explanation of construction terms)

The guide stresses the importance of knowing where to go to obtain advice and what questions need to be asked. The guide comprises of only 12 pages and information on items is deliberately kept brief. CIRIA's membership is made up mostly from professional construction organisations.

In addition, CIRIA also publish a series of client guides relating to the following different forms of contractual methods for procuring buildings: traditional (CIRIA (1985d)), cost-reimbursable (CIRIA (1985a)), design and build (CIRIA (1985b)) and management contracts (CIRIA (1985c)). Each guide suggests potential advantages and disadvantages of each method as well as outlining the important stages.

With regard to the method of clients obtaining these guides the dissemination method is likely to be similar to that of the NEDO guide, discussed in the previous section, namely from professionals.

3.6 SPECIFIC AREA OF INVESTIGATION

In this and the previous chapter characteristics of professionals and clients have been discussed and described. To carry out a study of the nature of advice provided by construction professionals to clients, it is necessary to use these parties as the main source of data for the investigation.

The RIBA, in their 'Plan of Work' (RIBA (1977)), outline a framework of stages which describes the management tasks and design work in a project programme from the initial contact between client and architect to the point when the building is completed and in use.

These stages are:

A.	Inception	G.	Bills of Quantities
B.	Feasibility	H.	Tender Action
C.	Outline Proposals	J.	Project Planning
D.	Scheme Design	K.	Operations on Site
E.	Detailed Design	L.	Completion
F.	Production Information	M.	Feedback

This research is concentrating on the Inception stage, stage A, which includes the initial point of contact between a potential client and professional advisors. This initial contact is considered to be a most crucial point in any project's development and will heavily influence the course of action which follows.

As the project progresses through the initial phases the client will become involved with a number of professionals from different disciplines. Traditionally the architect has been the initial point of client contact. However, recent developments in the roles taken by other professionals, including the growth in the use of project managers, has meant that clients may initially come into contact with a number of different parties. These may include multidisciplinary practices, consulting engineers, quantity surveyors offering a range of services, including project management, and contractors who are involved in design and build packages and construction management (Hunter (1986)).

Having discussed the roles of both clients and professionals in the previous two chapters it was considered necessary to conduct a detailed search for information relating to interaction between individuals specifically during the inception period. No large well-established body of relevant literature in relation to clients, professionals and their interaction within a construction industry context exists. Cherns and Bryant (1984) investigated the role of the client in the construction management process. They highlighted the importance of obtaining access to critical data and put forward their impressions in a list of 20 points which they suggest be treated as hypotheses to be tested. Their point 10 states:

"The earliest decisions taken by the client system have more influence over the way the TMO (Temporary MultiOrganisation) is formed and its subsequent performance than those taken later."

This emphasises the importance of early client decisions and also how the client is integrated into the project organisation, and acts as confirmation that the client has a significant role to play in making decisions before any contracts are signed.

Higgin and Jessop (1965) highlight problems of communication between clients, design teams and construction teams. They arranged the building process into 7 phases, beginning with the client's decision to build and ending with handover and final account settlement. In the first phase, client deciding to build, they highlight the key concept of client sophistication and the influence of the first point of contact with the industry. They summarise their review of problems relating to the building process by putting forward two general conclusions. The first states that the main factor lying behind communications difficulties is the nature of the relationships between the communicators. The second is as follows:

"..any attempt at improvement, however limited, cannot hope to achieve any significant degree of success in the absence of much more information than is at present available, about just what job any communication is supposed to do."

Again the importance of the early stages in project development, in this instance emphasising communication as the key concept, is raised.

Higgin and Jessop's work forms part of a large body of investigation into socio-technical systems conducted at the Tavistock Institute of Human Relations, which was founded in 1947 by a group of psychologists, and therefore offers a psychological analysis of the construction industry. The work of their Building Industry Communications Research Project, (Higgin and Jessop (1965), Tavistock Institute (1966)), attempted to apply the socio-technical framework, the understanding of the interrelation of technology and social groups, to the construction process. The five facet model of the socio-technical system, (Tavistock Institute

(1966)), comprises of: a '*social system*' (personal and group interactions), a '*technical system*' (machinery and techniques), a '*system of resource controllers*' (allocating resources to the technical system), a '*formal liaison system*' (between resource controllers) and an '*informal liaison system*' (between resource controllers). Higgin and Jessop contend that there is a mismatch between the formal and informal liaison systems resulting in a social system in which animosity and mistrust proliferate. This leads to a failure to optimise the process due to lack of planning, causing inefficient use of resources.

There are a number of criticisms relating to weaknesses in the Tavistock approach to analysing problems in the construction industry, many of which are discussed by Winch ((1987), (1988)) from a sociological perspective. Winch (1988) contends that the Tavistock work ignores conflicts which are caused by the social structure of the situation, and in particular conflicts brought about by the differing economic interests of the independent firms involved in the process. The Tavistock socio-technical systems approach is derived from much research conducted within single organisations, such as the National Coal Board (Trist and Bamforth (1951)) and the Glacier Metals study (Brown (1967)). In addition the psychological orientation of the system ignores the disparate economic interests of the participants. Therefore its application to a construction industry context where the project participants, both clients and professionals, are likely to have different economic interests, is more problematic. This is particularly relevant, in the context of this investigation, when considering the proliferation of different professional services now being offered to clients; a situation which leads to different organisational and contractual relationships: between the professionals, and with their clients. As Winch (1988) states:

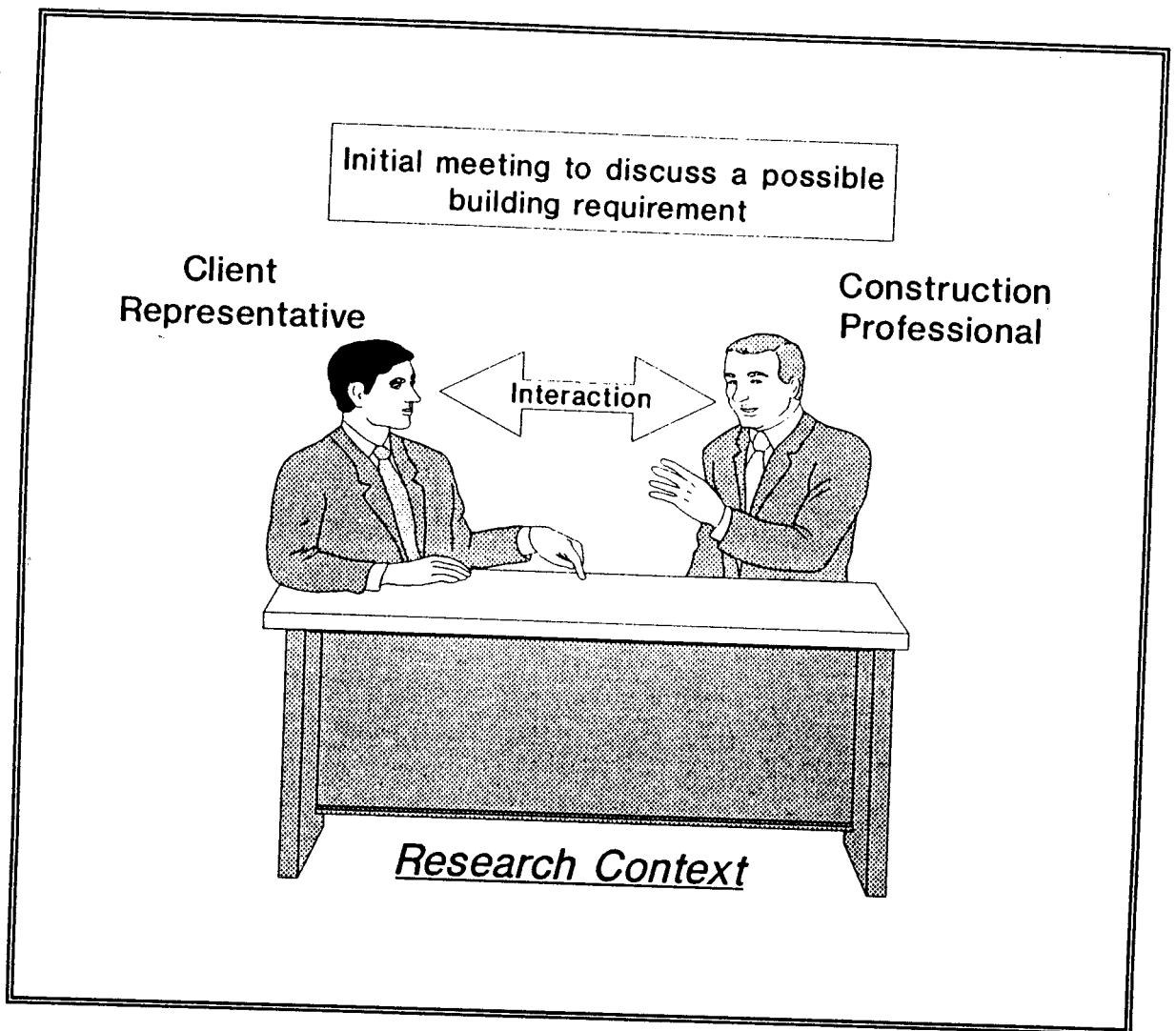
"To retain their relative economic and social power, professions must exclude others from their sphere of expertise. At the same time they must maintain their professional ethic in the exercise of their monopolized expertise. Both of these imperatives induce a distancing from other parties to the construction process, be they other professional groups or non-professionals. The existing contracting system makes it much easier for construction professionals to manipulate their relationship with others to their own advantage."

Therefore the economic and social power of the professions needs to be considered.

Wallace ((1987a), (1987b)) looked at design team communication content in the pre-contract design stages. He collected data from 16 construction projects and analysed the content of design team meetings, concentrating on the decision-making process of architects in particular. In the inception and feasibility stages, A and B, of the RIBA "Plan of Work", (RIBA (1977)), one of the findings was that there were problems with reconciling items such as capital cost and cost-in-use relating to client requirements. This led to client requirements in such areas becoming obsolete as the design progressed. This highlights the importance of clear and realistic client requirements being defined and communicated at the earliest stages of a project's development.

At the inception stage a situation exists where the parties involved, client and professional, possess specific bodies of knowledge relating to a potential construction project. However, these spheres of knowledge will not be identical. For example, inexperienced clients will have knowledge of their own organisation and of their perceived requirements for a building. On the other side the professionals will have specialised knowledge relating to their own construction-related professional disciplines. This situation forms the basis of an interactive process where relevant information is exchanged.

Therefore the boundaries of the investigation were defined, and can be illustrated using the following diagram:



The process under investigation is the interaction process between clients, of varying levels of experience, and construction professionals, from varying disciplines. The situation under examination takes place during the inception stage of the project, RIBA stage A, and concentrates in particular on the first meeting between client and professional.

3.7 SUMMARY

Professionals from different disciplines are involved in varying relationships with other professionals, and some form of client, on any construction project.

Considering the historical development of the professions their roles, in the context of their function and responsibilities, have changed. The clearly defined barriers between professional groups no longer exist. One of the major reasons for this is the increase in

procurement options now available to clients. Although, in the majority of cases, the same professional groups are involved in construction projects, their functions and responsibilities differ. An example of this is the escalation of construction professionals from all disciplines offering '*Project Management*' services to clients, which encompass functions and responsibilities outside of their main historical areas of expertise.

The separate professions have also been influenced by the establishment of professional institutions who, by introducing rules and procedures, have shaped the development of those professions within their own fields. Their influence extends to the education of professionals where they have influenced the educational system in two particular areas. Firstly, the entry requirements at degree level are set at levels relating to the status of particular professional disciplines. Secondly, they have been able to control, to a certain extent, the content of courses attached to their particular professions. Over the years this has led to the development of an educational curriculum, particularly at degree level, with a specialisation towards certain subject areas which are related to particular professions. However, recent changes to the historical roles do not appear to be reflected in the content of degree courses.

Individuals are shaped by established expectations of the roles which they are to take in their working environment. Concepts of professional work, and the professional-client relationship, lead to a situation where professionals develop a set of preferred diagnosis patterns. Their control over applying such diagnoses will be influenced by the expertise of the client in the particular situation being debated. Professional occupations are rated in terms such as social status, by themselves and others, to produce a '*construction hierarchy*' which has changed little over the years. The ranking of the construction professions with regard to social status is identical to that obtained when ranking entry requirements to degree courses. Therefore social status is promoted by educational entry levels.

Finally, the current advice services offered to clients by the professional institutions have developed to represent, and perhaps safeguard, the interests of their members as well as the interests of potential clients. In addition, other client guides produced by independent organisations are generally available through professionals as it would be difficult for clients, and particularly inexperienced ones, to know of their existence. This highlights the difficulty

for clients attempting to obtain independent and impartial advice with the availability of such material being in the hands of professionals.

Having discussed the role of professionals in this chapter, and reviewing the tentative hypothesis presented at the end of chapter 2, the following four hypotheses are put forward to be tested:

- 1. The way in which potential building clients and construction professionals interact is a function of the client's previous experience of construction.**
- 2. Inexperienced clients tend to be dominated by the professionals they are interacting with who determine the interaction process.**
- 3. Experienced clients tend to dominate the professionals they are interacting with and determine the interaction process.**
- 4. The interaction process between inexperienced clients and construction professionals is determined by the professional discipline of the professional with whom they are interacting.**

4.0 **RESEARCH METHODOLOGY**

4.1 **INTRODUCTION**

The previous two chapters have investigated the two participant groups involved in the process of procuring a building. Factors contributing to their behaviour and its likely effect upon the interaction process have been discussed and the hypotheses formed. The next stage is to develop a research method which tests the ideas generated and ultimately presents results which support or disprove the validity of these hypotheses.

This chapter describes the development of the method adopted to collect data and how it is used to test the hypotheses.

The first section is a summary of the final method adopted. The subsequent sections discuss the reasoning behind the selection of this method by comparing and contrasting the alternatives that were considered for key parts of the research design. These are: participant selection, data collection techniques, data coding and processing procedures and data analysis methods.,

4.2 **RESEARCH METHOD SUMMARY**

In this section the final research method adopted for this investigation is summarised. The reason for outlining the method at this point in the thesis is to enable the reader to see the overall research concept. The subsequent sections discuss the reasoning behind the selection of methods and techniques.

(i) **SOURCE OF DATA**

A series of case studies involving interviews between clients, of varying levels of experience, and members of four different construction professions.

(ii) **RESEARCH SUBJECTS**

- (a) Client representatives (clients) of organisations who are considering commissioning a construction project.
- (b) Construction professionals representing four disciplines: architecture, quantity surveying, consulting engineering and contracting.

(iii) **DATA COLLECTION PROCEDURE**

- (a) Each client produced a 1 page written description of their building requirements before the interviews commenced, with these details being provided to professionals one week before the interviews were conducted.
- (b) Clients take part in 4 interviews, individually, with a representative from each professional discipline to discuss their building requirements.
- (c) Each interview, of 45 minutes duration, was recorded on audio tape.
- (d) The order in which clients were interviewed by the various professionals was varied to reduce the influence of bias towards one particular party.
- (e) After each individual interview both parties, client and professional, completed written data sheets providing information on their impressions of the interview.
- (f) After all interviews were completed each participant completed: a data sheet giving their overall impressions of the interviews, and a brief written personality test.

(iv) **DATA PROCESSING**

- (a) Audio tapes were transcribed manually and stored in wordprocessor formatted data files.
- (b) Further processing of interview data was conducted using coding systems to classify interaction process during interviews and interview content.

(v) **DATA ANALYSIS**

Results testing the validity of hypotheses are presented in two formats:

- (a) Analysis of data on a case study basis using quantitative data presented in the form of graphical profiles, supported by qualitative extracts from data sheets, and the results of personality tests.
- (b) Statistical analysis, using a t-test, comparing client and professional sub-groups.

To test the chosen hypotheses it was necessary to identify and select clients and professionals to take part in the research investigation.

Clients with the varying levels of experience of involvement in construction projects, as classified in Chapter 2, were required. A number of methods were utilised to identify client organisations who would be willing to take part in the research. These included:

- (a) Letters were sent to 120 major companies in the Berkshire area. These included: developers and service and manufacturing organisations.
- (b) 30 letters were sent to local companies whose names were obtained by searching Local and County Council registers of: commercial and industrial companies, and registers of local planning applications.
- (c) A letter was included as part of mailshot of 500 local companies being conducted by Reading based firm of Chartered Surveyors.
- (d) Advertisements were placed in local newspapers: Business Gazette, Newbury Business News, Reading Chronicle.
- (e) Contact was made with the RIBA Clients' Advisory Service.

The response to these methods was extremely low. 12 replies were received to the letters and one contact was made from the advertisements.

Ideally an equal number of representatives of each client classification were required. However, because of the low response to identifying clients, it was necessary to revise the requirements. For example, no firm offers of assistance were obtained from any clients, such as property developers, who would be classified as primary experienced. Firm offers of assistance were received from 12 client organisations, classified as follows:

- (a) secondary inexperienced - 6 No.
- (b) secondary experienced - 6 No.

One of the secondary inexperienced clients was unable to attend on the day when the interviews were scheduled, because of illness. Therefore 11 clients took part in the research.

The identification of professional participants was conducted in a similar manner. Letters, requesting assistance, were written to architectural practices, quantity surveying practices, consulting engineers and contractors. 15 positive responses were received, with 12 professionals being required, three from each profession. Professional representatives, from each of the four disciplines, were selected to provide comparable levels of experience.

The inclusion of representatives of primary experienced clients was originally anticipated. However, their absence does not necessitate a review of the hypotheses. All of the secondary experienced clients were represented by experienced in-house professionals, whose primary responsibility was managing property procurement for the client. In addition all of the representatives had been involved in other construction projects within the 12 months before the research interviews took place. Therefore a comparison between '*inexperienced*' and '*experienced*' clients is still valid.

Further details of both clients and professionals, who took part in this research, including classifications of the organisations and their representatives, are given in Appendix 1.

4.4 DATA COLLECTION PROCEDURE

4.4.1 Use of Interviews

With the decision being made to use interviews as the main source of data to be collected the advantages and disadvantages of this method need to be considered.

The main advantage is that using interviews between clients and professionals reproduces a process which occurs naturally in real-life situations. The key disadvantage is the frequently cited effect on participants of being observed in a laboratory setting rather than in their own natural environment (Bouchard (1969), Green and Taber (1980)). Canter and Brown (1985) state that there are many aspects of human experience which cannot be studied in a laboratory, and that it is necessary to approach the people in the settings themselves. They

refer to examples such as behaviour in prisons and how people buy houses.

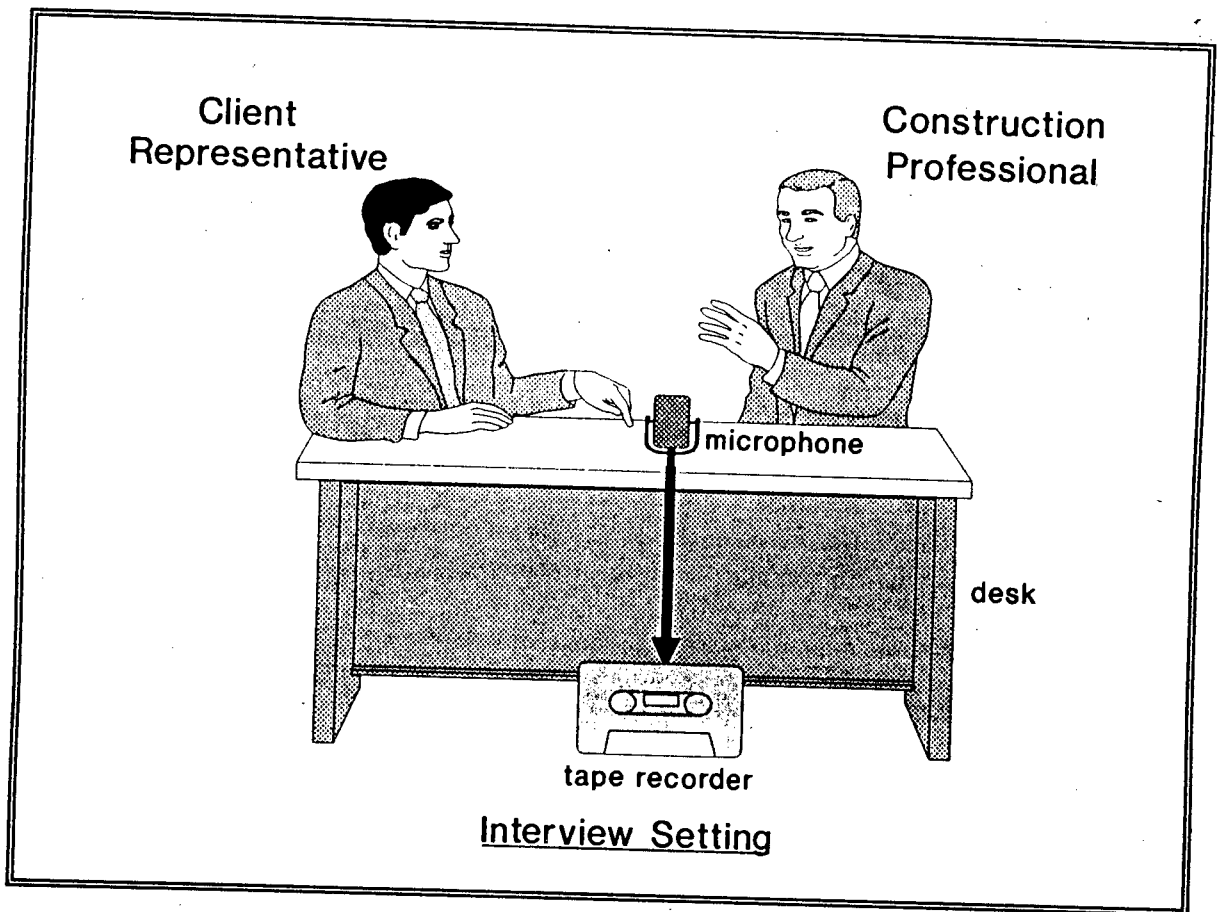
Although the ideal situation would be to observe clients and professionals in their 'natural' setting such an arrangement raises certain practical and methodological issues when the main research objectives are considered.

Because the research is focusing on the initial contact between clients and professionals, and how different client types interact with different construction professionals, the observation of meetings in either party's offices would be problematic. Firstly, the researcher would have no control over how interviews were conducted both in terms of the number of people involved in each meeting and the timescale of them. Secondly, it is extremely unlikely that a potential client would, in reality, seek initial advice from a number of different professionals. A valid comparison would be difficult to produce because of the lack of control over many of the variables involved. Therefore an interview methodology was developed so that valid comparisons could be made from the interaction between clients and professionals.

To overcome the previously mentioned problems, of timescale, numbers involved and different professionals' involvement, the decision was made that the interviews would be conducted in a 'laboratory type setting', which is a well established research method in the field of counselling psychology. This allows for certain constraints to be imposed upon the participants particularly relating to timescale and order of interviews. However, one area where it was considered essential that no constraints should be imposed was that of the actual verbal interaction during each interview. Although the setting might be considered to be 'unnatural' the nature of the discussions during the interviews should remain as open and natural as possible (Duncan and Fiske (1977)).

The setting, in which the interviews took place, was another factor which was standardised as much as possible, with a consistent setting being provided. A number of studies have been conducted into different settings in which interviews take place (Bloom *et al* (1977), Kerr and Dell (1976), White (1953)). Widgery and Stackpole (1972) conducted an experiment where they found that there was a significant interaction effect between

interviewers desk position and interviewee anxiety level. Taking this into account the setting of the interviews was standardised so that each room used was arranged in the same way with regard to desk and seat orientation. The arrangement adopted is illustrated in the diagram below:



Room arrangements consisted of a desk, with two adjacent chairs for the interview participants. No other parties, including the researcher, were present during the interviews. The presence of recording equipment will be explained in section 4.4.2.1.

Because this investigation is concentrating on an interactive process involving dialogue between two parties, at a specific point in time, there are a number of alternatives available for the collection of this data. In considering possible approaches to the collection of data using interviews Dunnette (1976) outlines the following alternatives, based on different question and response permutations:

<u>RESPONSES</u>	<u>QUESTIONS</u>	
	SPECIFIED	UNSPECIFIED
SPECIFIED	A	C
UNSPECIFIED	B	D

Type A - Totally Structured

Type B - Structured Questions, Open Responses

Type C - Open Questions, Structured Answers

Type D - Totally Unstructured

Taking into account the situation under investigation the above options were evaluated as follows:

Type A - Totally Structured

This method would involve the production of both standard questions and structured alternative responses. Their production would be based on a priori assumption that certain areas had already been identified and provided the basis of a procedure for testing specific hypotheses based on specific answers (Sjoberg and Nett (1968)).

Also at such an early stage in the project development process it would be very difficult to ensure that standard questions and structured responses would elicit valid information, primarily because of the diversity of client types, professional groups and project types. Therefore this method was rejected as it would not allow for a '*natural*' interaction between the parties. Also Mackinder (1980) has highlighted problem areas using such a method relating in particular to due attention being given to structured questions, the depth of detail of information collected, and the tendency of respondents to state the ideal rather than the actual.

Type B - Structured Questions, Open Responses

This option was also rejected for similar reasons to those given for Type A. Again questions would be based on priori assumptions on areas but responses would be based on the perceptions of the respondent.

Although this method was rejected for the main data collection it was considered to be potentially useful as an additional form of data collection. One particular area of use, which is suggested by Lindzey and Aronson (1980), is in the form of a post-experimental interview or de-briefing session.

Type C - Open Questions, Structured Answers

Dunnette (1976) states, in his outline of these options, that this option is one which is rarely, if at all, used. Such a method would impose unrealistic constraints upon the data collection and was therefore also rejected.

Type D - Totally Unstructured

This unstructured approach to interviews is well established, particularly in the field of clinical interviewing. Taking into account the nature of this research, looking at the interaction between clients and construction professionals, a possible danger would be the imposition of an 'unreal' situation upon the participants. Two key concepts need to be considered when using this type of experimental design. Firstly, there is "*experimental realism*" which suggests that a situation is realistic to the subjects if it involves them, has an impact upon them and that they are forced to take it seriously. The second is "*mundane realism*" which is the extent to which events occurring in a laboratory setting are likely to occur in the real world (Lindzey and Aronson (1980), Rosenthal and Rosnow (1991)).

The situation where a client discusses his requirements with a construction professional is one which is situationally realistic, and also occurs as a '*real world*' phenomenon.

Therefore the totally unstructured method was selected as the main method of collecting data for this research.

The next area to consider is that of the order in which interviews were to be conducted. Taking as a general framework a day of interviews involving 4 clients and 4 construction professionals (architect, quantity surveyor, consulting engineer, contractor) a matrix needed to be constructed which reduced the element of bias towards any particular party. For instance if each client was interviewed first by an architect, and then by the other 3 professionals in the same order, a bias towards architect's views, as the initial contact, is introduced. To reduce this bias the latin square method of design was used (Barker (1985), Fisher and Yates (1963)). A latin square comprises of an equal number of rows and columns within which a set of numbers or letters appears only once in each row and column. To produce a design using the latin square Barker (1985) outlines the following procedure:

- A. Identify the number of levels in the factor under study.

This is the number of professionals involved (4).

- B. Match the number of levels in the blocked factors to this number.

The 2 blocked factors are: number of clients (4) and number of interviews (4).

- C. Assign blocks to rows and columns and put the factor under study into the body of the matrix.

Clients assigned to rows, interview numbers to columns and professionals put into the body of the matrix.

- D. The appropriate type of latin square is then selected.

In this case the 4x4 first transformation set self-conjugate standard squares (Fisher and Yates (1963)) were selected as shown:

A B C D
 B A D C
 C D B A
 D C A B

Square 1

A B C D
 B C D A
 C D A B
 D A B C

Square 2

A B C D
 B D A C
 C A D B
 D C B A

Square 3

By assigning different professional disciplines to each letter within the square, and using square 1 as the example, the following interview arrangement is produced:

PROFESSIONAL INTERVIEW ORDER				
	(1)	(2)	(3)	(4)
CLIENT (1)	A	QS	CE	CON
CLIENT (2)	QS	A	CON	CE
CLIENT (3)	CE	CON	QS	A
CLIENT (4)	CON	CE	A	QS

Key to Professionals :

A = Architect

CE = Consulting Engineer

QS = Quantity Surveyor

CON = Contractor

By using a different latin square for each set of interviews the bias factor can be further controlled.

The original objective was to involve an equal number of clients from each classification: two secondary inexperienced and two secondary experienced, in each latin square design. This was not possible in practice because of incompatibilities between interview dates and client availability. Therefore on each of the three days of interviews the following number of types of clients participated:

DAY	SECONDARY INEXPERIENCED	SECONDARY EXPERIENCED
(1)	1	3
(2)	3	1
(3)	1	2

N.B. On day (3) one secondary inexperienced client was unable to take part in the interviews.

4.4.2 Types of Data Collected

4.4.2.1 Interview Recordings

Each interview was recorded on audio tape to enable each interview to be analysed, as the researcher was not present in the interview room during any of the interviews. The reason for this was to prevent any influence being placed upon the interview participants by the presence of a non-participating party (Lindzey and Aronson (1980)).

The presence of a tape recorder could also be said to have an influence upon the interview participants. Roberts and Renzaglia (1965) conducted a research project where counselling interviews were carried out under three different recording conditions:

1. Tape recorder visible in room.
2. Microphone only visible in room.
3. No recording.

In condition 3 above, no recording, interviews were in fact recorded using a hidden system. The results showed that the different conditions had no influence upon the ratio of talk between client and counsellor, and therefore the study concluded that the use of a recorder did not influence the counselling process. However, this study raises certain ethical issues relating to the way in which research projects are conducted. Indeed, at the end of Roberts and Renzaglia's paper a commentary is made on it by Leona Tyler of the University of Oregon. She states that their experiment should never have been carried out, with the major

criticism relating to the ethics of recording interviews, using hidden equipment, without the agreement of the participants.

Therefore in this project tape recorders and microphones were visible, and the consent of all participants to the recording of interviews was obtained.

To fit into the research design, and arrangement of interviews with different parties, each interview was a maximum of 45 minutes duration. This was to allow for the interviews to be completed on one day, with time being allowed to complete data sheets between interviews.

4.4.2.2 Data Sheets

A number of data sheets were designed to elicit specific information from client and professional participants in this research project.

The first data sheet, [DAT.1], was a statement of client requirements. This consisted of a 1 page statement of what each client perceived to be their requirements for a new building. This statement was produced before the interviews with professionals were conducted. These data sheets were circulated to the professionals one week before the interviews were conducted. The reasons for collecting this data are twofold.

Firstly, such a statement provides an initial written record of what clients think they need in a new building. To substantiate the use of this initial statement, as being one which is likely to be produced by clients in real situations, a number of construction professionals were contacted for their opinions. Examples of their responses are given below:

(a) A Multi-Disciplinary Consultancy Organisation

"Formats for conveying information take many forms i.e. discussions, written documents, questionnaires, visits and field trips. These formats develop over time as does the relationship between a potential client and his designer".

(b) A Design / Build Company

"Client requirements are always conveyed in written form with the length of the statement varying from a couple of pages to massive documents".

(c) Architectural Practice (1)

"Outside the large institutions who build regularly, it is for most clients a one off experience in which they start as novices. Seldom do they come with any clearly defined brief, they simply do not know the questions to ask. The brief and priorities only evolve through discussion".

(d) Architectural Practice (2)

"With experienced clients the initial requirements are normally in detailed written form. With inexperienced clients there is not one particular method that was used, as circumstances were so different from one client to another".

Therefore, given the range of methods used in practice, the incorporation of a written statement of client requirements into the research design is realistic.

Secondly, there is the problem of imposing a time limit upon the main interviews. The amount of meaningful and relevant information, i.e. information specifically related to the main research objectives, can be constrained during a time-limited unstructured interview. A written statement, given to the professionals before interviews take place, provides an initial source of information which allows them to focus upon aspects which are of particular relevance to their own discipline. This provides the potential for more specific and focused discussions with clients. A number of research projects have concluded that such a time-limited approach can be as effective as other open-ended alternatives (McKittrick and Gelso (1978), Munro and Bach (1975), Shlien *et al* (1962)).

Other data sheets were completed by clients and professionals after each individual interview, and at the completion of all interviews. The objective was to obtain the impressions of both parties of: each other and the discussion which took place.

Lindzey and Aronson (1980) suggest that the final stage in an experimental process is normally a post-experimental interview, or de-briefing session, to obtain feedback from participants in the main experiment. They also state that the time at which this process is conducted is of critical importance to overcome problems of memory recall on significant events. For example, if such a de-briefing session were to be conducted a week after the main interviews took place the level of accuracy of participant recall about those interviews is likely to be lower than if they were carried out immediately afterwards. Also delayed sessions could affect the validity and reliability of the data due to misinterpretation and omission (Sudman and Bradburn (1974)).

Therefore participants were given standard forms to complete to obtain data on their impressions of each individual interview, immediately after each interview. A final form of overall client and professional impressions of all of the interviews was completed immediately after the completion of all interviews. This data provides a source of information to enable comparisons to be made between client impressions of different professional groups and vice versa.

A full set of examples of the data sheets used are shown in Appendix 2.

4.4.2.3 Use of Personality Tests

The relationship of personality to role and status is an important area. Bales and Slater (1970), looking at the performance of groups, identified problems in group performance, such as lack of fusion and integration. Groups who were perceived to have performed poorly were affected most strongly by personality differences among group members. Particularly in a one-to-one situation the element of personality becomes an area which needs to be considered.

The interview arrangements seek to control the introduction of bias, due to different professional roles, by using the latin squares design. However, these arrangements do not address the personality dimension of such interviews.

Because the research is concentrating on a situation which is a first point of contact between individuals each party is likely to form some initial impression of the other, which could be favourable, neutral or unfavourable. The introduction of some form of test of personality provides a method of measuring some of the underlying themes behind such impression formulation. Two main potential advantages of using personality tests are now considered.

1. Using a test would allow for an analysis to be conducted to determine similarities or differences between client types and different professional groups. A comparison can be made between types of personality relating to the level of client experience. Similarly, individual professional groups can be studied, for example, to determine if architect's exhibit particular personality characteristics as a group when compared to consulting engineers.
2. Certain interviews may be noticeably different from the majority in terms of their content or based on written comments from one or both parties. In this instance individual personality profiles could be used to determine whether or not personality did in fact contribute towards unusual circumstances in a particular interview.

Although the use of personality tests is considered to be beneficial to the research design certain limitations of use need to be highlighted. The main aspect of such limitations is concerned with the sample size of clients and professionals, if one considers the sample size in relation to the total population of the groups under investigation (Duncan and Fiske (1977)). Because the sample size is small it is not possible to produce statistically valid conclusions, particularly with regard to point 1 previously outlined. In these circumstances any results have to be treated as a source of supplementary information rather than being part of the main research findings from the interviews themselves. However, the use of test results on an individual interview basis, as outlined in point 2, is considered to be a valid procedure as it concentrates on an individual act at one point in time, rather than drawing inferences from a limited series of acts at different times.

A number of different tests are available for use in determining certain elements of an individual's personality, and some examples are now discussed. Bales and Slater (1970) used

the 30 item California F-Scale, in their study of leadership of groups, which measures personal perceptions and values (Adorno (1950)). As part of an investigation into interactions between individuals in small groups Duncan and Fiske (1977) used a series of paper and pencil tests on participants. These included the Thorndike Dimensions of Temperament Scale (Thorndike (1966)), which scales temperament variables, and the Firo-B Questionnaire, (Schutz (1958)), which provides scores that estimate the levels of behaviour which the individual feels comfortable or appropriate in connection with their needs for inclusion, control and affection. This questionnaire was also used by Dodd and Langford (1990) in their case study of a large construction project to measure the nature of interaction between construction managers and trade contractors.

Another common test is the Myers Briggs Type Indicator, (Briggs Myers (1985)), which measures perception and judgement and is used to evaluate the choice of careers. Each of these two measures is then divided into two further options. Perception is divided into sensing and intuition, and judgement into thinking and feeling.

Considering the specific factors identified for this research a decision was necessary on the most appropriate test to use based on two main criteria, firstly, time availability to complete the test and, secondly, the provision of test results relevant to the situation under investigation.

One of the limitations of the research is the design to collect data in one location on one day. This imposes time constraints upon the parties involved. In Duncan and Fiske's (1977) study a period of 55 to 60 minutes was allowed for the completion of tests. Also in the Myers Briggs test subjects have to answer 126 questions.

The second criteria, relating to the situation being studied, means that the selected test must provide data which measures the interaction feelings of individuals and which incorporates simple scales capable of interpersonal comparison.

The Firo-B Interpersonal Dimensions questionnaire is designed to provide scores which indicate the level of behaviour an individual is most comfortable in demonstrating towards

others: **expressed**. It also points to the behaviour that the individual prefers others to use in their attempts to interact with him or her, **wanted**. The second area of its scoring system is to categorise scores in three dimensions. The first dimension, **inclusion**, assesses the degree to which a person associates with others. The second, **control**, reflects the extent to which a person assumes responsibility, makes decisions or dominates people. The third, **affection**, reflects the degree to which a person becomes emotionally involved with others. The relationship between personal behaviour and the three dimensions can be summarised in the following table:

	EXPRESSED BEHAVIOUR (e)	WANTED BEHAVIOUR (w)
INCLUSION (I)	I include others in activities, try to belong and be with people as much as possible.	I want others to include me in their activities, and invite me even if I don't make an effort to be included.
CONTROL (C)	I try to exert control and influence over things, take charge and tell others what to do.	I want others to control and influence me and tell me what to do.
AFFECTION (A)	I make efforts to be close to people and to be friendly, affectionate, personal and intimate.	I want others to be close, friendly and affectionate to me.

The results can also provide examples of compatible and incompatible behaviours (Musselwhite and Schlageter (1977), Ryan (1989)). As examples of this the following compatibilities and incompatibilities are suggested:

COMPATIBILITIES

A person with	matched with a person with
High expressed inclusion	High wanted inclusion
Low expressed inclusion	Low wanted inclusion
High expressed control	High wanted control
Low expressed control	Low wanted control

INCOMPATIBILITIES

A person with	matched with a person with
High expressed inclusion	Low wanted inclusion
Low expressed inclusion	High wanted inclusion
High expressed control	Low wanted control
Low expressed control	High wanted control

Test results are given on a scoring scale: with the range running from 0 to 9, with the following sub-classifications and characteristics:

<u>SCORE</u>	<u>DEFINITION</u>	<u>BEHAVIOUR</u>
0 - 1	very low	rarely displayed
2 - 3	low	not noticeable
4 - 5	medium	marginal
6 - 7	high	noticeable
8 - 9	very high	strongly characteristic

To illustrate the use of the Firo-B two examples of test results are now presented, one for a client and one for a professional. Having answered the questions each form is analysed and a set of summary scores is produced in the following tabular format:

Results for Client X

	I	C	A
e	8	9	3
w	3	2	7

Results for Professional Y

	I	C	A
e	2	3	8
w	8	9	2

The two rows represent expressed (e) and wanted (w). The three columns represent scores for Inclusion (I), Control (C) and Affection (A).

These results show that client X exhibits very high expressed inclusion, very high expressed control and high wanted affection. Professional Y exhibits very high wanted inclusion, very high wanted control and very high expressed affection. The Firo-B results suggest that these two individuals are highly compatible as their scores show high compatibility on all three measures: inclusion, control and affection.

Therefore the Firo-B questionnaire was selected for use as it was considered to satisfy the main criteria outlined previously for two main reasons. Firstly, it can be satisfactorily fitted into the timescale of the research. It consists of only 54 short questions which require answers to be given on a six point scale. Secondly, the factors it measures, particularly exertion of control over others, a measure used by Dodd and Langford (1990), provide data which can be used to explain the occurrence of certain interaction patterns, relating to client or professional domination, in the research interviews.

Having identified the situation under investigation as being the interaction between clients and construction professionals the next crucial stage is the processing and coding of the collected data. Gerbner *et al* (1978) state:

"The purpose of any analysis is to illuminate or to make possible inferences about something that is not otherwise apparent. In the analysis of messages this particular 'something' is a type of significance or 'content' that becomes available to an analyst who uses particular methods for specific purposes."

In this section the selection of appropriate processing and coding methods is discussed. This includes descriptions of the framework for processing data, and of the coding techniques utilised to interpret the data in relation to the defined hypotheses.

The section concentrates on the reasoning behind the processing and coding rather than detailing the full processing and analysis method. A detailed example showing the way in which collected data was processed, coded and analysed is given in Appendix 2.

4.5.1 Processing Collected Data

This research is dealing with an interactive process between human beings. Therefore the processing of the data must incorporate a system where such interaction is capable of being defined, measured and ultimately analysed to provide relevant results.

The reasoning behind the collection of qualitative information from interview participants using data sheets has already been discussed, in section 4.4.2.2. Processing of this data involves a comparative analysis of comments made. This form of data is primary and explicit (Krippendorff (1980)). However, the main corpus of data collected is the audio tape recordings of the interviews. 44 interviews were recorded producing approximately 33 hours of speech to be processed and then analysed. Clearly implications of timescale, and resources available, need to be taken into account. As Krippendorff (1980) states:

"When a researcher decides to simply tape the group experiments he conducts the man-hour requirements for a content analysis of these tapes can easily be between 10 and 100 times the time covered by the tape."

Therefore using this estimate 33 hours of recordings equates to between 330 and 3300 man-hours of analysis. Because of the resource implications the method adopted needs to combine processing with the early stages of the analysis, namely the coding procedure.

The majority of studies of group interaction which have been undertaken have occurred in the field of social psychology, used in psychotherapy situations where patients and therapists discuss particular client problems (Boyd (1970), Claiborn *et al* (1981), Corrigan *et al* (1980)). Many early studies used small random samples from collected data for analysis purposes because of the resource and timescale implications of processing large corpuses of data manually (Auld and Murray (1955), Duncan and Fiske (1977), Marsden (1965)). However, major advances in computer technology, with powerful hardware and software being available to researchers, means that greater amounts of data can be processed and analysed (Hockey (1980), Oakman (1980), Pfaffenberger (1988), Tesch (1990), Wallace (1987a), Zimmer and Cowles (1972)).

When dealing with a communication process a method must be determined to analyse the communication content. An established and well documented procedure for carrying out studies concerning methods of communication is '*Content Analysis*'. It is described by Berelson (1971) as:

"....a research technique for the objective, systematic and quantitative description of the manifest content of communication."

Content analysis is based on the assumption that the language in which people choose to express themselves contains information about their psychological state (Krippendorff (1980), Viney (1983), Weber (1980)). An example of this, in relation to this research, would be if a client frequently referred to timescale during an interview. A content analyst would assume from this that time is a heavily influential factor on that client. If client references

to timescale were frequently found in a majority of interviews then it could be concluded that timescale is heavily influential upon clients in general as a group. Therefore topic frequency is related to the level of interest of subjects under investigation (Pool (1959)).

Although Mostyn (1985) says that the analysis of communications using content analysis can be traced back to 1740, she also states that the greatest impetus in its use came during the second world war for the analysis of propaganda (Lasswell and Leites (1965), Lazarsfeld and Rosenberg (1964)). Since then content analysis has been used to analyse a wide variety of topics such as themes on Greek vases, dreams, voices, facial expressions, children's books, films, plays and magazines. These are all examples of quantitative content analysis. This raises a central and long established debate in the use of content analysis. This is the **quantitative** approach versus the **qualitative** approach: or in more basic terms **numbers** versus **words** (Berelson (1971), Canter *et al* (1985), Mostyn (1985), Pool *et al* (1973)).

Mostyn (1985) outlines seven major areas of difference between the two approaches which are illustrated in the following table:

	QUANTITATIVE	QUALITATIVE
SAMPLE SIZE	Large	Small
INTERVIEW LENGTH	Short using short answer, multiple choice techniques	Long to get beyond the superficial
QUESTIONING	Set format used for each respondent	Follows respondents reactions to various stimuli within a general framework
OBJECTIVES	Checking exercise, refining existing data	Learning exercise, expansion of existing data
ANALYSIS	Statistical	Content Analysis
REPORT	Statistical based on correlations to further the level of understanding about the research subject: eg. what is going on ?	Based on theories written to understand the attitudes and behaviour of respondents vis-a-vis the research subject: eg. why is this going on ?
RELIABILITY AND VALIDITY	Can always be determined if time and resources are available	Can rarely be determined due to the subjective nature of the research material and the one-off nature of most projects

Quantitative content analysis involves the assignment of codes to verbal text to classify words, sentences or phrases, and is concerned with the frequency of occurrence of given content characteristics (Marsden (1965), Pool (1959), Wallace (1987a)).

In contrast to this, qualitative content analysis involves a less structured approach to verbal text analysis. Rather than being involved in a 'counting' procedure its methodology consists of the scrutiny of raw material to identify the occurrence of regularities in terms of single words, themes or concepts. Therefore the presence or absence of a certain content characteristic is used as a content indicator rather than a frequency count (Mostyn (1985), Pool (1959)).

This dichotomy of approaches can be illustrated by the following example. The basis of a quantitative study might show that architects references to cost reduced considerably during

a number of meetings with clients. The inference from this might be that architects are becoming less interested in cost. Indeed this was one of the findings of the work conducted by Wallace (1987b). However, the qualitative analyst might make a similar inference from the fact that in the architects final project reports to clients, cost was not mentioned. In the first case it is the frequency distribution of attention to cost over a period of time on which the inference is based. In the other it is the mere presence or absence of the word cost on a particular occasion which serves as a basis for the inference.

It could be argued that in the above example the absence of cost in the architects final report might be a function of the fact that cost implications have been sorted out and do not merit further discussion. Therefore in this instance the use of a qualitative analysis system searching for particular words, such as cost, would seem inappropriate. This example shows the importance of the selection of an appropriate system for the situation under investigation to obtain valid results.

Berelson (1971), in his review of seven key areas relating to the similarities and differences between qualitative and quantitative analyses, raises the point that much qualitative analysis is in fact quasi-quantitative. He states:

"Just as quantitative analysis assigns relative frequencies to different categories so qualitative analysis usually contains quantitative statements in rough form. They may be less explicit but they are nonetheless frequency statements about the incidence of general categories."

The key to the success of any analysis of communication content is, as Berelson suggests above, the categorising or coding of the data. Any content analysis is only as good as its coding system (Gerbner *et al* (1978), Krippendorff (1980)). Pool (1959) states that the value of results obtained is dependent upon setting up proper categories and the subsequent coding of material.

The approach to the coding of material can be considered by putting forward two extremes for consideration. One extreme involves the utilisation of existing coding systems, and the

other, the development of a dedicated unique system for a particular research project. Clearly there are intermediate options, but again the key point is the utilisation of a system which is 'appropriate' to a particular situation.

A number of categorising systems do exist which have been developed for use in particular situations and for particular projects, with some of the most recent being developed to enable computers to be utilised.

The 'General Enquirer' system (Stone *et al* (1966)) is a word counting system which also retrieves segments of text relating to specific dictionaries of categories. Examples of the areas for which dictionaries have been developed are: psychosociology studies, political documents and cultural folk tales. The system was initially developed in 1963 running on a mainframe computer using punch cards to process data. Output from the system can be in statistical, graphical and tabular forms. The program can only be run on a mainframe computer and its availability is limited. The Whitehorn-Betz scales (Whitehorn and Betz (1954)) measure the effectiveness of psychotherapists when treating patients using two dimensions of style of work and content of interviews. The system involves the rating of psychotherapists into specific categories such as those with legal expertise or scientific expertise before categorising the interaction procedure (Boyd (1970)). Evaluation Assertion analysis (Osgood *et al* (1957)) is a system which codes the level of emphasis placed upon communication content by an individual. The coding is an involved 4 stage process which identifies messages, establishes assertions, assigns weightings and collates assertions. In a critique of the system, Pool *et al* (1959) contend that although the system is rigorous and explicit it is extremely laborious. Figures are given of one hour of trained coder time to process one page, of 133 words, of material. The Gottschalk-Glesser system (Gottschalk and Glesser (1969)) developed scales for use in clinical psychology and psychiatry to assess disruptive and distressing states such as anxiety and hostility. The system has been used on a wide range of investigations where, in many cases, it has been developed further for specific uses (Viney (1983)). The Thematic Apperception Test (TAT), devised by Murray (1943), has been used in psychological studies to analyse narratives. It classifies phrases into established categories such as competition and aggression. Markoff *et al* (1975) highlight problems using TAT relating to coder instructions which give only general guidelines rather

than exact conditions to classify text. Duncan and Fiske (1977) developed a coding system to analyse two party interactions which consists of 88 variables such as turn taking and physical expressions and movements, which required interviews to be video taped for coding purposes. Wallace (1987b), in his study of design team communication produced a coding system, using a number of published typologies, which he designed and adapted for the purposes of his own investigation.

All of the above examples relate to systems which have been developed for specific purposes and, in some cases, have subsequently been adapted for use in various situations. Because most systems are developed for a specific purpose, to measure a certain communication process between groups of human beings, it is inevitable that revisions and refinements will be made.

A seminal work in the field of group interaction is that of Robert Bales who developed a method called, "*Interaction Process Analysis (IPA)*" (Bales (1951)). The system works by classifying sequences and patterns employed by participants in problem-solving groups. It differs from the previously discussed systems in that it is solely concerned with the process of interaction rather than the content (Olmsted (1979), Stone *et al* (1966)). Therefore it is always used in its pure form, without any alterations or revisions, and has been used to analyse group interactions in situations such as labour mediations (Landsberger (1955)) and undergraduate training groups (Stone *et al* (1966)).

The other extreme of coding strategy is the development of a unique system for a particular research investigation. For example Wallace (1987b) developed a unique coding system for measuring design team interaction. However, much of the system was made up of existing coding systems used both in their pure and refined forms.

One of the main proponents for the development of unique coding systems are Glaser and Strauss (1967). They suggest that rather than applying a coding system to data such codes should emerge from detailed inspection of the data, a method they define as comparative analysis. This method gives the flexibility for the development of new theories from the data in addition to the testing of defined theories. They believe that theories and models should

be grounded in actual empirical observations rather than be governed by established, traditional approaches (Gummesson (1991), Noblit and Dwight Hare (1988), Strauss and Corbin (1990)).

Another approach is ethnographic content analysis which combines the testing of theories with the development of a system of analysis (Tesch (1990)). Categories are not established precisely prior to the analysis but partially emerge from the data. Mostyn (1985) advocates the 'Concept Book' approach to analysing communication content, which consists of 13 stages. The fourth stage, immersion, involves the researcher in an initial inspection of the data with the objective of producing impressions and ideas in relation to the defined hypotheses. The next stage, categorizing, establishes the categories to be used in the coding procedure. This allows for subtleties in the data to be incorporated into the coding system, and the categories are more exhaustive (Pool *et al* (1959), Weber (1980)). Taylor and Cameron (1987) make the following important statement relating to this issue:

"A satisfactory model must incorporate principled and reliable criteria for dividing data into segments, plus an exhaustive classificatory apparatus which does not leave segments unaccounted for, nor allow *ad-hoc* categories to proliferate."

Clearly there are many diverse approaches to the coding of data, some of which have been discussed in this section. The overriding factor must be the selection and application of a system, or systems, which are appropriate to a particular situation (Holsti (1969)).

4.5.2 Measuring Interaction

Each of the four hypotheses defined for this research investigation require that tests are conducted concerning the interaction process and how it affects clients and professionals. Therefore an appropriate system of measurement needs to be selected and applied.

A number of existing analysis typologies have been described in the previous section. Most have been developed for use in particular situations, generally in the field of personal counselling. It could be argued that the process under investigation, the interactive

Bales IPA system consists of the following 12 categories:

CATEGORY	DESCRIPTION
(1)	<u>SHOWS SOLIDARITY</u> - raises others status, gives help, reward.
(2)	<u>SHOWS TENSION RELEASE</u> - jokes, laughs, shows satisfaction.
(3)	<u>AGREES</u> - shows passive acceptance, understands, concurs, complies.
(4)	<u>GIVES SUGGESTIONS</u> - direction, implying, autonomy for others.
(5)	<u>GIVES OPINION</u> - evaluation, analysis, express feeling, wish.
(6)	<u>GIVES ORIENTATION</u> - information, repeats, clarifies, confirms.
(7)	<u>ASKS FOR ORIENTATION</u> - information, repetition, confirmation.
(8)	<u>ASKS FOR OPINION</u> - evaluation, analysis, expression of feeling.
(9)	<u>ASKS FOR SUGGESTION</u> - direction, possible ways of action.
(10)	<u>DISAGREES</u> - shows passive rejection, formality, withholds help.
(11)	<u>SHOWS TENSION</u> - asks for help, withdraws out of field.
(12)	<u>SHOWS ANTAGONISM</u> - deflates others status, defends or asserts self.

Group interaction is coded relating to this system and can be used for both verbal utterances and physical actions.

For example, if a professional were to say to a client: "*You need a 2 storey office building*", using Bales' IPA system this statement would be placed in category 4 - gives suggestions, as it is an attempt by the professional to direct the client towards a solution to their requirements.

However, the IPA system does have certain limitations, primarily relating to the content of interactions (Olmsted (1979), Stone *et al* (1966)). Again using the example sentence, "*You need a 2 storey office building*", the results of an IPA analysis would only classify this sentence as the professional giving a suggestion. There would be no indication of the subject

matter of the suggestion.

Although Bales IPA does have limitations it was adopted as the most appropriate system to categorise client-professional interaction, to provide quantitative data for analysis. However, it was recognised that additional measures were necessary to address the problem of classifying the content of the interactions.

4.5.3 Measuring Content

The previous section recognises the limitations of the Bales IPA system which produces results relating to how people interact, without considering the subject matter of the interaction. This subject matter is of particular importance in relation to the fourth research hypothesis which concerns both interaction and differences between professional groups. 33 hours of interview recordings undoubtedly produce a rich source of more qualitative data on the issues which different clients and professionals consider to be important. A system which reduces the content to numerical values alone cannot provide a comprehensive analysis. Therefore an additional coding of the data was investigated to provide more appropriate qualitative and quantitative analysis of the data.

The use of existing coding systems is less appropriate for a more qualitative analysis because it is critical that the coding system reflects the content, as discussed previously (Glaser and Strauss (1967), Mostyn (1985)). Clegg (1974) collected data from construction sites, for his research into power in organisations, and presents transcripts of parts of recorded data to support and illustrate his ideas. In his book, based upon his Ph.D. research (Clegg (1975)), he states his reasons for adopting this approach:

"I deliberately used ordinary conversational material as my 'data', rather than any form of more elaborate, and consciously designed method (such as questionnaires), because I wanted to be able to point to 'power' in the material of the social world."

The only other system which has been produced, in a context related to this research, is documented in the work of Wallace (1987b) on design team communication. His analysis

system contains elements of a number of existing systems to measure variables such as: contribution type and strength, subject type and sentence strength. The main content of the data, classified as universal design variables, was generated from a review of the data which he collected.

In addition to the review of existing analysis systems the other source of information to assist in category generation is relevant published literature. Strauss and Corbin (1990) make the observation that technical literature can be used to stimulate the theoretical sensitivity of the researcher. Published material relating to clients and professionals was studied to establish a basis from which an exhaustive coding system could be produced. The importance of the definition of client requirements has been discussed previously in Chapter 2, section 2.4.1, with three primary factors being identified: time, cost and quality. The discussion, highlighting many other issues which a client needs to consider at this stage, is equally applicable to the process of producing an exhaustive coding system to classify interview data. It would be extremely difficult to code every sentence in relation to these three factors alone. One could consider using a more detailed classification such as the NEDO report, "Thinking About Building", (NEDO (1985)), a report produced specifically to guide clients. This report has a list of 9 key issues: time, control, complexity, quality, price certainty, competition, division of responsibility, professional responsibility and risk avoidance. All of these issues are undoubtedly important to clients. However, the classification is again too narrow to enable interview material to be coded effectively.

Therefore a procedure was adopted to generate a sufficiently detailed coding system, using two sources of information. The first source of information utilised was published literature, with the general framework of the coding emerging from it. The following five reports had a major influence on defining the major categories: Goodacre *et al* (1982a, 1982b), O'Reilly (1987), NEDO (1988) and Wallace (1987b). The second source of information was the interview data. Using Mostyn's (1985) '*concept book*' approach, and considering the coding procedures suggested by Strauss and Corbin (1990), interview transcripts were studied with important factors being listed.

The combination of these two approaches, to the generation of a suitably detailed set of codes, produced the following five primary factors under which the coding system was developed in detail, which include lists of other reference material of relevance:

Site Factors

The identification of an acceptable site is an essential part of any building procurement process. The client and his advisors need to take into account factors such as location, ownership, size and environmental considerations (Fearfield and McCredie (1988), Goodacre *et al* (1982a), (NEDO (1983, 1988), O'Reilly (1987)).

Building Requirements

Depending upon the clarity and detail of the initial client requirements discussion is necessary to determine the importance of both qualitative and quantitative factors relating to the construction of the required building. Items such as space requirements, appearance, programme, cost, quality and building lifespan need to be determined (Barnes (1988), Goodacre *et al* (1982a, 1982b), NEDO (1983, 1985, 1988), Newman *et al* (1981), O'Reilly (1987)).

Planning Factors

Legislation relating to permission to build on a site is an important consideration which greatly influences what can be achieved on a particular site. It takes into account factors such as traffic and noise generation. Without obtaining the necessary permissions a building cannot be constructed. The process of obtaining planning permission and building regulations approval is a critical part of the procurement process, which can affect other project factors such a timescale and may place restrictions on the type and/or size of building which can be constructed (Capner (1987), CIRIA (1987), Fothergill *et al* (1987), Mackinder and Marvin (1982), O'Reilly (1987), Salt and Brown (1987)).

Project Organisation Factors

During the early stages of project development discussion is necessary concerning how the project will be organised in relation to issues such as: appointment of professionals, professional responsibilities, forms of contract, procurement options and risk allocation

(Austen and Neale (1984), Bennett (1985), British Property Federation (1983), Canter (1974), CIRIA (1985a, 1985b, 1985c, 1985d), Franks (1990), Nahapiet and Nahapiet (1984), NEDO (1976, 1983, 1985, 1988), Ratcliffe and Poulson (1985), Skitmore and Marsden (1988), Tietz (1987a), Walker (1989)).

Client Organisation / Policy Factors

It has already been established that the client has a key role to play in any construction project in defining requirements and communicating them to professionals. Factors to consider include: building standards / ideas, client product / production process, company organisation, future company development and source of funding (Architects Journal (1987), Canter and Canter (1982), CIOB (1980), Cherns and Bryant (1984), CIRIA (1987), Fearfield and McCredie (1988), Goodacre *et al* (1982a), Graham (1983), Higgin and Jessop (1965), Hillebrandt (1984), Mackinder and Marvin (1982), NEDO (1974, 1983, 1985, 1988), O'Reilly (1987), Robinson (1987), Walker (1980)).

These 5 areas provide the framework for the coding of the context of interview material. They form sub-sections of a category titled, "*sentence context*".

In addition to the above categorising of sentence context other coding measures were incorporated into the coding system. Firstly, a speaker identifier was included to distinguish between interview participants. Secondly, the type of interaction was classified, using the Bales IPA system utilised in the quantitative analysis detailed in the previous section. The reason for incorporating this into the qualitative analysis was to overcome the limitation of not being able to relate the nature of the interaction to the subject matter. Using the IPA system and sentence context codes together enables data to be retrieved relating to both the subject matter and type of interaction. For example, a search could be made for a segment of text concerning a professional giving an opinion on the subject of building cost. The final measure incorporated was a system of references to people. This includes self references and references to other construction-related professionals, members of client organisations and other parties associated with procuring a building, such as planners and accountants. This measure can be used to determine how frequently clients and professionals make reference to themselves and various other parties.

This coding system is documented in full in Appendix 3.

4.5.4 Coding / Processing of Interview Material

Having established what is going to be coded it is necessary to determine how the coding operation will to be conducted.

4.5.4.1 Defining the Coding Unit

The first decision to be made is to define the unit to be used for coding purposes. This involves the definition of two factors: the recording unit and the context unit. (Berelson (1971), Holsti (1968), Krippendorff (1980)). The recording unit is defined as the smallest body of content in which the appearance of a single occurrence of a content element is counted. The context unit is the largest body of content that may be examined in characterizing a recording unit. The relationship between these factors can be illustrated by using the following example quoted by Berelson (1971):

"...the recording unit may be a single word or term, but in order to note whether the particular term was treated favourably or unfavourably the analyst will be instructed to consider the entire sentence in which the term appears (the context unit)".

Depending upon the research context the recording unit can be based upon the coding of words, themes or sentences (Weber (1980)). Reducing the coding to individual words reduces the analysis to a mere counting procedure, as it is not possible to determine the context in which an individual word is used, and in some cases words may have more than one meaning leading to erroneous conclusions. It also produces large volumes of data. The theme involves the coding of a single assertion about a particular subject, and has been widely used in studies relating to propaganda (Lasswell and Leites (1965)). Finally, the sentence can be used in situations where the researcher is interested in words, or phrases, which occur closely together.

With regard to the context unit, in some situations it may not be possible to classify the recording unit without further reference to the context in which it appears. For example the

following sentence spoken by a client, classified as the recording unit, might appear in an interview transcript:

"Yes I agree with that"

If one was using the Bales IPA coding system (Bales (1951)), to measure interaction, this sentence would be classified as a category 3 action: "agrees". The code can be assigned without reference to any other textual information. However, the process of coding is more involved when it comes to assigning content codes to this sentence. The context in which the statement is made is not immediately apparent. Therefore it is necessary to examine the transcript in more detail, and in particular the textual information immediately before this sentence, to establish the context in which this statement is made. If the following preceding sentence in the transcript was spoken by a professional:

"Building cost is your most important consideration"

this establishes that the client statement is a reaction to the professional's contextual statement concerning building cost. The client sentence can now be assigned the context code SB24: "building cost".

Therefore the units used to define the coding procedure for this investigation are as follows:

<u>Coding System</u>	<u>Recording Unit</u>	<u>Context Unit</u>
Bales' IPA	Sentence	Sentence
Content Coding	Sentence	Sentence and Preceding Text

4.5.4.2 Code Processing

The initial coding of interviews in this research was conducted manually. The use of computers in content analysis has already been outlined briefly, in section 4.5.1. However, the majority of computer programs are used to process coded data as opposed to conducting the coding (Weber (1980)). Many wordprocessors allow text files to be searched for particular words but are unable to carry out any coding. Some other programs, such as the

General Inquirer (Stone *et al* (1966)), use defined dictionaries to process data, and others provide concordances and frequency counts (Hockey (1980)). In all of these cases the processing is carried out using specific predetermined rules.

Using computers to actually assign codes to a textual file is undoubtedly complex and problematic. Pfaffenberger (1988) describes early developments in the field of artificial intelligence, developing expert systems to assist in the categorising of data. However, he acknowledges that this is a complex field and the development of such systems is very much in its early development stages. The use of computers to code data and produce the required output is dependent upon the nature of the investigation. If a research project involves classifying the frequency of occurrence of words then simple word counting programs can easily be used. It is in more complex situations that the use of computers to code data becomes difficult.

This can be illustrated by considering the coding procedure used in this investigation to measure client-professional interaction. The Bales IPA system is a relatively simple 12 category method. However, to apply the categories to sentences is not a process that can be simply conducted by a computer. To determine whether the content of a sentence is, for example, an opinion (category 5) or a suggestion (category 4) requires a comprehension of many linguistic factors such as morphology, semantics and syntax (Miller (1951)). Computer programs capable of carrying out such a procedure are not currently available. Therefore, for the purposes of this research, the manual coding of data is the only option available.

Having stated that it is not possible to utilise computers to assist in the coding of data they can be utilised in data processing, sorting and result generation (Tesch (1990), Pfaffenberger (1988), Weber (1980)). It was in this context that computer programs were used in connection with both the interaction and content classification schemes used in this research.

With regard to the coding of interaction, using Bales' IPA, the processing and result generation requirements for a computer program were that it could process IPA codes and provide quantitative output concerning their frequency of occurrence. A package was identified called the "Oxford Concordance Program (OCP)", which produces output of

frequencies of occurrences of words and, more importantly, user specified codes (Hockey (1988), Hockey and Martin (1988)).

Tape recordings of interviews were transcribed in the format required for processing of files using OCP. During the transcribing procedure Bales' IPA codes were assigned to each sentence. When a transcript was completed it was then processed using OCP to produce results relating to the frequencies of occurrence of IPA categories for both clients and professionals. A detailed example of this procedure is shown in Appendix 2.

With regard to the coding system developed to measure the content of interviews, a more qualitative and flexible approach was required in investigating the utilisation of appropriate computer programs, because of the complexity of the coding system used.

The requirements for a computer program in this case were for one which would allow multiple coding of sentences. It also needed to be capable of retrieving segments of text in response to requests to searches for appropriate single or multiple codes. The final requirement was for quantitative output, particularly concerning the frequency of occurrence of individual codes.

Pfaffenberger (1988) and Tesch (1990) summarise and categorise the computer programs available for use in qualitative research. The main characteristics of such programs are that they attach codes to segments of text, search for text segments using either single or multiple codes and count frequencies of occurrence of such codes.

Most of the programs are very similar in terms of their code attachment, search and retrieval facilities. Differences between them are relatively minor and mostly relate to the procedures for inputting codes and requesting their retrieval (Tesch (1990)).

Having evaluated the available programs, by comparing the coding requirements for this research with the facilities of each package, and determining their availability, a program called "The Ethnograph" (Seidel *et al* (1988)) was selected for use. The program allows for up to 12 codes to be assigned to each defined segment of text, allows searches to be

conducted for single and multiple codes and also counts the frequency of occurrence of each code word in individual data documents.

Before processing commenced, interview transcript files were formatted to be compatible with the requirements for data file input into The Ethnograph. The program then processes the file and produces a paper copy printout of each interview with each line being assigned a number. The assigning of codes manually, to each sentence, is conducted on paper and then input to the program. When the codes have been entered into the program searches can be conducted.

The Ethnograph does produce a limited amount of quantitative data in terms of frequencies of occurrence of individual code words. To enable further quantitative data to be abstracted from this program, rearranging data to assist in evaluating relative emphasis on factors, two small programs were written in BASIC. Again a detailed explanation of these programs is given in Appendix 2.

4.5.4.3 Reliability and Validity of Coding

Viney (1983) states:

"An assessment of technique is reliable to the extent that it is consistent in measurement. The technique cannot be consistent if errors occur when it is used."

The reliability of the application of the coding system to the collected data is an important factor to consider (Berelson (1971), Mostyn (1985), Stone *et al* (1966)). Pool (1959) contends that the value of results from any content analysis are dependent upon setting up proper categories and accurate coding. Krippendorff (1980) defines three types of reliability which are pertinent to content analysis. The first, '*stability*', refers to the extent to which the results of a content classification are invariant over time. Stability can be determined when the same content is coded more than once by the same coder. Secondly, there is '*reproducibility*', which is sometimes referred to as intercoder reliability. This concerns the extent to which content classification produces the same results when the same

text is coded by more than one coder. The final type, 'accuracy', refers to the extent to which the classification of text corresponds to a standard or norm.

In the context of this research these measures of reliability have been addressed as follows. The problem of stability relates to the expertise of the coder. In this investigation only one person carried out the coding as additional resources were not available. In exploring any activity which is new to an individual there has to be a learning curve during which the researcher gains experience in the task. A series of checks were carried out by the coding of segments of text twice. These segments were statistically analysed initially during the pilot study, using the system described by Bales (1951), applying a chi-square test to two sets of coding scores. As this was the beginning of the training process there were, inevitably, significant variances between coding results, with coefficients of reliability as low as 0.67 being recorded. This led to reviews of the coding procedure. Further tests during the later stages of the pilot study coding, as well as at regular intervals throughout the main study coding, produced coefficients of coding reliability comparable with other published research. Viney (1983) reports reliability coefficients, relating to coding using 10 different content analysis scales, of between 0.71 and 0.96. Other studies report a range of coefficients: Boyd (1970); 0.95 and Elliott (1979); 0.85. After the initial review period the level of reliability reached 0.89.

The issue of reproducibility is again related to resources. As the coding was conducted by one person no measure of intercoder reliability can be produced. Therefore the only way to ensure high consistency, should another individual wish to use the same coding system, is to provide comprehensive documentation of the systems used. The Bales IPA System (Bales (1951)) is very well documented, and has been utilised on a number of research projects (Bales and Slater (1970), Landsberger (1955), Wallace (1987b)). Detailed instructions are available for applying the categories to data. Therefore reproducibility, after an initial training period, should be high. With regard to the content coding system, developed specifically for this research, reproducibility is perhaps more of an issue. Because this coding system is unique no established body of instruction is available. The only source of information is if a detailed description of the way in which the coding system has been used is produced. Therefore an important consideration in the writing of the method description

has been to document, as fully as possible, how the coding system has been derived, developed and applied to the data. Full descriptions of the coding process and categories are given in Appendices 2 and 3.

Finally accuracy is, according to Krippendorff (1980), the strongest form of reliability. However, its use is limited to situations where standard codings have been established for texts, usually for training purposes. As the textual information is unique to this research this test of reliability cannot be applied.

An issue related to reliability is that of validity. Reliability cannot be considered in isolation from validity as reliability needs to be high to demonstrate that results are valid (Stone *et al* (1966)). In situations where there is a high degree of agreement on the definition of categories validity is not a particular problem (Berelson (1971)). The use of established categories such as Bales IPA system, (Bales (1951)), would be an example of this.

Weber (1980) outlines a number of validity measures. The one which is of most relevance to this research is *hypothesis validity*. This involves the generation of hypotheses from reviewing literature and developing theories to be tested. The analysis of collected data is then conducted with the objective of discovering if the defined measured variables validate the hypotheses. This issue will be discussed in the following section, 4.6.3.

4.6 DATA ANALYSIS

Both qualitative and quantitative approaches have been adopted in the analysis. The processing and coding of the collected interview data, which in itself is part of the analysis process, has been described in the previous section, with an example being shown in Appendix 2.

Before discussing and describing the methods adopted to analyse the data one needs to consider the data which is available to be analysed. Interview data, coded and then processed using the selected computer software, has been translated into 'quantitative' data measuring interaction and sentence context. The other source of 'quantitative' data is the

results of the personality tests completed by all participants. In addition 'qualitative' data is available in the form of data sheets completed by the interview participants and transcripts of the interviews.

When applying any test to a set of data, and when using statistical techniques in particular, one needs to consider the size of the sample of research subjects (Rosenthal and Rosnow (1991)). In this research the sample collected is divided into two main categories, clients and professionals, with further sub-categories of each. The overall size of the sample of clients and professionals is 23, divided into the main categories of 11 clients and 12 professionals. The numbers and sub-categories of client are: 5 secondary inexperienced and 6 secondary experienced. The numbers of professionals, in each of the 4 sub-categories are: 3 architects, 3 quantity surveyors, 3 consulting engineers and 3 contractors. Therefore it can be seen that the sample size is very small.

The analysis of the collected data can be considered on a number of different levels with varying sample sizes by: considering individual interviews, using all of the interviews between one client and 4 professionals, comparing client types, and comparing professional disciplines.

Individual interviews are commonly used in studies examining differences between defined parties, particularly in connection with counselling psychology research into areas such as patient counselling (Boyd (1970)), labour mediations (Landsberger (1955)) and employment interviews (Tullar (1989)). Data collected in this way enables analysis to take place on a number of different levels. Measures can be used to compare patterns of behaviour of individual interview participants. Data can be examined and a comparison between groups of subjects made statistically, for example: job applicants versus interviewers, clients versus counsellors. In the context of this research this analysis approach could apply to individual interviews, client types and professional differences. Another option for commenting on data, and making comparisons between groups, is the use of tabulation and graphical methods to represent the results. Friedlander *et al* (1989) conducted a study involving the content analysis of four expert counsellors interviews with one family, to identify commonalities between counsellors. Results of the content analysis, in the form of percentages of

contributions, were tabulated, and then comparisons were made by discussing the levels of contributions exhibited by the different participants. Zimmer and Cowles (1972) presented data, from three therapeutic interviews, in the form of line graphs to compare the behaviour of different counsellors. Other researchers have used a combination of statistical analysis and graphical presentation of their data (Faulkner and Day (1986), Higgin and Jessop (1965), Wallace (1987b)).

Secondly, the use of a number of interviews with one client as a data set can be considered for examining behaviour patterns. This would be considered to be a case study approach (Gummesson (1991)). Yin (1989) suggests that case studies can be used in a number of ways, either as: individual events, or, if a series of case studies are conducted, they can be compared to produce cross-case conclusions. The case study approach is used frequently in research projects, and there are a number of construction-related research reports which have used this approach (Mackinder and Marvin (1982), Nahapiet and Nahapiet (1984), NEDO (1983, 1988), RICS (1979), Turner (1990)).

Raw scores from both the Bales' (1951) IPA and sentence context analyses were converted into percentages of relative proportions of category contributions by clients and professionals in each interview, to provide a measure of the interaction between the parties. This tabulated interview data, produced using computer programs, was translated into graphical interaction profiles, produced to provide a visual representation of the data. These profiles can be used to assist in the interpretation of the results (Friedlander *et al* (1985), Zimmer and Cowles (1972)).

4.6.1 The Case Study Approach

Quantitative results produced from the coding procedures and qualitative data from data sheets have been combined to present results on a case study basis. Previous research, by Wallace (1987b), has adopted the approach of using qualitative data to support and explain the results of a quantitative analysis.

Each client has a particular set of requirements. Therefore certain items of data primarily relate to the context in which the data is collected. In this instance this context is a set of

4 interviews between a client and four different professionals. The qualitative data, in the form of data sheet comments by interview participants, relates to the particular situation, the client and his project.

The approach adopted for the analysis and presentation of data on a case study basis for each client can be explained using the analogy of a series of '*sieves*' being used to sort and separate a sample of soil. At specific intervals sub-sets of the overall sample are collected and analysed, ranging from small to large particles. Having completed the analysis an overall profile of the sample is produced.

The first '*sieve*' of the analysis examines each individual interview, highlighting the prominent interaction and sentence context features, and describing similarities and differences between interviews with regard to client and professional contributions. At this stage qualitative data in the form of extracts from the data sheets is presented to provide the reader with information on the participants views on the interviews. This data provides a useful source of supporting evidence to both the interaction and sentence context scores.

The second '*sieve*' considers an average profile obtained by combining the profiles of the four client-professional interviews. From these profiles, inferences can be drawn by comparing average client and professional contributions with the individual interview profiles. Profiles which are similar, and very different, to the averages can be discussed using: comments from the data sheets, results from the sentence context coding analysis and by inspecting the results of the personality tests.

The final '*sieve*' presents overall results relating to clients and professionals, divided into their sub-categories. Results of the analysis of the data can be presented on a cross-case basis to assist in determining if the research hypotheses are supported.

At this point it is necessary to discuss the use of average scores to make comparisons between interviews. The research design, in relation to the collection of data, provided a standard setting with as many variables as possible being controlled, such as the setting and timing of the interviews. To make a valid comparison between cases, any figures used must

be capable of comparison (Miller (1984), Rosenthal and Rosnow (1991)). Although a time limit of 45 minutes was set for each interview not all of the interviews lasted the full period. In a small proportion of cases the parties considered that nothing more could be discussed and finished the interviews before the specified time, with the minimum period being 22 minutes.

The second issue to raise relates to the characteristics of each individuals' speech. Some participants spoke fast, others spoke slowly. Also there were periods of silence. When one looks at the figures for total words per interview they range from 3,679 to 7,639. This situation also affects scores for interaction and sentence context. The range of scores for interaction and sentence context are: 208 to 650 and 290 to 968 respectively. Particularly because of the small sample size, to use figures with such large variations, in their raw form, it would be extremely difficult to draw inferences between individual interviews and cases. Therefore a normalising procedure needs to be adopted (Rosenthal and Rosnow (1991)); with a conversion of raw scores into percentages being used in this instance. This enables comparisons to be made between case study interviews on both an individual and a cross-case basis.

4.6.2 Statistical Analysis

It is common research practice to apply statistical procedures to collected data, to test defined hypotheses. As the sample size for this investigation is small any statistical test applied to the data must be sensitive to this factor.

One statistical test often used to measure association between samples is the chi-square test which compares the frequency of occurrence of observed and expected scores (Wallace (1987b), Zimmer and Cowles (1972)). However, this test can only be used with integral numbers, and is not valid for use with proportions, percentages and other numbers derived from data (Croft (1976)). Therefore the transformation of the raw scores into percentages invalidates the use of a chi-square test on the data.

Other tests, particularly applicable to the testing of the difference between means of two independent samples of scores, are the Z test and t-test. The Z test requires large samples

of at least 30 subjects in each group. The t-test, although not as powerful as the Z test, is particularly applicable to samples smaller than 30 (Miller (1984)), and is frequently used in research relating to the analysis of interaction processes. It can also be used to compare two samples with unequal sample sizes.

Elliot (1979) used the t-test to test for differences in conversations between clients and counsellors, by applying it to the mean scores of both groups. Tullar (1989) looked at the relational control of employment interviews, which involved an analysis of paired exchanges of interviewers and applicants. The results of t-tests, applied to measures such as comparing the mean number of utterances of successful and unsuccessful interviews, showed significant differences between the groups. Thorensen *et al* (1970), in their study of the influence of counselling on high school students between schools, used the t-test to compare means of information seeking variables.

The t-test is an appropriate test to apply to the raw research data which has been normalised, by being transformed into percentages. Therefore it was selected to test the hypotheses.

4.6.3 Tests Applied to Hypotheses

Having determined that data will initially be presented on a case study basis, it is now necessary to define the tests that will be applied to the data to test the validity of the hypotheses.

The case study data presents a number of overall percentage scores relating to client and professional interaction and sentence context contributions. Therefore overall percentage contributions of clients and professionals can be utilised to test the hypotheses. A third measure which can be used to test the difference between groups relates to the number of words spoken by each interview participant. Carrying out a normalising process on the raw numbers, converting them to percentages of the total interview contribution per participant, enables a comparison to be made between groups.

Therefore the following three items of data will be used to statistically test the validity of the hypotheses in relation to clients and professionals:

1. Overall percentage Bales' IPA scores.
2. Overall percentage scores for sentence context factors.
3. Overall percentages of wordcounts.

The t-tests were conducted at the 5% level of significance, as it is the commonly accepted level at which to apply the test (Miller (1984), Rosenthal and Rosnow (1991))

In addition to the statistical tests supporting data will be cited by referring to the graphical interview profiles illustrating interaction and sentence context profiles, shown in Appendices 4 and 5.

4.7 TESTING THE RESEARCH METHOD

Before the main interview procedure was carried out a pilot study was conducted to test the research method.

There were two main objectives in conducting the pilot study: firstly to identify problem areas and, secondly, to provide training to the researcher in the coding of collected interview data. The experience of the pilot study assisted in identifying problem areas which allowed refinement and revision of the method to ensure that appropriate procedures were used to ensure that valid and meaningful main study data was collected (Canter and Brown (1981)).

Because of difficulties encountered in identifying participants, and in particular clients, as outlined in section 4.3, certain constraints were placed upon the way in which the pilot study could be conducted.

Two members of staff from the Department of Construction Management at the University agreed to participate in the pilot study by 'role playing' as clients. Role playing is an established technique in content analysis studies (Mostyn (1985)). Both clients were briefed about the role which they were expected to play, namely representatives of organisations investigating the possibility of obtaining a new building for their own use.

The professional participants were volunteers from a group of students studying for a Masters degree in Construction Management in the Department of Construction Management. Three students volunteered to take part. All three students had a number of years of industrial experience, two in architectural practice and one working for a contractor. They were also briefed on their expected role in the pilot study.

Each client produced a 1 page summary of their requirements for a building in advance of the interviews, and these details were provided to the professionals.

Because there were only 2 clients and 3 professionals a revised version of the interview matrix was used as follows to try and control bias as much as possible:

		INTERVIEW NUMBER		
		(1)	(2)	(3)
CLIENT (1)		A1	C	A2
CLIENT (2)		C	A2	A1

Key to Professionals:

A1 = Architect (1) A2 = Architect (2)
 C = Contractor

All of the interviews were audio recorded, both client and professional participants completed the specified data forms, and completed written personality tests.

Debriefing meetings with all participants were conducted after the interviews to obtain comments on the procedure. Comments on the procedure concerned only minor points, such as revisions being made to the wording of instructions on data sheets.

The second, and perhaps most important, objective of the pilot study was to provide training to the research investigator with regard to the coding of interview data (Krippendorff (1980)). The pilot study was conducted at a point in time when Bales IPA had been evaluated and selected to be used to measure client/professional interaction. Therefore pilot

study data was test coded using only the Bales IPA categories.

Interview recordings were transcribed and then test codings were conducted. Each interview, of 30 minutes duration, was split into segments of approximately 10 minutes with each one being coded using the Bales IPA system. Subsequently selected segments were coded again, with the results of the two codings being compared. A number of coding and testing phases were conducted to improve the researchers consistency of coding. In accordance with the procedure outlined by Bales (1951) a chi-square statistical test was applied to tests of segments at regular intervals to determine the level of reliability between scores. Consistency of scoring reached levels above the acceptable level stated by Bales of 0.5. Scores improved from an initial 0.63 to 0.86.

No results of the data collected for the pilot study are presented. Because of the role playing basis of the interviews the analysis of data might provide misleading results.

However, the two stated objectives for conducting the study were satisfied. Firstly, the procedure provided information and feedback to refine the main study procedure. Secondly, the training of the investigator in coding reached acceptable reliability levels.

4.8 SUMMARY

Having discussed the alternative options for conducting the data collection a method of using interviews within the framework of a case study has been selected. Data processing techniques have been described and appropriate tests defined.

5.0 RESEARCH RESULTS

5.1 INTRODUCTION

This chapter presents the results produced using the data collection and analysis methods described in the previous chapter.

The chapter begins with a section presenting qualitative and quantitative data, collected during the research on an individual case study basis. The subsequent two main sections summarise the findings of the case studies in relation to client and professional characteristics, taking into consideration both parties sub-groups. Then each of the four research hypotheses are restated and results of quantitative analyses are presented to determine if the data supports them.

5.2 CASE STUDIES

In this section a summary of information relating to each of the 11 case studies conducted is presented, using qualitative and quantitative data, divided into sub-sections. Each sub-section contains specific information, now described. The first gives background information on the client organisation and representative. In the second, information is presented on the client requirements for the specific project under discussion. The third contains analysis and comment on the interaction and sentence context profiles, with the reader being referred to the relevant graphical profiles in Appendices 4 and 5. In the fourth, client and professional post-interview comments are presented. Finally key points emerging from each case study, relating to both the client and professionals, including considerations of personality are summarised, again with reference to interview profiles in Appendices 4 and 5.

5.2.1 Case Study 1 - New Corporate Headquarters

5.2.1.1 Client Background Information

The client organisation is a multinational computer company which originates in the United States. The organisation has significant previous experience of constructing buildings both in the UK and overseas.

The client representative (C1) is the company's UK facilities manager, with overall responsibility for all construction work in the UK. He is a qualified chartered engineer with 15 years experience working for contracting, consulting and client organisations.

5.2.1.2 Client Building Requirements

The client organisation has a requirement for a new corporate headquarters building, to replace existing leased facilities. A site has been purchased and outline planning permission obtained. The long term objective is to develop a number of buildings on this site forming a "company park", housing a number of organisational functions.

The client requirements data sheet, [DAT.1], provides information relating to both the site and building. Site information given relates to size of building, car parking requirements and access. Building information consists of style, image, flexibility, comfort conditions, maintenance and standards. A construction timescale and building cost are also stated.

5.2.1.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C1) are illustrated in Figure A4.1, in Appendix 4, and the sentence context profiles are given in Figure A5.1, in Appendix 5.

The primary features of the client's contribution to the interaction process are giving orientation (BAL6) and giving opinions (BAL5). The professionals similarly concentrate on giving orientation (BAL6) and giving opinions (BAL5), with the latter category having the higher contribution. A third primary category, asking for orientation (BAL7), is also apparent.

Three primary areas of the client's contribution to sentence context emerge: client organisation, building and project organisation. The contribution of the professionals varies. In interview numbers 1 (C1-A1) and 2 (C1-QS1) there are two primary areas: project organisation and building. In interview number 4 (C1-CON1) the professional's (CON1) contribution is minimal. Finally in interview number 3 (C1-CE1) the professional (CE1) primarily concentrates on building factors, with a secondary emphasis on site factors.

Interview number 3 (C1-CE1) shows a reversal of the roles, with the professional (CE1) dominating the client. The reverse is true of interview number 4 (C1-CON1) where the client dominates the professional (CON1) contributing 88% of total interactions and 92.1% of sentence context.

5.2.1.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3], are:

architect (A1):

"Interesting and enjoyable discussion with an architect wanting to know more detail about the brief and our requirements.....very quickly we began to discuss rather than interview. As a preliminary interview it was reasonably effective and successful."

quantity surveyor (QS1):

"Early focus on the brief and then a departure away to broad topics. (QS1) did not concentrate enough on the Q.S. issues - building cost, maintenance cost. He didn't feel he could influence (C1) in its procurement path. A wrong assumption. Too many professionals are not prepared to look outside the normal, traditional routes and offer impartial advice to customers."

consulting engineer (CE1):

"A real selling job !.....an interview with limited discussion. I didn't feel comfortable and therefore didn't feel we focused on the issues and discussed in the way I consider appropriate for this stage. It was not necessary to structurally design the building today.....Unfortunately, not the kind of guy I could work with - final impressions not good."

contractor (CON1):

"Probably the least selling job of the day. Not too much focus on our requirements but was the only one to ask the question: what do you want? Not a great deal of advice given.....I probably did too much talking."

The professionals comments on the client, extracted from data sheets [DAT.2], are:

architect (A1):

"....considerable experience of building procurement.....have established ways of appointing professionals, including own legal agreement. We will have to do a lot of research within the organisation. Fast track programme. 12 month construction period will determine construction method. High standard of building required."

quantity surveyor (QS1):

"An expert client.....has a particular system of building procurement which has been developed through experience.....Management Contracting has been adopted as the preferred method.....gives (C1) a high input during the project from inception to completion. This desired method of procurement is difficult to influence with an expert client....."

consulting engineer (CE1):

"Very well informed client. Preferred contract procedure employing management contractor.....used successfully previously. Building 50m x 50m on plan with three floors, 2.75m ceiling height 4m floor to floor. Suggested steel frame....Site London clay - piling of frame required and also possibly ground floor loading of 120 lbs/sq.ft."

contractor (CON1):

"Client requires Management Contractor and it is up to us to satisfy that requirement. Intention of meeting was to identify the key points they are interested in eg. fees versus personalities."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are:

"Generally good but disappointed with the advice on offer even for a so called 'knowledgeable client'. Had the impression I was being 'sold' the organisations."

When asked to select one of the professionals, for further consultations, the client selected the architect (A1), giving the following reasons:

"Most flexible, least dogmatic. Easy to discuss. Likeable guy."

5.2.1.5 Overall Comments

The average interaction profile for case study (1) is illustrated in Figure A4.12, in Appendix 4, with Figure A5.12, in Appendix 5, showing the average sentence context profile.

The overall averages of contributions, by the client and professionals, for all 4 interviews relating to: interactions (Figure A4.1) and sentence context (Figure A5.1) are:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	=	62.1%	65.0%
PROFESSIONALS	=	37.9%	35.0%

In both of the average interaction and sentence context profiles the client (C1) makes the higher overall contribution. The interaction profile shows the client taking the role of information provider (BAL6) and analyser (BAL5). The professionals role is that of analyser (BAL5), questioner (BAL7) and information provider (BAL6).

Because the client (C1) and the organisation have significant previous experience of procuring buildings, discussion during the interviews focuses on important issues, raised by the client, in the three primary areas of contribution, to which the professionals respond. For example the dominant factors, in the category project organisation, are professional appointment (code SD2) and responsibilities (code SD4) reflecting the situation that the client has established procedures for appointing professionals and defining their responsibilities. The comments by the professionals, extracted from the data sheets, confirm that the client has established requirements, and they acknowledge that their influence over the client is limited.

Two of the interviews in this case study exhibit unusual characteristics. In interview number 3 (C1-CE1) the professional makes the higher interaction and sentence contributions dominating the client. Post-interview comments show the client (C1) to be unhappy, as the professional (CE1) focused on issues that the client deemed inappropriate. In addition on inspection of the results of the personality tests the results show that both parties exhibit high expressed control scores and very low wanted control scores. Such scores suggest strong incompatibility between the participants. The professional's score is so extreme that it is categorised by Ryan (1989) under the heading of, "mission impossible", with the main characteristic being an intense need for recognition. The incompatibility in personality, and the discussion of issues considered inappropriate by the client, help to explain the interaction in this interview.

The other unusual example is interview number 4 (C1-CON1), where the professional's (CON1) contributions are minimal. It has already been established that the client scores high on expressed control. The professional's expressed control score is low, with a medium wanted control score. Ryan (1989) classifies this combination as, "the checker", someone who has doubts about their ability to make decisions with a tendency to check with others.

Therefore the differences in personality help to explain the unusual profiles in these cases.

The selection of architect (A1) by the client is also supported by their personality test scores. The architect has low expressed and wanted control scores which suggests that there is unlikely to be any conflict.

Clearly the client representative is experienced, and therefore in a position to lead the interviews communicating well defined requirements to the professionals. The professionals respond to the client offering their opinions.

5.2.2 Case Study 2 - UK Auto Centre Company

5.2.2.1 Client Background Information

The client organisation is a company, providing services such as new tyres, exhausts and related equipment, with existing premises throughout the UK. It is involved in a continual expansion programme. The organisation has significant previous experience of constructing buildings.

The client representative (C2) is the company's regional property manager, with overall responsibility for all construction work in England. He has a degree in Civil Engineering with 10 years experience working for contracting organisations, before moving into property management and development.

5.2.2.2 Client Building Requirements

The client organisation has a set of requirements for new depots at a number of locations. Based upon market research information the company has identified a number of locations as part of its expansion programme. Sites have been identified in some locations but not others.

The client requirements data sheet, [DAT.1], provides general information relating to their requirements for new depots. Details of floor area, number of storeys, type of construction and services are stated. Site location and access requirements are also provided.

5.2.2.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C2) are illustrated in Figure A4.2, in Appendix 4, and the sentence context profiles are given in Figure A5.2, in Appendix 5.

The primary features of the client's contribution to the interaction process are giving orientation (BAL6) and giving opinions (BAL5). The primary professional category is giving opinions (BAL5). Secondary professional categories featured are asking for orientation (BAL7) and giving information (BAL6).

Three primary areas of the client's contribution to sentence context emerge: client organisation, project organisation and building. Professional contributions vary. In interview number 5 (C2-QS1) primary emphasis is placed upon project organisation, client organisation and building factors. For professional (A1), in interview number 6 (C2-A1), factor emphasis is spread across all five categories, with client organisation being the most apparent. The professional (CON1) in interview number 7 (C2-CON1) makes a minor contribution in two areas: project organisation and building factors. In interview number 8 (C2-CE1) the primary contribution of the professional (CE1) relates to building factors, with a secondary emphasis on project organisation and site factors.

In interview number 7 (C2-CON1) the client dominates the professional (CON1) contributing 77.4% of the total interactions and 81.4% of sentence context factors. A more balanced profile occurs in interview number 8 (C2-CE1).

5.2.2.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3], are:

quantity surveyor (QS1):

"Very keen on Design and Build contracts. Very likeable character, quietly effective in giving good advice, getting work for his own practice didn't appear to be his main objective. Wish (QS2) had demonstrated how his practice ensure that they apply full proof restraints to ensure close control over the client's money."

architect (A1):

"A good interview, asked all the correct questions regarding what (C2) need: external appearance, internal appearance and layout of equipment, lighting etc. Very refreshing not to have Design and Build thrust down my throat, and tended to agree that traditional competitive tendering was quite acceptable. Liked his suggestion that the only way to understand (C2) requirements is to visit several sites during busy operational hours, and watch closely what goes on."

contractor (CON1):

"....already aware of the fact that all retail companies want is a contractor that completes the job on or ahead of time, for the minimal amount of money and hassle. Appear to be a reasonable building company, but won't know for definite until they do a job for us. (CON1) did not sell his company very well."

consulting engineer (CE1):

"Very good interview, extremely confident and obviously well practiced in interviewing potential clients. Asked all the right questions about what (C2) required, and made some very sensible suggestions about maximising the sites we purchase. Tried very hard to sell his practice."

The professionals comments on the client, extracted from data sheets [DAT.2], are:

quantity surveyor (QS1):

"Client has significant understanding of building procurement. The present approach of generally a traditional method. With any retail organisation the time from site purchase to operation is critical, even at the expense of the budget, bonuses for early completion being a regularly used inducement."

architect (A1):

"....a client experienced in building looking for a rapid response and a high degree of organisation from the architect. Little emphasis on design....great emphasis on corporate image. Expressed preference for traditional professional / contracting roles. (C2) is an astute businessman, who knows what he and the company wants and how best to get it."

contractor (CON1):

"Client knows what he requires and the alternatives to use. There is nothing you can tell a client like this. We learn from them not vice versa."

consulting engineer (CE1):

"Very commercial, energetic and well informed....Solution to normal requirements is steel frame, brick clad. High cost sites should be developed to maximum potential by multi storey construction. I suggest, and (C2) prefers, traditional contract with architect, engineer, Q.S. and competitive contractor quotation."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are:

"A little surprised at some of the reluctance to ask searching questions, ie. fee structures, who our current professionals are, funding etc. I think all the interviewers knew what our requirements are, but some explained it a little better than others."

When asked to select one of the professionals, for further consultations, the client selected the consulting engineer (CE1), giving the following reasons:

"Seemed aware of our priorities, and gave a very good impression of his practice. Obviously very experienced and capable."

5.2.2.5 Overall Comments

The average interaction profile for case study (2) is illustrated in Figure A4.13, in Appendix 4, with Figure A5.13, in Appendix 5, showing the average sentence context profile.

The overall averages of contributions, by the client and professionals, for all 4 interviews relating to: interactions (Figure A4.2) and sentence context (Figure A5.2) are:

	<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	= 63.9%	65.3%
PROFESSIONALS	= 36.1%	34.7%

Both of the interaction and sentence context profiles show the client (C2) making the higher overall contribution. The interaction profile shows the client taking the role of information provider (BAL6) and analyser (BAL5). The professionals role is that of analyser (BAL5), questioner (BAL7) and information provider (BAL6).

Clearly defined client requirements, based upon expertise in procuring a specific building type, directs the context of discussion towards specific areas. In the client organisation category the client concentrates on client product / production process (code SE12). The architect's (A1) post-interview comments identified that the client places limited emphasis on design. The most important factor to this client is how the building functions internally, namely the ergonomics of the operation. Important issues relating to project organisation

are: professional appointment / fees (code SD2), responsibilities (code SD4), design and build / package deal (code SD14) and tendering (code SD7). The professionals data sheet comments recognise that the client has specific requirements.

Unusual profiles appear in two interviews, numbers 7 (C2-CON1) and 8 (C2-CE1). The personality test scores of professionals (CON1) and (CE1) have been discussed in case study (1), section 5.2.1.5. Client (C2) exhibits very high expressed, and very low wanted control scores. This would explain the high client profiles in the interview with (CON1). However, this is not the case with (CE1), as both parties come under the "mission impossible" heading. Indeed the client selected the consulting engineer (CE1), as the most appropriate person for further consultations. During the interviews the client expressed a preference for employing professionals who take over the day to day responsibility of organising his projects. One of the characteristics of a "mission impossible" person is that they wish to assume many responsibilities. This may explain the client's choice of (CE1) along with the fact that the client's reason for selecting him was that he focused on client priorities.

An experienced client representative, with specific building requirements, and an established procurement system for obtaining them, leads the interviews. The professionals, acknowledging the client's experience, adopt the role of opinion providers.

5.2.3 Case Study 3 - Ultrasonic Equipment Company

5.2.3.1 Client Background Information

The client organisation is a small electronics company, producing ultrasonic testing equipment, currently occupying a leased building. Because of an increase in workload the company is expanding and is therefore considering moving into larger premises. The organisation has no previous experience of being involved in construction work.

The client representative (C3) is the product development director of the company, and is one of two founders of the company. He is a qualified electronics engineer with no experience of construction work.

5.2.3.2 Client Building Requirements

The client has a requirement to expand and is considering acquiring a purpose built factory to replace an existing leased facility. No site has been identified.

The client requirements data sheet, [DAT.1], provides information relating to both the client organisation and building requirements. Site information given relates to a preferred location. Building information consists of image, security and space requirements with provision for future expansion.

5.2.3.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C3) are illustrated in Figure A4.3, in Appendix 4, with the sentence context profiles given in Figure A5.3, in Appendix 5.

Client interaction contributions are mainly in the giving orientation (BAL6) and giving opinion (BAL5) categories. Professionals contributions concentrate mainly on giving opinions (BAL5) and giving orientation (BAL6). Secondary emphasis is placed on asking for orientation (BAL7) and giving suggestions (BAL4).

The client's primary sentence context contributions relate to client organisation and building factors. In interview number 9 (C3-CE1) the professional (CE1) concentrates primarily on building factors, and makes secondary emphasis on site and client organisation factors. In interviews number 10 (C3-CON1) and 11 (C3-QS1) the professionals (CON1 and QS1), concentrate on client organisation, building and project organisation factors. Finally in interview number 12 (C3-A1) the professional's (A1) contributions are fairly evenly distributed across four categories: client organisation, building, project organisation and site.

The interviews illustrate two distinct patterns. Interview numbers 10 (C3-CON1) and 12 (C3-A1) show balanced profiles with a marginal bias to the professionals (CON1 and A1). In interview numbers 9 (C3-CE1) and 11 (C3-QS1) the professionals (CE1 and QS1) dominate the client.

5.2.3.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3], are:

consulting engineer (CE1):

"Particularly good at working out approximate cost and floor areas of the building. I felt that the firm had plenty of experience in dealing with the kind of building I wanted. I did feel that it would probably have been better to have spoken to an architect (and accountant !) first - not so much for design matters but more for information on the sequencing of events, the arrangement of contracts and so on."

contractor (CON1):

"Very much a "to the point" interview centred on establishing the best method of procurement. I felt that the interview was being fairly strongly structured with two stages - firstly a stage where I was being asked for basic information and secondly a stage where I was being sold the idea of management contracting."

quantity surveyor (QS1):

"Very helpful - identified a number of shortcomings in the brief and critical issues to discuss. Particularly useful on identifying problems connected with different forms of tenure and also on cost control in general. The next steps to be taken in the procurement process ie. identification of a site and the preparation of an outline scheme, were made clearer."

architect (A1):

"Emphasised the tight time constraints and the need for rapid selection of a site. The arguments for the procurement method seemed sound and I felt confident that the firm had reasonable experience of this kind of work. I did, however, feel that some of the potential cost problems of this scheme were not properly identified. I liked the informal and unpatronising approach."

The professionals comments on the client, extracted from data sheets [DAT.2] are:

consulting engineer (CE1):

"Knows his own business, but not well informed on construction industry / planning requirements etc....needs guidance on type of building - suggest architect approached at an early stage. Suggested solution is for two storey 5,000 sq.ft.....loadbearing brick /block to ground floor with metal cladding above, concrete floors. Car parking for say 35 cars....site required one quarter to one half acre. Client is not conversant with financing - this should be clarified immediately. Action required: land search, appoint architect, arrange funding."

contractor (CON1):

"MANAGEMENT CONTRACTING. Hi-tech requirements. Have done previous similar projects. 2 man decision making company. Therefore must reach both of them to establish needs and requirements."

quantity surveyor (QS1):

"The client has a minimal knowledge of the building process, it is important he analyses his future growth policy and identifies the reasoning behind the need for a freehold building. Once planning permission has been obtained....the project could be advanced in one of two ways, either traditional method or design and build route. The client has suggested that because the building procurement is likely to be the single largest piece of expenditure the company has made, budget control is likely to be a major factor probably more significant than building design."

architect (A1):

"No previous building experience. Will need to be steered carefully along the course, and warned in advance of any potential hold-ups. Will need to go into detail on budget and get Q.S. to give early indication of likely costs to ensure can afford building. Naive about time scale. Need to extract more information on future expansion. Finding site key to success of project."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are:

"I found all the interviews helpful but each had a rather different emphasis. The main use of the interviews was to help me to clarify the questions I should be asking rather than to reach a decision about which consultant I should use."

When asked to select one of the professionals, for further consultations, the client selected the quantity surveyor (QS1), giving the following reasons:

"He went into a number of important cost considerations which were not dealt with by others. His general advice seemed sound and he did not seem to be particularly biased towards one method of procurement."

5.2.3.5 Overall Comments

The average interaction profile for case study (3) is illustrated in Figure A4.14, in Appendix 4, with Figure A5.14, in Appendix 5, showing the average sentence context profile.

The overall averages of contributions, by the client and professionals for all 4 interviews relating to: interactions (Figure A4.3) and sentence context (Figure A5.3) are:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	=	40.4%	36.0%
PROFESSIONALS	=	59.6%	64.0%

In both the interaction and sentence context profiles the professionals makes the higher overall contribution. The interaction profile shows the client taking the role of information provider (BAL6) and analyser (BAL5). The professionals role is primarily that of analyser (BAL5), information provider (BAL6) and questioner (BAL7), with secondary emphasis being placed upon providing suggestions (BAL4).

The client, who has no previous experience of obtaining buildings, has presented a number of ideas concerning his requirements. Therefore the sentence context contributions for the professionals and the client are distributed across the categories, with the exception of planning, which is a reflection of the necessity to clarify many of the clients' ideas. Both client and professional post-interview comments confirm this view. Examples of significant areas requiring further thought in the building factors category are building function (code SB4) closely followed by building timescale / programme (code SB23).

Overall interaction and sentence context contribution profiles show a bias towards the professionals. The highest and lowest professional contributions are made by professionals (CE1) and (CON1) respectively, whose personality scores have been discussed previously. The results of the client's personality test show that he has very low expressed and wanted control scores. In fact his scores are low in all of the dimensions. These results support the extremes of bias in the interviews: high for (CE1) and low for (CON1).

The client's preferred professional was (QS1). Looking at their personality test profiles the professional (QS1) has a high expressed control score and a very low score for wanted control. This shows compatibility with the client. In addition the client expressed the importance of cost to him. The analysis of sentence context shows that professional (QS2) makes the highest contribution relating to the factor building cost (code SB24).

In this case the client representatives inexperience in construction matters, and unclear requirements contribute to the professionals taking the lead to determine more information and analyse the problem in more detail.

5.2.4 Case Study 4 - Extension to Existing Factory

5.2.4.1 Client Background Information

The client organisation is a large electronics company with facilities at a number of locations around the UK. The organisation has significant previous experience of constructing buildings in the UK.

The client representative (C4) is the company's property manager, with overall responsibility for all construction work in the UK. He is a qualified engineer with experience of working for engineering companies as a designer, project engineer and plant manager.

5.2.4.2 Client Building Requirements

The client organisation has a requirement to expand its facilities on one of its existing sites due to an increase in orders for specific electronics equipment.

The client requirements data sheet, [DAT.1], provides information relating to both the existing site and buildings. Space requirements for the new building are listed and the importance of the timescale of the project is highlighted.

5.2.4.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C4) are illustrated in Figure A4.4, in Appendix 4, and the sentence context profiles are given in figure A5.4, in Appendix 5.

The primary features of the client's contribution to the interaction process are giving orientation (BAL6) and giving opinions (BAL5). For the professionals three primary categories emerge: giving opinions (BAL5), giving orientation (BAL6) and asking for orientation (BAL7).

For sentence context the client concentrates on three primary areas: building, client organisation and site. In interview numbers 13 (C4-CON1), 15 (C4-A1) and 16 (C4-QS1) the professionals (CON1, A1 and QS1) place primary emphasis on project organisation factors. The exceptional case is interview number 14 (C4-CE1) where the professional's (CE1) primary contribution is in the area of building factors, with a secondary emphasis on site factors.

One exceptional profile is interview number 14 (C4-CE1) with the professional (CE1) dominating the client contributing 59.5% of the total interactions and 57.5% of the total sentence context.

5.2.4.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3] are:

contractor (CON1):

"Advised to take design and build route. From (CON1) questions (eg. What bad experiences have you had ?) I believe he determined that we had a preference for this route....he did determine where "I" would like the building to be positioned on site and what preconceived design ideas we had and what we were going to do in the building. Most certainly was a sympathetic listener."

consulting engineer (CE1):

"Advised to go local architect C.E. and Q.S. route. Seemed to be suggesting we should go for some type of clad building design and rather threw away our interest in brick cladding. Was most interested in car parking arrangements - normally a high priority with us - but in this particular case we have sufficient room. Technically highly accurate."

architect (A1):

"Recommends architect then construction team. Very Detailed analysis of our company structure, method of working, product and viability of local company in area of this project. Came close to suggesting design and build on a couple of occasions especially with respect to the tight timescale of the project. Extremely Good Listener noted all points of discussion....Certainly agreed to unofficial approach of pre-planning meeting to iron out any problems that could unnecessarily arise at planning stage. Did not discuss costs - but then neither did I."

quantity surveyor (QS1):

"Recommended design and build as he identified time as the most important criteria in this project. Did consider local architect for initial concept drawings to present to a pre-planning meeting but came very rapidly to the design and build reply. Good

Listener. No detailed discussion on building design or layout other than to accept what I had given as brief for our requirements as we see them. So presume that our design has no basic flaws - his comment " a very simple concept" - seemed to confirm this."

The professionals comments on the client, extracted from data sheets [DAT.2], are:

contractor (CON1):

"DESIGN and BUILD - Agreed Date, Agreed Price, Agreed Quality - our problem not his. Client has very strong ideas and knows his requirements - speed. Requested single point of contact....this reduces any worries he may have with regards to the construction of his building."

consulting engineer (CE1):

"Well informed client, knew what he wanted....Solution suggested was 2 storey 30 ft. x 300 ft. alongside existing industrial building with flat roof, steel framed, concrete floors, columns to first floor only on centre-line. Floor loadings of 4+1 KN /sq. metre i.e. 100 lbs / sq.ft. Indicative costs £ 35 to £ 40 / sq.ft. 18,000 x 35 = £ 630,000; x 40 = £ 720,000 + 10% fees total = £ 770,000 approx. Ground is silted area - possibly piling to frame required. Two years from brief to completion would be no problem unless strong objections from local community groups."

architect (A1):

"Client has pre-determined ideas of his building solution. Keeping to completion date essential otherwise will lose order. I suggested should go along traditional route to ensure clients brief was met, but had to admit that completion on time was often not a strong point of this method. Suggested a compromise of architect getting planning permission and writing detailed brief then going out to tender for price / detailed production drawings with JCT 80 With Contractors Design as giving best compromise. I pointed out that going out to tender for package deal on outline brief (such as presented to me) could give widely varying tenders / buildings, which would be difficult to compare."

quantity surveyor (QS1):

"...has firm views on what he wants ie. firm price in a fixed time for the building procurement. Timescale appears to be far more critical than budget considerations, and therefore the compression of period from inception to completion is preferred. Design considerations are relatively important....with these criteria on board it would seem the Design and Build route is to be preferred, particularly the large organisation who has the in house expertise and ability to react quickly."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are:

"Architects seem, not unexpectedly, to prefer architect run projects - others seemed to prefer design and build for the project given."

When asked to select one of the professionals, for further consultations, the client selected the contractor (CON1), giving the following reasons:

"Broad company base and background which suggests stability - pre-knowledge of our type of problem immediate time scale discussion and promise of next meeting with drawings etc."

5.2.4.5 Overall Comments

The average interaction profile for case study (4) is illustrated in Figure A4.15, in Appendix 4, with Figure A5.15, in Appendix 5, showing average context profiles.

The overall averages of contributions, by the client and professionals, for all 4 interviews relating to: interactions (Figure A4.4) and sentence context (Figure A5.4) are:

	<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	= 56.5%	56.7%
PROFESSIONALS	= 43.6%	43.3%

The average interaction and sentence context profiles both show the client (C4) making the higher contribution. In the interaction profiles the client takes the role of information provider (BAL6) and analyser (BAL5), with the professionals concentrating on analysis (BAL5), information provision (BAL6) and questioning (BAL7).

The client representative (C4) is experienced in building matters and has a specific requirement for his building. The requirement to expand on their existing site, due to new orders, sets project timescale as the key project parameter. The sentence context analysis shows building timescale / programme (code SB23) to be a dominant factor. The professionals post-interview comments confirm the client's emphasis on time, and his preferred method of procurement, design and build, based upon previous good experience of this method.

The one unusual interview profile is interview number 13 (C4-CE1). This again involves professional (CE1) dominating the client. All of the six client personality test scores, in the

three dimensions of expressed and wanted, are low. This would explain the domination by the "mission impossible" professional in this interview.

For further consultation the client selected professional (CON1) because of his company's background offering the type of service he requires. The personality score of the client's low wanted control shows compatibility with the professional's (CON1) low expressed control.

The client's requirements are clearly defined and the important parameter, timescale, has been identified. Therefore the client provides information upon which the professionals offer opinions.

5.2.5 Case Study 5 - New Office Facility

5.2.5.1 Client Background Information

The client organisation is a multinational computer company which originates in the United States. The organisation has significant previous experience of constructing buildings both in the UK and overseas.

The client representative (C5) is the company's principle project manager with overall responsibility for a number of construction projects in the UK. He is a Chartered Builder with 17 years experience working for contracting and client organisations.

5.2.5.2 Client Building Requirements

The client organisation has a requirement for a new office building, to replace existing facilities. No site has been identified.

The client requirements data sheet, [DAT.1], outlines brief information relating to the location and building. Site information given relates to the preferred location and car parking. Building information consists of: number of occupants, details of computer usage and a timescale for occupation of the building.

5.2.5.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C5) are illustrated in Figure A4.5, in Appendix 4, and the sentence context profiles are given in Figure A5.5, in Appendix 5.

Client interaction contributions are mainly in the giving orientation (BAL6) and giving opinion (BAL5) categories. Professionals interaction contributions concentrate mainly on giving opinions (BAL5) and giving orientation (BAL6). In addition two professionals (CE2) and (CON2) place a secondary level of emphasis upon asking for orientation (BAL7).

With regard to client sentence context contributions, in three of the interviews, numbers 17 (C5-A2), 22 (C5-QS2) and 27 (C5-CE2) two primary categories emerge: building and client organisation. In interview number 32 (C5-CON2) primary emphasis is placed on three categories: project organisation, client organisation and building. Professionals (A2) and (CON2), in interview numbers 17 (C5-A2) and 32 (C5-CON2), place primary emphasis on project organisation and building factors. Professionals (QS2) and (CE2), in interview numbers 22 (C5-QS2) and 27 (C5-CON2), place primary emphasis on building factors, and a secondary emphasis on project organisation and client organisation.

Two of the interviews: numbers 17 (C5-A2) and 22 (C5-QS2) display interaction and sentence context profiles where the professionals (A2 and QS2) dominate the client. In interview number 32 (C5-CON2) both profiles are more balanced with a marginally higher professional (CON2) contribution. In interview number 27 (C5-CE2) the domination is reversed in favour of the client.

5.2.5.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3] are:

architect (A2):

"Questioning around my statements good. Cost space matrix too low - assumed some figures which would have left me 50 % under budgeted. Assumptions around extendability good. Alternative construction methods well presented evenly and unbiased. Programme advice good. Happily and openly talked fees. No problem except costs - Q.S.'s game, certainly not this architects 'forte'."

quantity surveyor (QS2):

"Specific reference to the project outlined thin and at times it seemed deliberately avoided. Efforts to keep to the subject often frustrated. (QS2) had made up his mind he was going to "sell" his practice....I do not believe all his staff who would work on the project would have his strength of character and this may prove a disappointment in reality. Very open on fees. Very "his process" driven and others should comply. This leaves me uncertain how he would work in a mixed consulting TEAM !!"

consulting engineer (CE2):

"Great....introduced himself, cleared up his and my positions, practices....produced his "shopping list" which we used to talk about the specific project, the programme, (C5) policies, procedures etc. I felt totally comfortable with somebody who was not pushing hard who listened well and appeared to understand from a position of knowledge and experience."

contractor (CON2):

"It was very quickly identified that management contracting is not a method which fits in with (C5)'s philosophy. However, the resulting discussion was reasoned, logical and informative."

The professionals comments on the client, extracted from data sheets [DAT.2], are:

architect (A2):

"Well organised and experienced in building procurement. Has set tight timetable and clearly needs a flexible extendable building. Solution - because of tight time schedule should look for existing building to adapt or land with consent, if found quickly. With new build some means of condensing pre contract period essential, either negotiated contract or fixed fee Package Deal solution viable alternative."

quantity surveyor (QS2):

"Very large world-wide business. Very knowledgeable - has own briefing documents. Fully experienced as "Building / Property procurement 'supremo'. Understands risk analysis for cost, time, quality. Sets budgets and expects team to conform. Seeking time-scales for alternative methods of procuring 100,000 sq.ft. of new-build: eg. Traditional / Design and Build / Management. Is not committed to any particular professional as 'team-leader' - would use the best horse in the stable."

consulting engineer (CE2):

"Client is well versed in the constructional field and is fully aware of his requirements and how he wishes to use professional consultants for design and supervision of a project. I, personally, consider that (CE2) multi-disciplinary set-up would be a solution to satisfy (C5)'s requirements as it would save both time and money by the in-house coordination and single management aspects."

contractor (CON2):

"(C5) is very much the technical project manager. (C5) carry out extensive developments under a variety of forms of contract. The company procedures in terms of appointment of both consultants and contractors are well established. On this basis it was very difficult to offer advice as to which direction they might proceed."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are:

"Interview with (A2) was quite satisfactory. Interview with (QS2) was a 'marketing' exercise and almost one way from the consultant. Interview with (CE2) was Great !! Interview with (CON2) was unfortunate and inappropriate."

When asked to select one of the professionals, for further consultations, the client selected the consulting engineer (CE2), giving the following reasons:

"The maintained specific interest in the project to hand and the controlled reasoned logical approach to the whole project even though only one discipline might have been sourced from the practice."

5.2.5.5 Overall Comments

The average interaction profile for case study (5) is illustrated in Figure A4.16, in Appendix 4, with Figure A5.16, in Appendix 5, showing average context profiles.

The overall averages of contributions, by the client and professionals for all 4 interviews relating to: interactions (Figure A4.5) and sentence context (Figure A5.5) are:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	=	44.6%	46.7%
PROFESSIONALS	=	55.4%	53.3%

The average interaction and sentence context profiles both show the professionals making the higher contribution. In the interaction profiles the client takes the role of information provider (BAL6) and analyser (BAL5), with the professionals concentrating on analysis (BAL5), information provision (BAL6) and questioning (BAL7).

The client (C5) is an experienced construction project manager and the organisation has well documented and detailed requirements. However, the professionals lead the interviews, with

the exception of interview number 23 (C5-CE2). The client's post-interview comments, for the three interviews where the professional contributions are higher than the client, contain misgivings about the advice received such as, "...no problem except costs.....not this architects 'forte'", " Efforts to keep to the subject often frustrated" and "...not a method which fits in with (C5)'s philosophy." The main subject matter of the interview concerning the most prominent sentence context categories are: building function (code SB4) and, for project organisation, responsibilities (SD4), both areas being of major client concern with preferred client methods.

Client comments suggest that he was unhappy with the three interviews discussed above. The client's personality profile shows high expressed and very low wanted control scores, characterising him as a "mission impossible" person, Ryan (1989), who strives for recognition and maintained superiority. All four professionals show low wanted control score, suggesting incompatibility with the client.

Under these circumstances the client selection of professional (CE2) can be explained by the client bias on the interaction and sentence context profiles, and the client's post-interview comments which are very positive.

In this case study contributing factors to the general bias towards the professionals is the differences in personality between the client representative and professionals, and the focus of discussion on areas that the client deemed inappropriate.

5.2.6 Case Study 6 - New Laboratory / Office Facility

5.2.6.1 Client Background Information

The client organisation is a small company involved in the manufacture of analytical equipment for use in the chemical industry. It is currently based in a small starter unit of which it owns the freehold. The company has occupied these premises since it was established, but now needs larger premises as its business increases. It has no previous experience of building.

The client representative (C6) is the company's owner having set up the company himself 9 years ago. He is a qualified analytical chemist with no previous experience of constructing buildings.

5.2.6.2 Client Building Requirements

The client organisation has a requirement for a new laboratory / office building, to replace its existing facility. No site has been identified.

The client requirements data sheet, [DAT.1], provides information relating to both the site and building. Site information given relates to the preferred location of the building, size of site and the level of car parking. Building information consists of space requirements, and the services installations. A completion timescale is also stated.

5.2.6.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C6) are illustrated in Figure A4.6, in Appendix 4, and the sentence context profiles are given in Figure A5.6, in Appendix 5.

The primary features of the client's contribution to the interaction process are giving orientation (BAL6) and giving opinions (BAL5). There is a secondary client emphasis on asking for opinions (BAL7). For the professionals two primary categories emerge: giving opinions (BAL5) and giving orientation (BAL6). Two factors emerge on a secondary level: asking for orientation (BAL7) and giving suggestions (BAL4).

Two primary areas of client sentence context contribution emerge: building factors and client organisation. Emphasis made by the professionals varies. In interview numbers 21 (C6-QS2) and 26 (C6-CE2) one dominant category emerges: building factors. In interview number 31 (C6-CON2) primary emphasis is placed on two categories: project organisation and building by professional (CON2). Finally in interview number 20 (C6-A2) the professional (A2) places primary emphasis on three categories: building, project organisation and site.

One exceptional sentence context profile is interview number 26 (C6-CE2) which exhibits a marginal bias in favour of the professional (CE2).

5.2.6.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3], are:

quantity surveyor (C6):

"I was very impressed with (QS2). His advice was very useful in helping me to focus on key parameters viz cost and time scale."

consulting engineer (CE2):

"I found (CE2) pleasant and helpful. His detailed list of parameters to consider was very useful."

contractor (CON2):

"I found (CON2) very helpful. His advice to initially consult a quantity surveyor on the viability of having premises purpose built seemed to be very sound. As he advised it is more appropriate to have discussions with a management contractor after I have a better idea of outline finances."

architect (A2):

"....gave useful information on various costs, eg construction works, time scale, size of sites required etc. He also advised me to consult an established estate agent and quantity surveyor and highlighted just how time consuming a building project may be."

The professionals comments on the client, extracted from data sheets, [DAT.2], are:

quantity surveyor (QS2):

"Small but growing private company inexperienced in 'building'. Open minded on budget - specialised production methods may affect costs: but would apply 'value for money' judgement. Best solution seems to be to find nearby development site with permission for units of suitable size - perhaps have 2 units built, holding one for renting out until growth takes place to move in. Seems interested in 'one professional' in charge to handle all matters, while he runs his business."

consulting engineer (CE2):

"The client has no experience of dealing with people in the building industry and needs guidance through the various processes from choosing a site, to design stages, contractor selection, construction and handover. I think he needs the help of a multi-disciplinary professional firm who can guide him either as a Project Manager supervising a design team and a contractor or turnkey type project or as a Consulting Engineer carry out full multi-disciplinary design aspects and site supervision. Further discussions would be needed to determine the best solution as he has to date

considered only new premises whereas refurbishment of an existing building may be more advantageous in relation to his proposed budget."

contractor (CON2):

"....faced with making an initial decision as to whether to build himself or to purchase or lease an existing built unit. I advised him that he would need to make a fundamental decision to build or lease before proceeding any further and recommended that he should discuss this problem with (QS2) who would be able to offer expert help in this. If the decision was to build I suggested that he should look for some land, get an Architect to do an outline scheme and then ask us to do an appraisal of his project, initially at no charge."

architect (A2):

"....very limited knowledge in the field of buildings. Requirement for freehold and room to expand probably rules out existing building. Solution - retain commercial estate agent to find suitable site. Depending on time scale employ professionals to design building and use builder or if very short of time consider package deal.

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.2], are:

"Overall very worthwhile."

When asked to select one of the professionals, for further consultations, the client selected the quantity surveyor (QS2), giving the following reasons:

"He provided most information on costs which is my critical consideration."

5.2.6.5 Overall Comments

The average interaction profile for case study (6) is illustrated in Figure A4.17, in Appendix 4, with Figure A5.17, in Appendix 5, showing average context profiles.

The overall averages of contributions, by the client and professionals for all 4 interviews relating to: interactions (Figure A4.6) and sentence context (Figure A5.6) are:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	=	24.1%	30.4%
PROFESSIONALS	=	75.9%	69.6%

Both the interaction and sentence context profiles show the professionals dominating the interview contributions. In the interaction profiles the professionals take the lead concentrating on analysis (BAL5) and information provision (BAL6) and questioning (BAL7). The client responds taking the role of information provider (BAL6) and analyser (BAL5), with a secondary level of questioning (BAL7).

The client puts forward his building ideas to the professionals seeking clarification and advice. Because he has no previous experience of building, and his requirements are not defined in detail, discussion does not focus on any one particular sentence context category. Factors in two categories are emphasised. In building factors they are building cost (code SB24) and building function (code SB4), and in project organisation: professional appointment / fees (code SD2) and responsibilities (code SD4). Post-interview comments made by the client stress the importance of building cost in particular, and the professionals comments suggest varying solutions to the client's problem, including leasing; building two buildings to accommodate future expansion, refurbishment of an existing building and different procurement options: project management, traditional and design and build.

All of the interviews show a significant bias towards the professionals, with the sentence context of interview number 26 (C6-CE2) being the one exception. The professional (CE2) came to the interview with a prepared checklist of areas to discuss, which encouraged the client to make a higher contribution to the interview. This is supported by the Bales IPA profile, Figure A4.6, which shows higher than average professional questioning (BAL7).

The client selected professional (QS2) because of his advice on building cost. Both client and professional have similar personality scores with high expressed control and low wanted control, being classified by Ryan (1989) as, "self-confident". These scores suggest a degree incompatibility. Because of the client's expressed concern for cost, and the professionals (QS2) emphasis, the influence of personality incompatibility is reduced.

This inexperienced client requires guidance from the professionals who dominate the interviews.

5.2.7 Case Study 7 - New Head Office

5.2.7.1 Client Background Information

The client organisation is a large company involved in manufacturing products for the engineering industry. The organisation has previous experience of constructing buildings in the UK, but their last project was completed approximately 10 years before the date of the research interviews.

The client representative (C7) is the company's services manager, with overall responsibility for the management and running of local facilities. His background is in buying, shipping and services management. Although he is involved in the management of existing company facilities he has no previous experience of commissioning new construction work.

5.2.7.2 Client Building Requirements

The client organisation has a requirement for a new head office building, to replace existing leased facilities. No site has been identified.

The client requirements data sheet, [DAT.1], provides information relating to both the style of the building and a general specification. Style information given relates to building appearance, internal layout and environmental considerations. Specification information consists of space requirements, departments to be housed, staff numbers, services requirements, security. Site information relating to a preferred location and car parking requirements are also stated.

5.2.7.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C7) are illustrated in Figure A4.7, in Appendix 4, and the sentence context profiles are given in Figure A5.7, in Appendix 5.

Giving orientation (BAL6) emerges as the primary category of client contributions in the interaction profiles. Contributions on a secondary level are: asks for orientation (BAL7) and giving opinions (BAL5). Professionals contributions concentrate mainly on giving opinions (BAL5) and giving orientation (BAL6). At a secondary level emphasis is placed upon asking for orientation (BAL7) and giving suggestions (BAL4).

Building, client organisation and project organisation are the three areas that are most apparent in the client sentence context profiles. All four professionals emphasise two areas: building and project organisation factors. In interview numbers 25 (C7-CE2) and 24 (C7-QS2) the professionals (CE2 and QS2) place primary emphasis on building factors, while in interview number 30 (C7-CON2) the professional (CON1) concentrates on project organisation factors. Lastly, in interview number 19 (C7-A2), the professional (A2) gives equal consideration to both building and project organisation factors."

5.2.7.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3], are:

consulting engineer (CE2):

"Well structured interview with very detailed list of items to be covered. Felt that (CE2) could handle whole project but would want to discuss further control of costs and quality. Very helpful with advice on noise and air conditioning etc. but felt that further assistance would be required on planning and layouts...."

contractor (CON2):

"Very instructive on different forms of contract: Project Management v Design and Build v Traditional. Happy with the build, cost control and delivery aspects but doubt if a full package could be supplied to cover all needs. Good advice on how to achieve project in the 18 months required by making full use of the teams involved. Strong on management. Would like an input on design flair."

architect (A2):

"Standard approach to problem by well tested methods. Advice given on the various roles of the professionals and their use to best advantage. Felt much more control would be needed to meet targets if architects normal role was used. Direct links that the architects normally have with town planning would be an advantage."

quantity surveyor (QS2):

"Given very clear and precise picture of Quantity Surveyors role and importance of that role in the team. Good advice given on price and quality control..."

The professionals comments on the client, extracted from data sheets [DAT.2], are:

consulting engineer (CE2):

"The Client has a very good idea of his requirements but much more detailed information will be needed at later meetings to provide an agreed brief....requires a full professional package based on either: full consultancy design and conventional contractor which (CE2) could provide in-house....or using Contractor Design and

Build based on part design by (CE2) and Project Management by (CE2) to supervise overall."

contractor (CON1):

"The key problems of this project are two fold, firstly speed. (C7) need to move into the building in 18 months time. Secondly the client requires responsibility for the project to be taken by one organisation and this points to a design and build solution. I feel that a Design and Manage Contract would provide (C7) with the solution that they seek. This would also enable the early input on buildability which the project needs if it is to achieve the strict programme constraints. (C7) was concerned that the contract should contain stiff penalties to ensure that the project was completed on time. I assured him that no contractual wording would guarantee his completion date and that the only way to achieve this was to ensure that right well motivated team was appointed."

architect (A2):

"....clear idea of basic objectives. Detailed brief and approval of proposals should be achieved quickly. Tight programme for building of this size and quality. Finding site and obtaining planning consent vital to timetable. Solution - for quality result, appoint full range of professionals but shortage of time will demand negotiated or fixed fee forms of contact."

quantity surveyor (QS2):

"'Green' representative....interested in amount of detail which a Q.S. becomes involved with, particularly life-cycle costs, costs-in-use and energy management. Appeared receptive to idea of Q.S. being involved in running the job, but understood that Q.S. should not be the judge of 'quality' on site."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are:

"The four interviews in total give a balanced view....each gave a good guide to their profession and link with others...."

When asked to select one of the professionals, for further consultations, the client selected the consulting engineer (CE2), giving the following reasons:

"From these interviews he covered more of the needs of the client both in project terms and detail."

5.2.7.5 Overall Comments

The average interaction profile for case study (7) is illustrated in Figure A4.18, in Appendix 4, with Figure A5.18, in Appendix 5, showing average context profiles.

The overall averages of contributions, by the client and professionals for all 4 interviews relating to: interactions (Figure A4.7) and sentence context (Figure A5.7) are:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	=	26.1%	25.2%
PROFESSIONALS	=	73.9%	74.8%

The professionals dominate the interview contributions in both the interaction and sentence context average profiles. In the interaction profiles the client's input is distributed across four categories. His contributions cover information provision (BAL6), questioning (BAL7), analysis (BAL5). The professionals concentrate on analysis (BAL5) and information provision (BAL6).

The client presents his ideas of requirements for his building, based upon his existing building, and is looking for guidance from the professionals as to how to progress. The focus of discussion concentrates on two categories: building factors, where building services (code SB4) and building timescale (code SB23) are prominent, and project organisation factors which highlights responsibilities (code SD4). The client's background, in building services, explains the emphasis on services, and the fact that occupation of the new building is determined by the expiry of their existing non-renewable lease makes timescale critical. Also there is a need to clarify project responsibilities, particularly as the client expressed a preference for a single point of responsibility. The importance of these issues is confirmed in the professionals post-interview comments.

All of the interview and sentence context profiles show a strong domination by the professionals.

The client expressed a preference for professional (CE2), commenting on the wide coverage of issues. The use of a checklist by this professional (CE2) helps to explain this wide coverage. Client personality scores are medium expressed control and low wanted control, with the professional (CE2) showing high expressed and low wanted control scores. Both are classified by Ryan (1989) as, "self-confident" people who neither avoid making decisions

or become overbearing in their control of others. These scores show no significant personality incompatibilities.

The focus on building services in particular is a reflection of the client's personal background. However, because the client has no experience of procuring a building the professionals dominate the interviews.

5.2.8 Case Study 8 - Speculative Office Development

5.2.8.1 Client Background Information

The client organisation is a family business dealing mostly in the management of existing properties on a leasehold basis. The organisation has a limited amount of previous experience of construction mostly relating to maintenance and refurbishment of existing buildings.

The client representative (C8) is the son of the company's owner and joined the business on a full-time basis 6 months ago having completed a B.A. degree in Accounting and Finance. Although he has some experience of managing existing properties the proposed project is his first 'new-build' development venture.

5.2.8.2 Client Building Requirements

The client organisation owns an existing site with a building on it which is leased. The site has an area of land which the client is considering developing. They would prefer to build a new office building but are willing to consider other options, such as domestic flats.

The client requirements data sheet, [DAT.1], has little detailed information concerning the project. Therefore the information provided relates to details of the site and its location, existing site usage and ideas on the possible development options regarding the building of offices or flats.

5.2.8.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C8) are illustrated in Figure A4.8 in Appendix 4, and the sentence context profiles are given in Figure A5.8, in Appendix 5.

The primary features of the client's contribution to the interaction process are giving orientation (BAL6) and giving opinions (BAL5). Professionals primarily concentrate on giving orientation (BAL6) and giving opinions (BAL5). Secondary professional emphasis is in two categories: ask for orientation (BAL7) and give suggestions (BAL4).

The sentence context profiles of the client show that no one dominant area is apparent. Four categories show reasonably equal coverage: site, building, project organisation and client organisation. Professional contributions vary. In interview number 29 (C8-CON2) the professional (CON2) predominantly concentrates on project organisation factors and places a secondary emphasis on building factors. Professional (A2) gives primary importance to planning factors, with secondary significance being given to project organisation, building and site factors. In interview number 23 (C8-QS2) the professional (QS2)'s contributions are distributed across four categories: building, project organisation, client organisation and site. Finally in interview number 28 (C8-CE2) the professional (CE2) contributes in the same four categories as professional (QS2), listed above, with project organisation being the most dominant.

5.2.8.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3], are:

contractor (CON2):

"Good presentation, explained everything I wished to know, was knowledgeable and honest....a good marketing exercise by (CON2)...an extremely likeable person who knows the construction business very well. As there was no concrete proposal i.e. with plans etc, we could not talk in too much detail about my specific proposal. The advice was predominantly about construction management which was very interesting."

architect (A2):

"He was of great help with my proposal and the advice given was extremely good. He is the sort of professional I like to deal with. Very impressed."

quantity surveyor (QS2):

"Very professional, helped a lot with the services provided by surveyors. Tried to go as deeply into the proposal as possible. I would possibly use a company like this in the near future."

consulting engineer (CE2):

"Very helpful, genuine person. Honest in his assessment of the amount of help he could provide. Gave good sound advice."

The professionals comments on the client, extracted from data sheets [DAT.2], are:

contractor (CON2):

"I discussed alternative forms of contracting, in particular Management Contracting and Construction Management in which forms (CON2) specialise. (C8) was particularly interested in the value of a Contractors input at the pre planning conceptual stage. The general concept of Management Contracting appealed to him because he understood that he could regard the Contractor as his 'in house' building department."

architect (A2):

"client requiring confirmation and clarification....interested in alternatives. Solution - commission suitable professional, probably Architect, to submit detailed planning application. If successful carry out construction by builder selected in competition."

quantity surveyor (QS2):

"....needs to lay off some of the day to day management worries in developing small sites. This proposed scheme requires the obtaining of outline consent, then detailed, then build it out. Either offices of flats. Interested to try a professional who can offer design and cost, and possibly also construction management, advice."

consulting engineer (CE2):

"....considering a speculative development of a small site....mainly interested in the financial return rather than the type of building. He needs to undertake more preliminary studies and discussions with the local planning officer to determine a brief to take to a small architectural practice or builder who undertakes simple design.... would be better advised to deal with a local builder who has an architectural input from an architectural firm of one of two staff. On a cost basis, which is the main interest of this development, employment of (CE2) could not be justified unless there are unusual problems with foundations and adjacent buildings."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are

"Enjoyed interviews very much....learned a lot from them."

When asked to select one of the professionals, for further consultations, the client selected the architect (A2), giving the following reasons:

"His size of company and range of facilities match my requirements."

5.2.8.5 Overall Comments

The average interaction profile for case study (8) is illustrated in Figure A4.19, in Appendix 4, with Figure A5.19, in Appendix 5, showing average context profiles.

The overall averages of contributions, by the client and professionals, for all 4 interviews relating to: interactions (Figure A4.8) and sentence context (Figure A5.8) are:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	=	32.7%	34.7%
PROFESSIONALS	=	67.3%	64.3%

All of the interview and sentence context profiles show a strong domination by the professionals.

The average interaction and sentence context profiles show the professionals dominating the interview contributions in both. The client's role in the interaction is that of information provider (BAL6) and analyser (BAL5). The professionals concentrate, almost equally, on analysis (BAL5) and information provision (BAL6).

The client's ideas of requirements for this project are at a very early stage with no firm details relating to issues such as timing and, even, final building function. His main objective is to obtain a financial return on whatever he builds, with these views being confirmed by the professionals post-interview comments. Therefore he is looking for ideas as to how to progress this project, and to find out more about the procurement process, because he has no previous experience of a new build situation.

With the professionals dominating the interviews they lead the discussions and determine the focus on issues which they feel relate to the client's ideas. In the category project organisation professional appointment / fees (code SD2) and responsibilities (code SD4) emerge as dominant factors, with building function (code SB6) being the significant factor in the building factors category. One exceptional difference in this set of interviews concerns professional (A1) whose highest contribution relates to planning factors, concentrating equally

on appeals procedure (code SC11) and planning permission (code SC12).

Professionals suggestions of solutions to the client's requirements, stated on the post-interview data sheets [DAT.2], are varied. (CON2) puts forward the concepts of management contracting and construction management, (A2) recommends commissioning an architect, (QS2) proposes a project manager to take over the "day to day management" and (CE2) advises the client to deal with a small architectural practice or local builder.

The client selected professional (A2), because of the size of his organisation and facilities. As the site is in a sensitive location, close to a town centre, (A2)'s concentration on planning issues is likely to have contributed to his selection by the client. The client's personality test scores show very high expressed control and very low wanted control, a "mission impossible" person (Ryan (1989)). Professional (A2) scores very low for both expressed and wanted control. These results suggest strong compatibility on wanted control, but incompatibility on expressed control. Professional (A2) is classified by Ryan (1989) as a "rebel", a person who prefers old familiar areas of responsibility, which perhaps explains his concentration on planning issues.

The client's inexperience in construction matters, and the fact that his ideas for the project are not well developed, lead to the professionals taking the dominant role in this case study.

5.2.9 Case Study 9 - New Factory

5.2.9.1 Client Background Information

The client organisation is a small company, producing electronic equipment, currently occupying a leased building. Because of an anticipated future increase in workload the company is expanding and is therefore considering moving into larger premises. The organisation has no previous experience of being involved in construction work.

The client representative (C9) is a partner in the company, with a background in electronics engineering. He has no previous experience of construction work.

5.2.9.2 Client Building Requirements

The client has a requirement to expand and is considering the option of acquiring a purpose built factory to replace an existing leased facility. No site has been identified.

The client requirements data sheet, [DAT.1], provides information relating to the client organisation and building requirements. Site information given relates to a preferred location and level of car parking. Building information consists of requirements for functional areas such as assembly, offices, reception and storage.

5.2.9.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C9) are illustrated in Figure A4.9, in Appendix 4, and the sentence context profiles are given in Figure A5.9, in Appendix 5.

Client interaction contributions are primarily in the giving orientation (BAL6) and giving opinion (BAL5) categories. Agrees (BAL3) emerges as a secondary category. Professionals primary contributions concentrate on three categories: giving opinions (BAL5), giving orientation (BAL6) and asking for orientation (BAL7). Professional (CE3) places a primary emphasis on asking for orientation (BAL7), which contributes 18.8% of the total interactions. Secondary emphasis is placed on giving suggestions (BAL4), agrees (BAL3) and ask for opinions (BAL8).

The client's contribution to sentence context is primarily in two areas: client organisation and building factors. All four professionals concentrate predominately on building factors. Secondary emphasis varies between professionals. For professionals (QS3), in interview number 34, and (CE3), in interview number 35, the emphasis is on project organisation factors. Professional (A3), in interview number 33, concentrates on site factors. Finally in interview number 36 (C9-QS3) the professional (CON3) gives equal importance to project organisation and client organisation.

The one exceptional profile is for interview number 33 (C9-A3) where the professional (A3) dominates the client contributing 61.3% of total interactions and 66.4% of sentence context.

5.2.9.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3], are:

architect (A3):

"Quite an informative and relaxed interview. Seemed to get down to the important questions quite quickly and most aspects of the brief were well covered. Discussed possible 'procurement' methods of going ahead, including package deals. I think a definite 'high-tech' image for the building was being promoted and it was not necessarily what I was looking for. However, the general discussion was not too 'pushy' or high pressured."

quantity surveyor (QS3):

"I was given plenty of time to describe what I wanted and felt most points that could be covered were. There was a bit of evasion as to how much the building would cost on the basis of the brief."

consulting engineer (CE3):

"Very methodical interview which went into considerable detail over many issues.... felt that he was probably very experienced at extracting material from clients. At the same time the interview was quite relaxed and I felt comfortable.... The general focus was on design issues - sometimes quite detailed."

contractor (CON3):

"Good interview which covered quite a lot of ground. Servicing was particularly well dealt with. Interviewing was quite systematic and directed at extracting the relevant information. Advice was unbiased - I was recommended to use an architect rather than a project manager !"

The professionals comments on the client, extracted from data sheets [DAT.2] are:

architect (A3):

"The client was concerned about image of his new operation but was not sure which image he was trying to project. Seemed to conflict between rural site and high-tech nature of firm. Timing was also a problem since site acquisition was not completed. Since building was related to incoming orders which at present were not firm orders I suggested that a fast track operation would be suitable, using prefabricated steel frame and sheet cladding....the type of building required would be: high-tech image with building materials and components reflecting this.....client believes completion period of 18 months would be suitable. I would recommend....JCT 80 contract most suitable with bills of quantities to ensure maximum design and cost control over the project."

quantity surveyor (QS3):

"The client is obviously at a very early stage of formulating what he wants and thus has many options to consider....type of building, location, programme - how he can or wants to pay for it all....needs initially a very clear and positive report which addresses these options in broad terms, not in detail to explain the various options - what can or can't be achieved and the particular good or bad points of each option. The client will need firm recommendations to guide him along a particular route. Having established whether this is to be a new building or not / location / most beneficial method of funding we will then be able to make detailed proposals and recommendation as to procurement of the building."

consulting engineer (CE3):

"No decision made yet on appointment of consultants - various options being considered. Interested in comprehensive service including advice on possible sites - freehold preferred. Budget not known....funding identified from sale of existing assets and loans. Solution - Traditional build building (brick cladding etc). Two storey structure with emphasis on reception area and presentation / conference area."

contractor (CON3):

"Written brief was reasonably detailed and was generally reflective of the clients requirements....had little general knowledge of the administration of his project. Proposed solutions...single storey....offices finished to medium standard....reception and conference high standard...full air conditioning....externally car park at ground level. Procurement...due to uncertainty of Clients position, a traditional approach of engaging an Architect was recommended in the first instance, leading on to the appointment of further consultants and contractor...12 months following decision to proceed quoted by the Client....14 month period suggested as more realistic."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are:

"I think I performed much better in interviews in which I felt relaxed. The more comfortable I felt the better I was able to put across what I wanted. The ability to put a client at ease and at the same time to extract difficult information is a quite useful one."

When asked to select one of the professionals, for further consultations, the client selected the consulting engineer (CE3), giving the following reasons:

"The ability demonstrated to put me at ease whilst asking systematic and detailed questions."

5.2.9.5 Overall Comments

The average interaction profile for case study (9) is illustrated in Figure A4.20, in Appendix 4, with Figure A5.20, in Appendix 5, showing average context profiles.

The overall averages of contributions, by the client and professionals for all 4 interviews relating to: interactions (Figure A4.9) and sentence context (Figure A5.9) are:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	=	48.9%	45.8%
PROFESSIONALS	=	51.1%	54.2%

Both the interaction and sentence context average profiles show a marginal domination of the client by the professionals. The client's role in the interaction is that of information provider (BAL6) and analyser (BAL5). The professionals concentrate on analysis (BAL5), information provision (BAL6) and questioning (BAL7).

The client has listed a number of his perceived requirements based, firstly, upon his experience of his existing premises and, secondly, on the assumption of securing a number of large contracts in the future. Sentence context contributions concentrate on building factors and client organisation. Within these categories discussion focuses on building services (code SB4) and building timescale / programme (code SB23), for building factors and on client product / production process (code SE12) in client organisation. The importance of timescale is confirmed in the professionals post-interview comments. Some of the client's assembly needs to be conducted in a 'clean room' environment, which explains the high emphasis on building services. Also further information about the client's production process needs to be discussed so that the professionals can understand it clearly.

Advice from the professionals, given in data sheet [DAT.2], present a number of options regarding the appointment of professionals. Professionals (A3) and (CON3) suggest the traditional JCT 80 form of contract, and (CE3) puts forward the view that a 'comprehensive service' is required. Professional (QS3) states that the client needs a full report to examine all options.

The client's selection of a professional was (CE3) because of his methodical systematic approach, and the client felt relaxed and comfortable. The client's personality scores are low for both expressed and wanted control, with the professional (CE3) having medium scores for both expressed and wanted control. Under Ryan's (1989) classification the client is a "rebel" and the professional (CE3) is a "matcher". This suggests that the client likes to avoid responsibility and the professional (CE3) is capable of assuming responsibility. These characteristics, and the client's comments of feeling at ease, provide support for this selection.

Therefore in this case study the professionals exhibit a marginal dominance over the client.

5.2.10 Case Study 10 - New Office Facility

5.2.10.1 Client Background Information

The client organisation is a multinational computer company which originates in the United States. The organisation has significant previous experience of constructing buildings both in the UK and overseas.

The client representative (C10) is a project manager employed by the company with overall responsibility for a number of construction projects in the UK. He is a Chartered Engineer with experience working for contracting, design and client organisations.

5.2.10.2 Client Building Requirements

The client organisation has a requirement for a new district sales office building. A site has been selected, a business park, where the company already occupies an existing building.

The client requirements data sheet, [DAT.1], outlines brief information relating to the location and building. Site information given relates to the site location, development standards set by the site owners and car parking requirements. Building information consists of number of occupants, details of services requirements and a timescale for occupation of the building.

5.2.10.3 Interaction Sentence Context

The interaction profiles for interviews involving client (C10) are illustrated in Figure A4.10, in Appendix 4., and the sentence context profiles are given in Figure A5.9, in Appendix 5.

Two primary categories relating to client interaction contributions are apparent, namely giving orientation (BAL6) and giving opinion (BAL5). Professionals primary interaction contributions are distributed between four categories: giving opinions (BAL5), asking for orientation (BAL7), giving orientation (BAL6) and agrees (BAL3).

In three of the client sentence context profiles, interview numbers 38 (C10-CON3), 39 (C10-A3) and 40 (C10-CE3), building factors emerges as the primary category, with project organisation and client organisation being secondary categories. The exception is interview number 37 (C10-QS3), where relatively equal weighting is given to project organisation and building factors, as primary categories. In interview numbers 38 (C10-CON3), 39 (C10-A3) and 40 (C10-CE3), the professionals (CON3, A3 and CE3) place primary emphasis on building factors. Emphasis on secondary factors varies. Professional (CON3) concentrates on project organisation factors. For professionals (A3) and (CE3) there are no distinctive secondary categories. Lastly in interview number 37 (C10-QS3) the professional (QS3) gives primary consideration to project organisation factors, and emphasises building factors on a secondary level.

Interaction and sentence context contributions show mixed orientations. Interview numbers 38 (C10-CON3) and 39 (C10-A3) show fairly balanced profiles biased towards the client. In interview number 37 (C10-QS3) scores are biased in favour of the professional with overall scores of 55.1% for interactions and 52.6% for sentence context. Finally interview number 40 (C10-CE3) exhibits the greatest difference between client and professional scores, with both interactions and context profiles exhibiting a strong bias towards the client.

5.2.10.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3], are:

quantity surveyor (QS3):

"....he spent some considerable time obtaining further details on our brief which I felt was correct in order for him to formulate ideas on what contract form may be

appropriate....established that we have opted for a Design + Manage form of contract. He then was able to give advice on the wisdom of this choice....explained the drawbacks and advantages....although perhaps better on disadvantages which led me to believe his personal preference not to use this contract form."

contractor (CON3):

"Excellent, quickly came to a sound conclusions as to the "best" way to approach the project. Developed the brief from outline requirements very well. Indicated that whilst a general contract form could be used, it would be likely to be unsuitable as there would be insufficient time to achieve satisfactory quality standards. Identified which forms of contract we had used in the past and our successes / failures and current preferences....accepted our use of independent cost consultants to vet and approve information generated by management contractor."

architect (A3):

"Method of brief collecting was rather muddled, there was no logical progression from expanding on my limited brief....whilst he did understand that (C10) have well defined standards he appeared to not make much effort to find out what they were.... acknowledged that time was of the essence but....gave little advice on whether the tight timescales were realistically achievable or how a particular form of contract might be appropriate."

consulting engineer (CE3):

"Extracted information in an efficient and ordered manner but concentrated on his own discipline rather than enlarging on the wider issues of (C10)'s design philosophy. Examined in detail how (C10) utilise their space within a building with a view to tailoring the structure to suit. I think that this is a very important point and was impressed that a structural engineer raised it....seemed to be reluctant to become involved with contractors on a design and build basis: preferring to produce tender documents with approx. bills which I indicated is not a route (C10) like to use. Probably an advocate of the traditional client / consultant / contractor relationship which for the purposes of this example may prove to be inadequate due to time constraints."

The professionals comments on the client, extracted from data sheets [DAT.2] are:

quantity surveyor (QS3):

"recommend...full review of how the contract is set up - form of contract, responsibilities and duties of all parties concerned, quality of information given to contractor at tender / submission stage, programming, cost appraisals."

contractor (A3):

"Written brief was too vague, but a good level of detail was available as back up, during discussion....appeared well aware of the nature of the industry and of what he required from it....intended to maintain a high degree of involvement in the project including overall project management and site inspection....positive and confident about the project and his objectives. Solution - precast concrete frame and floors....

curtain wall....medium standard internal finishes....full air conditioning....ground level parking. Building procurement system - Design and Manage with independent PQS to audit cost plan and expenditure."

architect (A3):

"a very informed client....has done many buildings of this type before therefore knows most implications of the project. Seemed to have knowledge of all related matters. Existing buildings on the Business Park development are of a curtain wall nature and client expressed desire to match with existing buildings which they already own."

consulting engineer (CE3):

"Disciplined client approach. In house expertise to evaluate and advise on corporate guidelines. Project site identified adjacent to existing facilities. Building design will therefore have to harmonise with existing. Site conditions known but may have to have supplementary site investigation. Programme very short: form of contract and role of designer with contractor may lead to design construct rather than traditional JCT form of contract. Solution - (C10) knows to a great extent what he requires and is supported by technical advice / audit. Programme for project will dictate the form of building contract and from previous successful contract may pursue design construct...."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are:

"....genuinely surprised at (A3) lack of brief collecting ability. Both (CON3) and (QS3) were most able in terms of understanding the (C10) 'know what they want' and suggesting the fastest way of achieving it."

When asked to select one of the professionals, for further consultations, the client selected professional (CON3), giving the following reasons:

"He displayed a good ability to determine the additional information he required to produce advice on contract form, material selection, likely timescales for each phase of the project, leading to overall impressions that despite the short time available his organisation could achieve our occupation date."

5.2.10.5 Overall Comments

The average interaction profile for case study (10) is illustrated in Figure A4.21, in Appendix 4, with Figure A5.21, in Appendix 5, showing average context profiles.

The overall averages of contributions, by the client and professionals for all 4 interviews relating to: interactions (Figure A4.10) and sentence context (Figure A5.10) are:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	=	52.4%	55.4%
PROFESSIONALS	=	47.6%	44.6%

The average interaction and sentence context profiles both show the client (C10) making marginally higher contributions. The client's role in the interaction is primarily that of information provider (BAL6) with a secondary emphasis on analysis (BAL5). The professionals primary concentration is on analysis (BAL5) and questioning (BAL7), with a secondary emphasis on information provision (BAL6) and understanding (BAL3).

Because client (C10) is experienced in procuring buildings, and has well documented requirements discussion focuses on issues defined by the client. For example the dominant factors, in the category building factors, are building services (code SB4) and external cladding (code SB21). Also, in the category project organisation, most emphasis is placed on responsibilities (SD4). The professionals post-interview comments confirm the importance of these areas. The building will be heavily serviced and the cladding needs to match an existing building on the site. In addition the client has clearly defined procedures outlining the responsibilities of all involved parties.

One interview, number 37 (C10-QS3), exhibits a marginal bias towards the professional. The client's comments, post-interview, state that the professional (QS3), "spent a considerable time obtaining further details on our brief." In addition professional (QS3) has worked with this client organisation, but not representative (C10), some 2 years before this interview. Personality test scores show no significant incompatibilities.

Professional (CON3) was selected by the client for further consultation. The client has high expressed and low wanted control scores, and the professional's scores are medium for both expressed and wanted control. Taking Ryan's (1989) classification the client is a "self-confident" person, not overbearing in control of others. The professional (CON3) is a "matcher" who prefers to share responsibility but is capable of making decisions. This suggests no strong personality incompatibilities between client (C10) and professional (CON3).

The client representative (C10) is himself experienced, and has defined client requirements to communicate to the professionals, who respond with their opinions.

5.2.11 Case Study 11 - Refurbishment of Existing Facility

5.2.11.1 Client Background Information

The client organisation is a multinational manufacturer and supplier of electronic equipment with its parent company being located in the United States. The organisation has experience of constructing buildings both in the UK and overseas.

The client representative (C11) is the company's facilities manager, with responsibility for managing all maintenance and new build work on its one UK site. He gained experience in the technical corps of Her Majesty's Forces before moving on to work for contracting and client organisations in a management capacity.

5.2.11.2 Client Building Requirements

The client organisation has a requirement for the expansion and rationalisation of its present facilities on its existing site. As certain sections of the company are expanding more rapidly than others there is a need to review the existing facilities as well as considering alterations to existing buildings and new building options.

The client requirements data sheet, [DAT.1], provides information relating to the existing company organisation, site and buildings. Details of the company organisation relate to major functions such as sales, marketing and training. The current site is described and details provided on areas where reorganisation is being considered.

5.2.11.3 Interaction / Sentence Context

The interaction profiles for interviews involving client (C11) are illustrated in Figure A4.11, in Appendix 4, and the sentence context profiles are given in Figure A5.11, in Appendix 5.

With regard to interaction client contributions are primarily in one category, giving orientation (BAL6). Secondary categories are giving opinions (BAL5) and agrees (BAL3). Two primary categories are apparent from the professional profiles: giving opinions (BAL5)

and asking for orientation (BAL7). Secondary emphasis is placed on giving orientation (BAL6) and agrees (BAL3).

For sentence context three areas of significant contribution emerge: client organisation, site and building. All four professionals place primary emphasis on the same three factors as the client. Two of the professionals, (A3) in interview number 42 and (CON3) in interview number 43, give all three virtually equal weighting. Professionals (CE3) in interview number 41, and (QS3), in interview number 44, place primary emphasis on client organisation.

An exceptional profile is that of interview number 44 (C11-QS3), which shows a balanced profile with a marginal bias towards the professional (QS3). For sentence context all four overall interview profiles exhibit scores close to the above averages, showing a marginal dominance by the client.

5.2.11.4 Client / Professional Interview Comments

Client comments on the professionals, extracted from data sheets [DAT.3], are:

consulting engineer (CE3):

"...advice given was extremely useful and of a high professional standard...the results being a very sound and professional insight into what the professional can achieve for you in respect of major planning and layout of site complexes for large companies. The advice given to me was to have a consultant look at the overall picture of the main three warehouse functions and the control of vehicle traffic within and through the warehouse area."

architect (A3):

"The complexities of the organisation of my present site was excellent fodder...the advice given to me again was extremely good and of a very high professional nature, many ideas were expressed and went into, but because of the complexities of the different needs of the various functions no detailed plan was concluded."

contractor (CON3):

"The professional on this occasion was unable to give technical advice as to the restructuring of the (C11) site, however some very sound advice was given in respect of resiting various services to overcome other problems....discussion very interesting and professional in every aspect."

quantity surveyor (QS3):

"....interview most interesting and the advice given, particularly in long term planning is of great value to me....the detail and content of the advice was of a very high content the whole discussion was very interesting and very absorbing."

The professionals comments on the client, extracted from data sheets [DAT.2], are:

consulting engineer (CE3):

"The company is in a high tech field with technology progressing at a rate which has outstripped the facilities at the clients place of work. Security, access and egress and circulation of vehicles around the site requires to be addressed but this needs to be done in conjunction with rationalising storage facilities on the site and their relationship to production facilities. Solution - undertake feasibility study to optimise the replanning of the warehousing / storage facilities and their relationship to: production, traffic movements and security."

architect (A3):

"Client was uncertain how to proceed with new improvements to his existing operation. Although he has a number of objectives, through discussion it became apparent that a number of other considerations are required. (C11) have an American owner and it appears everything which is done in terms of improving the current operation will have to be related to minimum costs....recommend two approaches: Undertake feasibility on: (1) refurbishment and conversion of existing building, considering security, function, town planning, servicing, future expansion cost, image and phasing: (2) a new build situation on a nearby site which would produce the most efficient building related to present service / function and future requirements."

contractor (CON3):

"Written brief was imprecise and rambling, and did not describe the intended work at all....appears to be subject to overseas Head Office control, and imposed refurbishment / upgrading schemes set against unrealistic costs and timescales. (C11) did not appear to have any overall plan for the development of their estate, and given that the opportunity and intent to expand was evident, seems likely to undertake frequent minor disruptive refurbishments rather than a more major development. Solution - (C11) requires a considerable amount of professional advice in respect of basic planning of the work....recommend consulting an Architect....with a view to developing a coherent strategy for the work. My advice was that the execution of the long-term aims as a single operation was likely to be more effective than a series of separate phases tinkering with the existing buildings."

quantity surveyor (QS3):

"....has a logistics and phasing problem as how to achieve his expansion plans within the confines of an active tight site which must be kept operative....if he continues to expand eventually the site would become totally unsatisfactory and more drastic measures would be required....would suggest various studies are undertaken to propose what work is required....we would spell out the inherent costs of all the

temporary provision required for successful implementation of the overall plan. In conjunction and simultaneously with the above (C11) obviously needs a study undertaken to establish the costs and benefits of staying where he is as opposed to a total relocation."

Client overall comments, given after the interview procedure was completed, extracted from data sheet [DAT.4], are:

"All of the interviews were very interesting and had a lot of content in them, good solid advice was extracted from each interview, and a good guide to more positive thinking in respect of planning detail, layout, staff requirements etc."

When asked to select one of the professionals, for further consultations, the client selected the quantity surveyor (QS3): giving the following reasons:

"Attention to detail and forward thinking and planning. Very quick to see the problems at hand and to offer very good advice and very positive thinking."

5.2.11.5 Overall Comments

The average interaction profile for case study (11) is illustrated in Figure A4.22, in Appendix 4, with Figure A5.22, in Appendix 5, showing average context profiles.

The overall averages of contributions, by the client and professionals for all 4 interviews relating to: interactions (Figure A4.11) and sentence context (Figure A5.11) are:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENT	=	53.3%	54.7%
PROFESSIONALS	=	46.7%	45.3%

Average interaction and sentence context profiles both show that the client has marginally higher scores, dominating the interview contributions in both. The overwhelming client role in the interaction is that of information provider (BAL6). The professionals concentrate, primarily, on analysis (BAL5), with secondary emphasis on questioning (BAL7), information provision (BAL6) and understanding (BAL3).

The client representative (C11) is trying to resolve a situation where the company's changes to their products, in a high technology field, have led to their existing site and buildings becoming unsuitable. Refurbishments and alterations are being carried out in phases. These important issues are corroborated by the professionals post-interview comments, and the factors emphasised during the interviews. Predominant factors are: for site: usage (code SA12) and existing buildings (code SA4), for building: building function (code SB4) and for client organisation: building standards / ideas (code SE2).

The client selected professional (QS3) for further consultations because of his attention to detail and forward thinking and planning. Personality scores do not indicate any strong incompatibilities, with both the client and professional (QS3) having low expressed and wanted control scores. They are, therefore, both classified as "rebels" (Ryan (1989)), who prefer familiar areas of responsibility, and who mainly associate with other rebels in situations, as a defensive measure.

The client representative has a number of different requirements to satisfy, but is unclear how to achieve them, mainly due to existing building and site constraints, and restricted funds controlled by an overseas head office. The client provides a great amount of supplementary information to the professionals who respond by giving opinions, and questioning to determine specific information.

5.3 CLIENT CHARACTERISTICS

In the following two sections characteristics of all interviews between clients and professionals are considered, concentrating on client contributions.

5.3.1 Secondary Inexperienced Clients

The average interaction profiles, for all interviews between secondary inexperienced clients and construction professionals are illustrated in Figure A4.23, in Appendix 4. Average sentence context profiles are shown in Figure A5.23 in Appendix 5.

The clients interaction contributions show that they primarily take the role of information providers (BAL6), with a secondary emphasis on giving opinions (BAL5). These contributions apply to interactions with all 4 professional disciplines. Looking at the overall level of contribution (SUM), they take a secondary role in the interactions.

Sentence context profiles show primary contributions relating, firstly, to client organisation and, secondly, to building factors. The one exception to this is in interviews with consulting engineers, where building factors is the highest category. Overall contributions show a consistent level of contribution by the clients.

Taking an average of overall contributions for the clients' interviews, with all 4 professional groups, the following figures are obtained:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENTS	=	34.5%	34.4%
PROFESSIONALS	=	65.5%	65.6%

Both of the above sets of figures show that the professionals take the dominant role in the interviews.

5.3.2 Secondary Experienced Clients

The average interaction profiles, for all interviews between secondary experienced clients and construction professionals are illustrated in Figure A4.24 in Appendix 4. Average sentence context profiles are shown in Figure A5.24 in Appendix 5.

Primary client interaction contributions are in the category information provision (BAL6), with a secondary emphasis on giving opinions (BAL5). These contributions apply to interactions with all 4 professional disciplines. Considering the overall level of contribution, (SUM), clients take a marginally leading role in the interaction.

Sentence context profiles show primary contributions relating, firstly, to building factors, with one exception. The highest level of client contributions, in interviews with contractors,

is project organisation factors. Overall contributions show a consistent level of contribution by the clients, again with the exception of interviews with contractors which exhibit a higher than average bias towards the clients.

Taking an average of overall contributions for client interviews, with all 4 professional groups, the following figures are obtained:

		<u>Interaction</u>	<u>Sentence Context</u>
CLIENTS	=	55.5%	57.3%
PROFESSIONALS	=	44.5%	42.7%

Both of the above sets of figures show that clients take the dominant role in the interviews.

5.4 PROFESSIONAL CHARACTERISTICS

In the following four sections characteristics of all interviews between clients and the four professional disciplines are considered, concentrating on professional contributions.

The average interaction profiles, for all interviews between professionals and both client types, are shown in Figure A4.25, in Appendix 4. Average sentence context profiles are shown in Figure A5.25 in Appendix 5.

5.4.1 Architects

The interaction profile shows that architects contributions primarily take the form of giving opinions (BAL5), with a secondary emphasis on giving information (BAL6), when interacting with both client types. Contributions in the ask for orientation (BAL7) category are more significant with secondary experienced clients.

The sentence context profile shows primary contributions relating to building factors and project organisation factors with both client types. On a secondary level higher emphasis is apparent on site factors with secondary inexperienced clients.

Total contribution levels, for both interaction and sentence context, are higher for interviews with secondary inexperienced clients.

5.4.2 Quantity Surveyors

The quantity surveyors interaction profile show primary contributions, with both client types, of giving opinions (BAL5), with a secondary emphasis on giving information (BAL6) Ask for orientation (BAL7) category contributions are more significant with secondary experienced clients. The sentence context profile shows a variation in primary contributions, with the quantity surveyors concentrating on: building factors with secondary inexperienced clients and project organisation with secondary experienced clients.

Total contribution levels, for both interaction and sentence context, are higher for interviews with secondary inexperienced clients.

5.4.3 Consulting Engineers

The interaction profile shows that consulting engineers contributions exhibit two different orientations. For interviews with secondary experienced clients they primarily give opinions (BAL5), with an equal secondary emphasis being placed on giving information (BAL6) and asking for orientation (BAL7). However, when interacting with secondary inexperienced the primary emphasis changes to giving information (BAL6), followed by giving opinions (BAL5).

The sentence context profile shows primary contributions relating to building factors with both client types.

Total contribution levels, for both interaction and sentence context, are higher for interviews with secondary inexperienced clients.

5.4.4 Contractors

Contractors interactions are primarily in the giving opinion (BAL5) and giving orientation (BAL6) categories, with asking for orientation being more significant in interviews with secondary experienced clients.

The sentence context profile shows primary contributions relating to project organisation factors with both client types. On a secondary level higher emphasis is placed on building factors.

In both interaction and sentence context profiles, total contribution levels are higher for interviews with secondary inexperienced clients.

5.5 HYPOTHESIS TESTS

In this section the results of statistical tests are presented for each of the research hypotheses. Additional data, synthesised from the case studies is also presented as supporting evidence.

5.5.1 Hypothesis 1

"The way in which potential building clients and construction professionals interact is a function of the client's previous experience of construction."

The two samples compared to test this hypothesis are scores for: secondary inexperienced clients and secondary experienced clients. The sample sizes in this comparison are: 20 secondary secondary inexperienced client interview scores and 24 secondary experienced client interview scores.

The results of t-tests on the 3 data sets are:

Bales IPA (%)	Sentence Context (%)	Wordcount (%)	t (critical) (5% level)*	Degrees of Freedom (df)
6.032**	6.559**	7.560**	2.704	42

* = t (critical) is value for 2 tail test.

** = results significant at 1% level.

The results of the t-test on all three data sets show the observed values of t are greater than the critical value. These results confirm that there is a significant difference between the two samples.

The overall average percentage scores for the 3 data sets are:

<u>SAMPLE</u>	Bales IPA (%)	Sentence Context (%)	Wordcount (%)
Secondary Inexperienced	34.5	34.4	27.5
Secondary Experienced	55.5	57.3	56.0

5.5.2 Hypothesis 2

"Inexperienced clients tend to be dominated by the professionals they are interacting with who determine the interaction process."

The two samples compared to test this hypothesis are scores for: secondary inexperienced clients and construction professionals. The sample sizes in this comparison are: 20 secondary inexperienced client interview scores and 20 construction professional interview scores.

The results of t-tests on the 3 data sets are:

Bales IPA (%)	Sentence Context (%)	Wordcount (%)	t (critical) (5% level)*	Degrees of Freedom (df)
9.053**	9.748**	13.308**	1.681	38

* = t (critical) is value for 1 tail test.

** = results significant at 1% level.

The results of the t-test on all three data sets show the observed values of t are greater than the critical value. These results confirm that there is a significant difference between the two samples with the professionals making the higher contributions.

The overall average percentage scores for the 3 data sets are:

<u>SAMPLE</u>	Bales IPA (%)	Sentence Context (%)	Wordcount (%)
Secondary Inexperienced	34.5	34.4	27.5
Construction Professionals	65.5	65.6	72.5

5.5.3 Hypothesis 3

"Experienced clients tend to dominate the professionals they are interacting with and determine the interaction process."

The two samples compared to test this hypothesis are scores for: secondary experienced clients and construction professionals. The sample sizes in this comparison are: 24 secondary inexperienced client interview scores and 24 construction professional interview scores.

The results of t-tests on the 3 data sets are:

Bales IPA (%)	Sentence Context (%)	Wordcount (%)	t (critical) (5% level)*	Degrees of Freedom (df)
3.152**	4.020**	2.810**	1.679	46

* = t (critical) is value for 1 tail test.

** = results significant at 1% level.

The results of the t-test on all three data sets show the observed values of t are greater than the critical value. These results confirm that there is a significant difference between the two samples with the secondary experienced clients making the higher contributions.

The overall average percentage scores for the 3 data sets are:

<u>SAMPLE</u>	Bales IPA (%)	Sentence Context (%)	Wordcount (%)
Secondary Experienced	55.5	57.3	56.0
Construction Professionals	44.5	42.7	44.0

5.5.4 Hypothesis 4

"The character of the interaction process between inexperienced clients and construction professionals is determined by the professional discipline of the professional with whom they are interacting."

A number of different samples are compared to test this hypothesis. Scores for secondary inexperienced clients are compared with those for each of the four professional disciplines: architects, quantity surveyors, consulting engineers and contractors.

The two samples compared to test this hypothesis are scores for: secondary inexperienced clients and construction professionals from the four disciplines. The sample sizes in this comparison are: 5 secondary inexperienced client interview scores, compared with 5 interview scores for each professional discipline.

The results of t-tests on the 3 data sets, for architects are:

Bales IPA (%)	Sentence Context (%)	Wordcount (%)	t (critical) (5% level)*	Degrees of Freedom (df)
5.012**	7.778**	9.986**	2.306	8

The results of t-tests on the 3 data sets, for quantity surveyors are:

Bales IPA (%)	Sentence Context (%)	Wordcount (%)	t (critical) (5% level)*	Degrees of Freedom (df)
4.722**	4.308**	6.514**	2.306	8

The results of t-tests on the 3 data sets, for consulting engineers are:

Bales IPA (%)	Sentence Context (%)	Wordcount (%)	t (critical) (5% level)*	Degrees of Freedom (df)
4.354**	3.850**	5.071**	2.306	8

The results of t-tests on the 3 data sets, for contractors are:

Bales IPA (%)	Sentence Context (%)	Wordcount (%)	t (critical) (5% level)*	Degrees of Freedom (df)
3.160	4.109**	4.036**	2.306	8

* = t (critical) is value for 2 tail test.

** = results significant at 1% level.

The results of the t-test on all three data sets, for all four professional disciplines, show the observed values of t are greater than the critical value. These results confirm that there is a significant difference between the contributions of secondary inexperienced clients and construction professionals from the four disciplines.

Average interaction (Figure A4.23) and sentence context profiles (Figure A5.23), illustrating the contributions of secondary inexperienced clients and the four professional disciplines, are illustrated in Appendices 4 and 5.

5.6 SUMMARY

In this section both qualitative and quantitative data has been presented in a case study format. Analysis, in the form of individual and cross-case comparisons, has been presented firstly, for each study and then a comparison between studies has been made relating to the different parties involved: client types and professional disciplines. Finally, the results of statistical tests are presented. Discussion on the results of the analysis, in relation to establishing the support for the defined hypotheses, is conducted in the following chapter.

6.0 CONCLUSIONS AND AREAS FOR FURTHER RESEARCH

6.1 INTRODUCTION

This concluding chapter discusses the overall findings of the research investigation.

The chapter begins by considering the four research hypotheses, discussing and commenting on the results of the quantitative tests applied in the previous chapter and presenting qualitative data of relevance to each hypothesis. This is followed by two sections in which the interaction characteristics of clients and professionals are examined. Finally, overall conclusions are presented.

In addition suggestions for areas of further research are proffered.

6.2 RESEARCH HYPOTHESES

In this section a number of items of quantitative and qualitative data are discussed to determine the significance of the support for each of the four defined hypotheses.

6.2.1 Hypothesis 1

"The way in which potential building clients and construction professionals interact is a function of the client's previous experience of construction."

The results of the t-tests on the three data sets, presented in section 5.5.1, show that there is a significant difference between secondary inexperienced and secondary experienced clients. The test was originally applied at the usual 5% significance level, but the results show significance at the higher 1% level for all 3 measures.

To determine the direction of the difference between the two client types, which was not determined by the t-test, the overall average percentage scores for the three measures can be inspected. The three measures all show that secondary experienced clients make significantly higher levels of contribution than the secondary inexperienced clients.

To avoid repetition no additional qualitative data will be presented to explain and support the findings in relation to this hypothesis. By examining the discussion presented in relation to hypotheses 2 and 3, in the following sections, the reader will be presented with information which also applies to this hypothesis.

Therefore, based upon the data analysis and results presented, this hypothesis is **supported**.

6.2.2 Hypothesis 2

"Inexperienced clients tend to be dominated by the professionals they are interacting with who determine the interaction process."

Results of the t-tests on the three data sets, presented in section 5.5.2, show that there is a significant difference between secondary inexperienced clients and construction professionals. The test, applied at the 5% significance level also shows that all of the results are significant at the 1% level. In this hypothesis the direction of the difference between the samples was predicted, explaining the use of a 1 tail critical t value. The results also support the predicted direction of the difference, greater contribution by the professionals.

The overall average percentage scores, for the three measures of client and professional interview contributions, further support the prediction, showing that the construction professionals make a significantly higher level of contributions than the secondary inexperienced clients.

Comments extracted from the data sheets, previously presented in the case study material in chapter 5, support these results. Typical of comments made by the professionals about the secondary inexperienced clients are:

" 'Will need to be steered carefully along the course...' (A1), '...very limited knowledge in the field of buildings' (A2), '...good idea of requirements but much more detailed information needed' (CE2), 'Client requiring confirmation and clarification...' (A2)."

Comments such as these confirm the position that the client comes to the interviews with only basic ideas concerning their project seeking and needing additional information and clarification from the professionals.

Therefore, based upon the data analysis and results presented, this hypothesis is **supported**.

6.2.3 Hypothesis 3

"Experienced clients tend to dominate the professionals they are interacting with and determine the interaction process."

t-test results, presented in section 5.5.3, show that there is a significant difference between secondary experienced clients and construction professionals. All of the results are significant at the 5%, and 1% significance level, both applied using the 1 tail critical t value. Results also support the predicted direction of the difference, greater contribution by the clients.

Overall average percentage scores for the three measures of client and professional interview contributions, further support the prediction, showing that the secondary experienced clients make a higher level of contributions than the construction professionals.

Comments extracted from the data sheets, presented in chapter 5, support these results. Typical comments made by the professionals about the secondary experienced clients are:

"...considerable experience of building procurement...have established ways of appointing professionals...' (A1), '...has a particular system of building procurement which has been developed through experience...' (QS1), '...has very strong ideas and

knows his requirements...'(CON1), '...has own briefing documents.'(QS2),
'...nothing you can tell a client like this.'(CON1)."

Comments such as these confirm the position that the client comes to the interviews with very clear requirements and established systems of procuring professional services.

Therefore, based upon the data analysis and results presented, this hypothesis is **supported**.

6.2.4 Hypothesis 4

"The character of the interaction process between inexperienced clients and construction professionals is determined by the professional discipline of the professional with whom they are interacting."

The results of the t-tests, shown in section 5.5.4, show that there are significant differences between secondary inexperienced clients and each of the professional disciplines. All of the results are significant at the 5%, and 1%, significance level, with one exception, both applied using the 2 tail critical t value. The exception is the Bales IPA score for the contractor, which is only significant at the 5% level.

These results confirm that differences exist between clients and professionals but do not provide information on the nature of the differences. The underlying assumption of this hypothesis is that clients will tend to be led towards particular factors and solutions depending upon the professional discipline they are interacting with. Therefore additional data needs to be considered.

Using the results of t-tests, for the 3 measures, a ranking of highest and lowest values relating to each professional discipline can be conducted. This produces the following hierarchy moving from highest to lowest significance:

1. Architects
2. Quantity Surveyors
3. Consulting Engineers
4. Contractors

Another source of data are the average sentence context profiles, figure A5.23 in Appendix 5, examining professional emphasis. These profiles show that two primary categories emerge for all professionals: building and project organisation, with building showing the greater contribution, with the exception of contractors who concentrate on project organisation. The most prevalent issues discussed by professionals in these categories are: time, cost, and building services for building factors, and professional appointment, responsibilities and procurement systems for project organisation factors.

By studying comments made by both secondary inexperienced clients and professionals, presented in chapter 5, different emphasis on factors by professional disciplines is apparent. Examples of such factors relating to each discipline are:

- | | | |
|-----------------------------|---|--|
| Architects | - | site acquisition, site size, planning issues, building function, programme, procurement options, building image, cost. |
| Quantity Surveyors | - | procurement options, client budget/funding, cost, forms of contract, professional appointment, feasibility studies, life cycle costing, programme, services. |
| Consulting Engineers | - | cost, floor areas, frame, building structure, car parking, foundations, funding, professional appointment, procurement options, services, cost. |
| Contractors | - | specific procurement options (design and build, construction management, management contracting, traditional), forms of contract, timescale, services. |

These lists, and the emphasis on the various factors, show that all disciplines give priority to some factors, such as time, cost and procurement. However, other factors are more specific to a particular professional discipline.

Therefore based upon the data analysis and results presented this hypothesis is **supported**.

6.3 BUILDING CLIENTS

In the following two sections the characteristics of the client types investigated in this research are discussed.

6.3.1 Secondary Inexperienced Clients

Having established that the research results support hypothesis 2, it is clear that secondary inexperienced clients take a subordinate role in their interactions with construction professionals. The client adopts the '*traditional*' role in the professional-client relationship as suggested by Glaser (1972). The client representative is knowledgeable about his own organisation but knows little about procuring buildings. The clients' perceived requirements are mostly based upon an analysis of their existing buildings. Not surprisingly, he needs to seek advice from appropriate professionals. Using Bales IPA system, the interaction analysis shows that the principal role of secondary inexperienced clients is that of information provider (BAL6). Questioning (BAL7) and asking for opinions (BAL8) occur infrequently. This is a function of the professionals dominance of the situation. The sentence context analysis shows client contributions relating to client organisation and building factors, where they are providing additional information to the professionals.

The results offered to support hypothesis 4 show that, although core issues emerge for all professionals, other advice varies according to the professional discipline. One could argue that this diversity gives the client a wider overall view, and presents him with a number of options to consider. However, the greatest difficulty for the inexperienced client is evaluating these options and making the appropriate choice. The clients do not possess the '*knowledge*' to carry out their own diagnosis. They have expertise in their own professional areas such as electronics, chemistry and accountancy, not construction expertise.

Consequently they cannot conduct transactions within their organisation, and therefore must go to the market for professional services.

6.3.2 Secondary Experienced Clients

It is clear that secondary experienced clients take the leading role in their interactions with construction professionals. The results of the tests applied to hypothesis 3 support this view. The client adopts the role, advocated by Glaser (1972), of '*knowledgeable layman*'. The client representative is knowledgeable about his own organisation and the construction process, and therefore client requirements are clearly defined. The clients have '*preprofessionalized*' their own problems, in advance of seeking to obtain the services of construction professionals, as suggested by Abbott (1988)). Using Bales IPA system, the interaction analysis shows that the principal role of secondary experienced clients is that of information provider (BAL6). The sentence context analysis shows client contributions in three areas: building factors, client organisation and project organisation. In all of these areas the client has clearly defined requirements: building standards, existing buildings to use as models for new buildings, and preferred systems for appointing professionals and selecting procurement systems.

The overall averages of the 3 measures used in the t-test, in section 5.5.3, show a lower level of dominance than that exhibited in the difference between secondary inexperienced clients and professionals, as illustrated in section 5.5.2. This can be explained by the fact that the interaction process between secondary experienced clients and professionals involves two professionals interacting. Therefore their '*knowledge bases*' are more compatible.

Secondary experienced clients are in a position to clearly communicate their requirements to professionals, based upon their previous experience of constructing buildings. Also they deal with a large proportion of the early development stages in-house before approaching the construction market. The one potential danger area for these clients is when they find themselves faced with a requirement for a new building type, of which they have no experience. Applying their historically defined system, of standards and methods, to such a situation may be inappropriate and could lead to an unsatisfactory outcome. Such a situation is illustrated in case study 11. The client representative has been involved in

maintenance and refurbishment on the company's site for several years. However, faced with a problem of logistics concerning changes to the production process, he finds himself in a situation outside of his previous expertise.

6.4 CONSTRUCTION PROFESSIONALS

In chapter 3, section 3.4.1, a number of characteristics of professional role were considered in relation to the diagnosis and treatment of their clients' problems. With regard to their interaction with clients the research shows that they adopt two different roles.

When interacting with secondary inexperienced clients the professionals adopt the traditional expert-client relationship, dominating and controlling the interaction. The evidence presented in chapter 5, and the comments on professionals given in support of hypothesis 4, show that the different professional disciplines emphasise different factors. This behaviour is characteristic of the professional action discussed in chapter 3. The professionals diagnose the clients problem and then propose their treatment, the process defined by different authors as: painting and placing the picture (Abbott (1988)), pigeonholing (Mintzberg (1983b)), preference (Simon (1981)) and professional repertoire (Schön (1983)).

Interactions with secondary experienced clients take on a different format. The professionals take a supporting role to the client when faced with the '*knowledgeable layman*'. Rather than painting and placing the picture for the client, the picture comes to them with certain parts already painted. Therefore their influence over the client is reduced.

Examining the Bales' IPA interaction profiles, as shown in Figure A4.25 in Appendix 4, professionals place primary emphasis on giving opinions (BAL5), which is evidence of their diagnostic role. However, one exception to this situation is exhibited by consulting engineers in their interviews with secondary inexperienced clients. In their case the primary category is giving information (BAL6). Two of the three consulting engineers who took part in the interviews used pre-prepared questionnaires. The interaction profiles show that their level of questioning is higher than average with both client types. This prompts greater information provision by both client and professional. The sentence context profiles, figure

A5.25 in Appendix 5, show that architects and consulting engineers place primary emphasis on building factors, irrespective of client type, whilst contractors concentrate on project organisation factors for both client types. It is interesting to note that of all the professionals only quantity surveyors change their emphasis according to client type. With secondary inexperienced clients they concentrate on building factors, switching to project organisation factors with secondary experienced clients. If one examines the list of factors emphasised by the different professions, in section 6.2.4, those relating to quantity surveyors show equal emphasis on building and project organisation factors. Therefore with the secondary experienced client the emphasis towards project organisation can be explained by the fact that building factors are clearly defined, and therefore merit less discussion. This might be seen to support the contention that the quantity surveyor is best suited to undertake the role of project manager.

A major part of the chapter examining construction professionals concentrates on discussing the education that professionals receive. Evidence was produced, in section 3.3.4, as to how the subject areas studied vary between degree courses leading to the different professions. The results of the data analysis show a relationship between dominant areas in such courses and the emphasis on areas placed by professionals in discussions with clients.

Therefore the research has demonstrated that there is a significant difference in the interaction characteristics of construction professionals when faced with clients of different levels of experience.

6.5 OVERALL CONCLUSIONS

Many major changes have occurred in recent years in the alternative methods by which a client can procure construction services. Experienced clients have welcomed the newer building procurement options, such as management contracting and construction management, as they provide benefits such as faster programmes and greater involvement in their projects. For inexperienced clients also the options available to them for procuring a building have increased, as have the range of services offered by professionals. The architect, the traditional first point of client contact, has been joined by a number of other professionals

offering services directly to clients. Professionals from all four disciplines, discussed in this thesis, are now offering project management services to clients. A potential problem here is that, having been educated and trained in a specific professional discipline, they are likely to exhibit the '*pigeonholing*' approach to diagnosing a client's problem. Although there may be general agreement on primary factors, such as time, cost and quality, at a secondary level they are likely to place a higher emphasis on factors important to their own discipline.

In the medical profession the usual first point of contact for a patient is a general practitioner who makes an initial diagnosis. Should the patient need a more detailed diagnosis, to determine an appropriate treatment, he will be referred to a specialist. The move by all construction professionals towards offering project management services leads to a situation where specialists are acting as general practitioners. However, their education and training is specialist in its nature rather than being general. Criticism has been made of the current educational system, where education and training of construction professionals is conducted separately (CSSC (1989)). A move towards a more integrated approach to education, as suggested by CSSC (1988), would lead to a sharing of professional knowledge, a move towards producing a construction general practitioner. Such a practitioner could assist the client, and in particular the inexperienced client, in defining building requirements and procuring appropriate professional services. For example, in the United States an established professional role is that of a '*programmer*', who works with the client to establish his requirements and produce a project brief, without being involved in the subsequent design process (Newman *et al* (1981)).

The role of the professional institutions and construction trade bodies in providing client guidance is another area which merits further consideration. In her investigation into the British building industry, 26 years ago, Bowley (1966) suggested that consideration should be given to establishing a '*client service centre*' to provide advice on clients' building needs. Collaboration between professional bodies to provide, or sponsor, such a service would provide an independent source of client advice, removing any suggestion of bias towards any particular professional group or procurement method. Whatever the method adopted by clients to procure their buildings the same professional disciplines are involved. Therefore such a centre would not be detrimental to any particular discipline.

It is clear that clients, and particularly the inexperienced ones, are still in need of impartial advice and guidance on issues such as professional services and procurement options available to them. Also after a professional has been identified and appointed there needs to be a common understanding of the interaction process which needs to take place. This process needs to be '*interactive*' with '*both*' parties contributing. For example the research shows that inexperienced clients very rarely ask professionals questions. They should be encouraged to ask questions to improve their understanding of a wider range of issues.

One method which has been adopted by some professionals to assist in establishing client requirements is the use of checklists. The coding system developed for this research, shown in Appendix 3, could be utilised as a checklist. It has been derived originally from published sources and supplemented by the views of clients and professionals. Therefore its content reflects both theory and current practice.

An area which was seen as a peripheral issue in this investigation, is the factor of personality. The use of personality tests was incorporated into the research design to be used in situations where interviews exhibited unusual characteristics. In some instances this was the case. One such example is interview number 3 between client (C1) and professional (CE1), in case study 1. Written comments made by the client, after the interview, included the statement, "not the kind of guy I could work with". Inspection of the personality tests showed incompatibility between these individuals. However, the same professional was selected by another client, (C2), as the professional he was most likely to consult again in the future. Some larger clients are adopting procedures to address this issue. Representatives of two of the secondary experienced clients who took part in the research, (C1) and (C5), described details of systems they use. Client (C5) assembles his professional team on a fee competition basis. When members are selected they are brought together and spend a number of days with the representatives of the client's organisation. This sometimes involves visits to the United States to look at client buildings similar to their proposed project. If during this period one or more of the professionals do not appear to be fitting into the team they will be removed and replaced by other professionals. Client (C1) made the following statement, in one of the interviews, concerning his professional selection policy:

"If you feel that you can work with him...its going to be a good experience...that's all part of it. If you're going to be in bed with the guy for two years you've got to feel its going to be slightly enjoyable. If its going to be like a pain in the ass for two years I don't want to know, however good his track record might be. If you can't share a joke with him, and a bit of a laugh then I don't want to know."

Personality is a factor which needs to be addressed early in a project's development. Individual incompatibility at such an early stage of a project is likely to be detrimental to personal relationships and, if extreme, may affect the success of the project.

6.6 AREAS FOR FURTHER RESEARCH

This research investigation has created a valuable source of data capable of being utilised for further research, with the major item being the database of coded interviews created using '*The Ethnograph*' software. The coding system, which was developed during the research, enables the database to be selectively searched to retrieve data relating to: any individual participant, a group of participants, individual codes or combinations of codes. Therefore the views of a selected sample of clients and professionals, on many subjects have been catalogued for retrieval. Both the methodology developed to analyse the interaction process, and the computerised database which has been created from it, could be utilised for further research in a number of areas.

Bales' IPA system (Bales (1951)), has been used as one of the coding systems to measure the nature of the interaction process. Bales outlines a number of analytical measures which can be applied to interview data. For example, he suggests that interviews consist of four phases: orientation, analysis/diagnosis, solutions and praise. The structure of the database allows interrogation of different time sectors of interviews, from which output data could be used to measure if this four phase process occurs. He also describes a number of indices to produce data on problems relating to: communication, evaluation and control, during interviews. Both of these methods could be fruitfully utilised in future research.

The identification of factors relating to the client-professional interaction process, using methods such as those advocated by Bales, could lead to recommendations being made as to how such interactions could be conducted more effectively. The work of Canter *et al* (1985) states that procedures need to be developed to allow interviewees to express their own views, in their own way, whilst still providing information structured enough for systematic analysis and reporting. This would be particularly applicable to interactions between inexperienced clients and professionals, where this research has shown that such clients adopt a secondary role in the interaction process.

The information in the database could also be used as a basis for generating hypotheses, on aspects of client-professional interaction, utilising the '*grounded theory*' techniques advocated by Glaser and Strauss (Glaser and Strauss (1967), Strauss and Corbin (1990)). Such hypotheses could then be tested using structured and/or unstructured data collection and analysis methods.

The research clearly demonstrates that the different professional disciplines are now offering competing '*project management*' services to clients, which can lead to such clients being given different advice. The work of Schön (1983) suggests that there are differences between practitioners concerning their use of media, language and repertoires which they use to describe their conception of reality. Consequently differences between practitioners leads to the art of one practice being unclear to the practitioners of another. Therefore future research would be valuable into the way in which different professionals develop the feel for media, language and repertoires.

Finally, it is clear that inexperienced clients need guidance when they are considering building. Although a number of guides have been produced there is a problem in disseminating such guides to clients, at the very early stages, before they have committed themselves to a particular option or professional. How this dissemination process could be improved is another area to be considered for further research.

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APPENDIX 1

DETAILS OF CASE STUDY PARTICIPANTS

This appendix gives details of the case studies used in this research along with information on the participants. Names of companies and individual participants have not been included to maintain confidentiality.

Both client organisation and client representative are classified with regard to their level of experience.

Each client and professional was designated a unique code. Client representatives were designated codes from (C1) to (C11). Professionals were designated codes relating to their specialisation. Architects were designated (A1) to (A3), quantity surveyors; (QS1) to (QS3), consulting engineers; (CE1) to (CE3) and contractors; (CON1) to (CON3).

CLIENT ORGANISATIONS :

Case Study 1 - Multinational Computer Company

Client Organisation Classification - Secondary Experienced

Project Description - New Corporate Headquarters.

Client Representative (C1) - UK Facilities Manager - (Experienced)

Case Study 2 - UK Auto Centre Company

Client Organisation Classification - Secondary Experienced

Project Description - New Auto Centre Depot

Client Representative (C2) - Regional Property Manager - (Experienced)

Case Study 3 - Ultrasonic Equipment Company

Client Organisation Classification - Secondary Inexperienced

Project Description - New Factory

Client Representative (C3) - Technical Director - (Inexperienced)

Case Study 4 - Electronics Production Company

Client Organisation Classification - Secondary Experienced

Project Description - Extension to Existing Factory

Client Representative (C4) - Property Manager - (Experienced)

Case Study 5 - Multinational Computer Company

Client Organisation Classification - Secondary Experienced

Project Description - New Office Facility

Client Representative (C5) - Principle Project Manager - (Experienced)

Case Study 6 - Laboratory Equipment Manufacturer

Client Organisation Classification - Secondary Inexperienced

Project Description - New Laboratory / Office Facility

Client Representative (C6) - Company Owner - (Inexperienced)

Case Study 7 - Industrial Manufacturing Company

Client Organisation Classification - Secondary Inexperienced

Project Description - New Head Office

Client Representative (C7) - Facility Manager - (Inexperienced)

Case Study 8 - Small Property Management Company

Client Organisation Classification - Secondary Inexperienced

Project Description - Speculative Office Development

Client Representative (C8) - Company Director - (Inexperienced)

Case Study 9 - Small Electronics Company

Client Organisation Classification - Secondary Inexperienced

Project Description - New Factory

Client Representative (C9) - Technical Director - (Inexperienced)

Case Study 10 - Multinational Computer Company

Client Organisation Classification - Secondary Experienced

Project Description - New Office Facility

Client Representative (C10) - Project Manager - (Experienced)

Case Study 11 - Electronic Media Manufacturer

Client Organisation Classification - Secondary Experienced

Project Description - Refurbishment of Existing Facility

Client Representative (C11) - Facility Manager - (Experienced)

CONSTRUCTION PROFESSIONALS

Architect (A1) - Partner in Architectural Practice

Architect (A2) - Partner in Architectural Practice

Architect (A3) - Associate in Architectural Practice

Quantity Surveyor (QS1) - Partner in Quantity Surveying Practice

Quantity Surveyor (QS2) - Partner in Quantity Surveying and Project Management Practice

Quantity Surveyor (QS3) - Partner in Quantity Surveying Practice

Consulting Engineer (CE1) - Partner in Consulting Engineering Practice

Consulting Engineer (CE2) - Associate and Head of Discipline Multidisciplinary Engineering Organisation

Consulting Engineer (CE3) - Partner in Consulting Engineering Practice

Contractor (CON1) - Marketing Manager

Contractor (CON2) - Commercial Director

Contractor (CON3) - Project Manager

APPENDIX 2

CASE STUDY ANALYSIS EXAMPLE

In the following appendix the methodology for the analysis used in this investigation is presented by way of detailing of one of the client case studies conducted. It begins by outlining the procedure adopted, gives examples of the data collected, details the analysis methods and ends by presenting a set of results.

The case study selected to illustrate the analysis is Case Study 6, a small laboratory equipment manufacturer wishing to move into larger premises. The details of the processing and analysis concentrate on one interview between the client representative (C6) and the quantity surveyor (QS2).

A set of data sheets were completed by the client, and the professionals interviewing him, during the interview procedure as follows:

<u>Data Sheet</u>	<u>Data Sheet Content</u>
[DAT.1]	Brief details of building requirements completed by the client preceding the interviews, and circulated to the professionals.
[DAT.2]	Client impressions of professional after each interview.
[DAT.3]	Professional impressions of client after each interview.
[DAT.4]	Overall client impressions of all of the interviews with professionals, including selection of one professional for further consultation.
[DAT.5]	Overall professional conclusions on the interview procedure.

CLIENT CONCLUSIONS - INTERVIEW 1

CLIENT :- (C6) LABORATORY EQUIPMENT MANUFACTURER

PROFESSIONAL :- (QS2)

=====
Please give details below of your impressions of the professional who has interviewed you,
and the advice that you have been given :-

I was very impressed with QS2.

His advice was very useful in helping me to focus on key parameters viz cost and timescale.

PROFESSIONAL CONCLUSIONS

- INTERVIEW 1

CLIENT :- (C6) LABORATORY EQUIPMENT MANUFACTURER

PROFESSIONAL :- (QS2)

=====
Please give details below of your impressions of the client, and also the solution that YOU think satisfies his needs :-

Small but growing private company inexperienced in "building".

Own present freehold - would like to build and occupy a replacement.

Open minded on budget - specialised production methods may affect costs; but would apply "value for money" judgement.

Best solution seems to be to find nearby development site with permission for units of suitable size - perhaps have 2 units built, holding one for renting out until growth takes place to move in.

Leasing appears to be out.

Seems interested in "one professional" in charge to handle all matters, while he runs his business.

CLIENT CONCLUSIONS - INTERVIEW 2

CLIENT :- (C6) LABORATORY EQUIPMENT MANUFACTURER

PROFESSIONAL :- (CE2)

=====
Please give details below of your impressions of the professional who has interviewed you,
and the advice that you have been given :-

I found CE2 pleasant and helpful. His detailed list of parameters to consider was very useful.

For a first meeting the discussion was not as fruitful as the discussion with the quantity surveyor in helping me to focus on the key parameters such as cost of land, overall cost etc.

PROFESSIONAL CONCLUSIONS

INTERVIEW 2

CLIENT :- (C6) LABORATORY EQUIPMENT MANUFACTURER

PROFESSIONAL :- (CE2)

=====
Please give details below of your impressions of the client, and also the solution that YOU think satisfies his needs :-

The client has no experience of dealing with people in the building industry and needs guidance through the various processes from choosing a site, to design stages, contractor selection, construction and handover.

I think he needs the help of a multi-disciplinary professional firm who can guide him either as a Project Manager supervising a design team and a contractor or turnkey type project or as a consulting engineer carry out full multi-disciplinary design aspects and site supervision.

Further discussions would be needed to determine the best solution as he has to date considered only new premises whereas refurbishment of an existing building may be more advantageous in relation to his proposed budget.

CLIENT CONCLUSIONS - INTERVIEW 3

CLIENT :- (C6) LABORATORY EQUIPMENT MANUFACTURER

PROFESSIONAL :- (CON2)

=====
Please give details below of your impressions of the professional who has interviewed you,
and the advice that you have been given :-

I found (CON2) very helpful.

His advice to initially consult a quantity surveyor on the viability of having premises purpose built seemed to be very sound.

As he advised it is more appropriate to have discussions with a management contractor after I have a better idea of outline finances.

PROFESSIONAL CONCLUSIONS

INTERVIEW 3

CLIENT :- (C6) LABORATORY EQUIPMENT MANUFACTURER

PROFESSIONAL :- (CON2)

=====
Please give details below of your impressions of the client, and also the solution that YOU think satisfies his needs :-

As MD & owner of the company Mr (C6) represented the true non technical client with a very real requirement for a new building.

He is faced with making an initial decision as to whether to build himself or to purchase / lease an existing built unit. His requirement is for a standard "high-tech" building & so on that basis he could follow either route.

I discussed the advantages of management contracting particularly in terms of a quick start and being able to offer advice on construction particularly since he would consider constructing a smaller unit & extending in say 12 months time.

I advised him that he would need to make a fundamental decision to build or lease before proceeding any further & recommended that he should discuss this problem with a quantity surveyor who would be able to offer expert help in this.

If the decision was to build I suggested that he should look for some land, get an architect to do an outline scheme & then ask us to do an appraisal of his project, initially at no charge.

CLIENT CONCLUSIONS - INTERVIEW 4

CLIENT :- (C6) LABORATORY EQUIPMENT MANUFACTURER

PROFESSIONAL :- (A2)

=====
Please give details below of your impressions of the professional who has interviewed you,
and the advice that you have been given :-

Found (A2) very helpful.

He gave useful information on various costs, eg construction works, timescale, size of sites required etc.

He also advised me to consult an established estate agent & quantity surveyor & highlighted just how time consuming a building project may be.

PROFESSIONAL CONCLUSIONS

- INTERVIEW 4

CLIENT :- (C6) LABORATORY EQUIPMENT MANUFACTURER

PROFESSIONAL :- (A2)

=====
Please give details below of your impressions of the client, and also the solution that YOU think satisfies his needs :-

Client with real needs and very limited knowledge in the field of buildings.

Requirement for freehold and room to expand probably rules out existing building.

Solution

Retain commercial estate agent to find suitable site. Depending on time scale employ professionals to design building and use builder or if very short of time consider package deal.

CLIENT - POST INTERVIEWS

CLIENT :- (C6) SMALL LABORATORY EQUIPMENT MANUFACTURER

=====

(1) Please give details of your impressions of the interviews :-

Overall very worthwhile.

- | | |
|---------------------|------------------------|
| Order of usefulness | 1) Quantity Surveyor |
| | 2) Architect |
| | 3) Contractor |
| | 4) Consulting Engineer |

=====

(2) On the basis of the interviews which professional would you be most likely to select for further consultations :-

Quantity Surveyor.

=====

(3) Please outline the main reasons for your choice :-

He provided most information on costs which is my critical consideration.

=====

(4) Please give details of your general education and professional experience :-

I have a degree and Ph.D. in chemistry.

Have 8 years experience as analytical chemist and have run my own company for 9 years.

PROFESSIONAL - OVERALL CONCLUSIONS

PROFESSIONAL :- (QS2)

=====

(1) Please give details of your overall impressions of the interviews with the different clients :-

4 very different clients, but similar aims - to build best value for money in the best way.

No "contentious / disagreement" topics at all.

All appreciated the need for cost advice from the outset, and two understood the need to be represented by a professional in the Design and Build scene (from experience) and preferred the Q.S. in that role.

Money is very important to all 4 (of course !)

=====

(2) Please give details of your general education and professional experience :-

10 "O" levels - 3 "A" levels.

Qualified FRICS.

Self employed - senior partner Chartered Q.S. firm.

Also Project Management company director.

This qualitative data formed only part of the data collected in the course of the study. Each interview was tape recorded, producing 45 minutes of audio tape for processing and analysis. Recordings were transcribed using wordprocessing software on an IBM PC microcomputer. Such a large amount of unstructured interview data required the use of a coding system to produce quantitative results. To measure the interaction process, between interview participants, Bales' Interaction Process Analysis (IPA) was used, (Bales (1951)), consisting of the following categories:

CATEGORY	DESCRIPTION
(1)	<u>SHOWS SOLIDARITY</u> - raises others status, gives help, reward.
(2)	<u>SHOWS TENSION RELEASE</u> - jokes, laughs, shows satisfaction.
(3)	<u>AGREES</u> - shows passive acceptance, understands, concurs, complies.
(4)	<u>GIVES SUGGESTIONS</u> - direction, implying, autonomy for others.
(5)	<u>GIVES OPINION</u> - evaluation, analysis, express feeling, wish.
(6)	<u>GIVES ORIENTATION</u> - information, repeats, clarifies, confirms.
(7)	<u>ASKS FOR ORIENTATION</u> - information, repetition, confirmation.
(8)	<u>ASKS FOR OPINION</u> - evaluation, analysis, expression of feeling.
(9)	<u>ASKS FOR SUGGESTION</u> - direction, possible ways of action.
(10)	<u>DISAGREES</u> - shows passive rejection, formality, withholds help.
(11)	<u>SHOWS TENSION</u> - asks for help, withdraws out of field.
(12)	<u>SHOWS ANTAGONISM</u> - deflates others status, defends or asserts self.

Data files were formatted to enable computerised processing of the interview data to be carried out. This was achieved using a computer software package called the Oxford Concordance Program (OCP). Processing was initially carried out using OCP Version 2, (Hockey and Martin (1988)), running on the University Amdahl mainframe computer. Further processing work was conducted using Micro-OCP, a revised version of the program designed to run on an IBM PC compatible microcomputer (Hockey (1988)).

Specific identifiers needed to be introduced into each interview data file to enable interviews to be processed using OCP. References in square brackets, such as <D I21>, denote interview number and <T 0MINS> illustrates the time period of the interview. <C C6-CLIENT> and <C QS2-PROF> signify the speaker identity for the following sentence or sentences. Numbers in brackets at the end of each sentence, such as ((6.)), codify each sentence into the Bales IPA categories outlined previously.

The example below is the beginning of an interview data file formatted for processing using OCP. Annotations in brackets, beginning and ending in asterisks, illustrate the use of the identifiers outlined above.

```

<D I21> <-----(** INTERVIEW NUMBER IDENTIFIER **)
<T 0MINS> <-----(** INTERVIEW TIME PERIOD IDENTIFIER **)
<C QS2-PROF> <-----(** SPEAKER IDENTIFIER - PROFESSIONAL **)
I THOUGHT THAT I WOULD START BY JUST GIVING YOU AN OVERVIEW OF
WHAT A QUANTITY SURVEYOR IS UNLESS YOU ACTUALLY REALLY KNOW
WHAT ONE DOES. ((6.)) <---(** BALES IPA SENTENCE CODING IDENTIFIER **)
<C C6-CLIENT> <-----(** SPEAKER IDENTIFIER - CLIENT **)
NO, THAT WOULD CERTAINLY HELP. ((6.))
<C QS2-PROF>
BECAUSE AT LEAST THEN YOU'D KNOW WHY I'M GIVING YOU THIS
INTERVIEW, NEVER MIND IT BEING THE FIRST ONE TODAY, YOU'RE GOING TO
BE INTERVIEWED BY AN ARCHITECT, AN ENGINEER, A CONTRACTOR AND A
QUANTITY SURVEYOR. ((6.))
THE QUANTITY SURVEYOR REALLY, IN A NUTSHELL, IS BASICALLY THE
FINANCIAL MANAGER OF ANY CONSTRUCTION PROJECT. ((6.))
SO WE DEAL WITH IF YOU LIKE RISK MANAGEMENT IN ALL ITS ASPECTS,
PARTICULARLY ALL THE COSTS INVOLVED, AND WE WILL BE ADVISING ON
CONTRACT, LAW, INSURANCES AND THE PROCUREMENT OF THE BUILDING
ET AL. ((6.))
SO THAT WE HAVE AN EXPERTISE, THERE'S A BOOK AVAILABLE OF COURSE.
((5.))
<C C6-CLIENT>
I SEE. ((3.))

```

The first stage of the processing was to consider each individual interview in its entirety as a data source. To produce an output of data, using OCP, small command programs had to be written so that interview data files are sifted to produce the required types of output.

Command programs in OCP have to be formatted in a particular way and grouped into

sections. The ***INPUT** section defines the format of the input text and what portions of it are to be selected for processing. The ***ACTION** section defines what task is to be performed. The ***FORMAT** section defines the layout and format of the output on the printed page.

An example of the first type of command program used is shown below. It was written to obtain wordlists and statistics of the distribution of words spoken by the client in one interview.

```
*INPUT
REFERENCE COCOA.
COMMENTS BETWEEN "(" TO ")".
SELECT WHERE C = "C6-CLIENT".
*ACTION
DO WORDLIST AND STATS.
KEYS SORTED BY DESCENDING FREQUENCY.
*FORMAT
LAYOUT LENGTH 72 AND COLUMNS 3.
TITLE "WORDLIST & STATS INT 21 - CLIENT C6" CENTRE.
*GO
```

In the ***INPUT** section the referencing method is defined. REFERENCE COCOA refers to the format for references in the data file. The term "COCOA" is derived from an early word **CO**unt and **CO**ncordance generation program which ran on an Atlas computer (Hockey (1980)). The identifiers used in the data file, such as **<D I21>**, **<T 0MINS>** and **<C QS2-PROF>** are in COCOA format. COMMENTS BETWEEN "(" TO ")", in this case the Bales' IPA categories, defines text within double brackets, ((6.)), to be treated as comment and therefore not included in any word counting procedures. SELECT WHERE C = "C6-CLIENT" selects only those portions of the text following the COCOA reference to the client: **<C C6-CLIENT>**.

The ***ACTION** section defines two tasks to be carried out. DO WORDLIST AND STATS produces a list of words with their frequencies of occurrence, and a statistical analysis of the vocabulary. KEYS SORTED BY DESCENDING FREQUENCY determines the arrangement of the output wordlist. In this instance words are sorted in descending frequency, meaning

that a word occurring most frequently will appear at the top of the list and the least frequent at the bottom.

The ***FORMAT** section defines the layout of the page with regard to page length and number of columns, LAYOUT LENGTH 72 AND COLUMNS 3, and the title for the list, TITLE "WORDLIST & STATS INT21 - CLIENT C6" CENTRE.

A final command, ***GO**, is included to instruct OCP to carry out the commands stated.

When the command file has been executed the following output file is produced:

WORDLIST & STATS INT 21 - CLIENT C6

OF	67	ABOUT	6	BUILD	3
A	62	CURRENT	6	BUILDING	3
THE	59	GOT	6	BUILT	3
WE	46	IT'S	6	CAN	3
I	41	K	6	COSTS	3
THAT	38	NOT	6	DON'T	3
AND	37	O	6	FAIRLY	3
TO	31	OTHER	6	FEEL	3
IN	29	PERHAPS	6	FEEES	3
IS	27	PROBABLY	6	FIGURE	3
SO	25	TALKING	6	FITTING	3
YOU	25	WE'VE	6	FREEHOLD	3
WOULD	24	WHICH	6	GATHER	3
KNOW	23	AREA	5	HALF	3
SORT	22	BECAUSE	5	IDEAL	3
ARE	18	COULD	5	I'VE	3
OUR	18	FOOT	5	LABORATORY	3
AT	15	I'M	5	LOOKS	3
COST	15	INTO	5	MAIL	3
BE	14	OBVIOUSLY	5	MARKET	3
FOR	14	OR	5	MY	3
IT	14	SIGNIFICANT	5	NEXT	3
RIGHT	14	SORRY	5	NO	3
SQUARE	14	THAN	5	ORDER	3
ONE	13	THERE'S	5	OWN	3
JUST	12	ACTUALLY	4	PER	3
REALLY	12	AGENTS	4	PLUS	3
SAY	12	ALL	4	POUNDS	3
THIS	12	DO	4	PREMISES	3
WE'RE	12	GUESS	4	PRESUMABLY	3
YES	12	LAND	4	REQUIREMENT	3
AS	11	MILLION	4	SAID	3
HOW	11	MONTHS	4	SAVING	3
LIKE	11	MORE	4	STAGE	3
EM	10	MOST	4	SURE	3

HAVE	10	MOVE	4	TERMS	3
QUITE	10	MUST	4	THINGS	3
EH	9	OUT	4	THROUGH	3
FEET	9	PART	4	TIME	3
IF	9	PEOPLE	4	TOTAL	3
THERE	9	POSSIBLY	4	TWO	3
UNIT	9	PROPERTY	4	WAS	3
BUT	8	SOLVENTS	4	WHETHER	3
MUCH	8	THEN	4	WORKING	3
ON	8	UNDERSTAND	4	100	3
SEE	8	US	4	2000	3
ALTHOUGH	7	USING	4	ABSOLUTELY	2
AN	7	VERY	4	ADDITIONAL	2
BUSINESS	7	WHAT	4	AIR	2
HAVING	7	WHERE	4	ALLOWANCE	2
MOMENT	7	WILL	4	AM	2
THAT'S	7	WITH	4	ANALYTICAL	2
UNITS	7	ANOTHER	3	ASSUMED	2
WELL	7	BIT	3	BEEN	2
BETWEEN	2	SITE	2	CLEAN	1
BUY	2	START	2	CLIENTS	1
CERTAINLY	2	TECH	2	COLUMNS	1
CHEMISTRY	2	THEALE	2	COME	1
COMPANY	2	THESE	2	COMMERCIAL	1
COMPLETED	2	TIMETABLE	2	COMPARING	1
COMPONENT	2	TRY	2	COMPONENTS	1
CONSIDER	2	TRYING	2	CONCERNED	1
CONSTRUCTED	2	USE	2	CONDITIONING	1
DOUBLING	2	USED	2	CONSIDERED	1
EACH	2	VIABLE	2	CONSIDERING	1
EFFECTIVE	2	WANT	2	CONSUMEABLES	1
EFFECTIVELY	2	WERE	2	CONTENT	1
ESSENTIALLY	2	WHY	2	COVERS	1
ESTATE	2	YEARS	2	CRASH	1
EVERY	2	YOUR	2	CRASHES	1
EXPANDING	2	YOU'RE	2	CURRENTLY	1
EXTEND	2	1250	2	DECIDE	1
FROM	2	300000	2	DEMAND	1
FULL	2	5000	2	DEMONSTRATIONS	1
GLASS	2	ABLE	1	DESIGN	1
HAVEN'T	2	ABSOLUTE	1	DIFFERENCE	1
HIGH	2	ACCOUNTANTS	1	DISCUSSING	1
I'D	2	ACRE	1	DOES	1
IDEALLY	2	ADDED	1	DOOR	1
INDUSTRIAL	2	ADDITION	1	DROP	1
INTERESTED	2	ADMIT	1	EFFORT	1
ITS	2	ADVERTISED	1	EITHER	1
KEY	2	AFFECT	1	ELABORATE	1
LITTLE	2	AGAIN	1	EMPLOYEES	1
LONG	2	AH	1	END	1
LOT	2	ALONG	1	ENDED	1
MANY	2	AMBITIOUS	1	ENERGIES	1
ME	2	AMUSING	1	ENVIRONMENT	1
NEED	2	ANYWAY	1	EQUIPMENT	1

NEWBURY	2	APPRECIATE	1	ESSENTIAL	1
NINE	2	APPROPRIATE	1	EVENTUALLY	1
NORMALLY	2	APPROPRIATELY	1	EVERYTHING	1
OPEN	2	APPROXIMATELY	1	EXCLUDING	1
PERCENT	2	ASSESS	1	EXPAND	1
PLEASANT	2	ATTRACT	1	EXPANSION	1
POSSIBILITIES	2	ATTRACTIVE	1	EXPENSIVE	1
POSSIBILITY	2	AWARE	1	EXPERTISE	1
PRESTIGIOUS	2	BACK	1	EXTENT	1
PRICE	2	BALANCE	1	EXTRA	1
PRICES	2	BALL	1	FEED	1
PRODUCTION	2	BASICALLY	1	FILLING	1
PURPOSE	2	BEAR	1	FINANCIAL	1
PUT	2	BEFORE	1	FIND	1
QUARTER	2	BUILDINGS	1	FLEXIBILITY	1
RATHER	2	BY	1	FORTUNATE	1
REQUIRE	2	CHANGES	1	GATHERED	1
ROUGHLY	2	CHEMIST	1	GENERAL	1
SEEN	2	CHROMATOGRAPHY	1	GIVE	1
GOING	1	NICE	1	SCOPE	1
GOOD	1	NORM	1	SCRATCH	1
GREEN	1	NOW	1	SEEM	1
GUIDE	1	OCCUPATION	1	SEEMS	1
HANDLING	1	OCCUPIER	1	SERIOUSLY	1
HAPPEN	1	OFF	1	SHELF	1
HAZARDS	1	OFFERING	1	SHIFT	1
HEALTHY	1	OFFICE	1	SHOULDN'T	1
HELP	1	ONLY	1	SILICA	1
HIGHEST	1	OOO	1	SINS	1
HOPE	1	OPTION	1	SITUATION	1
HOUR	1	OPTIONS	1	SIX	1
IDEAS	1	OVER	1	SLOWER	1
I'LL	1	OWNER	1	SMALL	1
IMAGE	1	PARK	1	SMART	1
INCUR	1	PARKING	1	SOLD	1
INSTRUMENTS	1	PARTICULARLY	1	SOME	1
INSULATED	1	PICTURE	1	SOMETHING	1
INVESTMENT	1	PLANNING	1	SOMEWHERE	1
INVOLVE	1	POSITION	1	SPACE	1
INVOLVED	1	POWDER	1	SPACES	1
JUNCTION	1	PRECONSTRUCTED	1	SPECIALISED	1
KEEN	1	PREMIUM	1	SPECIFICATION	1
KITCHEN	1	PRETTY	1	SPENT	1
LEAPING	1	PROBLEM	1	STAINLESS	1
LEASE	1	PROBLEMS	1	STATE	1
LEASED	1	PRODUCT	1	STAY	1
LEAST	1	PRODUCTS	1	STEEL	1
LEGAL	1	PROFESSIONAL	1	SUBLETTING	1
LIABILITY	1	PROJECTS	1	SUCH	1
LIFE	1	PROSPECT	1	SUPPOSE	1
LIMITED	1	PUTS	1	SYSTEMS	1
LIQUID	1	RAPIDLY	1	TAKES	1
LOOK	1	RATE	1	TAX	1
LOSE	1	READING	1	TELL	1

LOW	1	READY	1	TEMPORARY	1
LOWER	1	REASON	1	TENTH	1
MANUFACTURE	1	REASONABLY	1	TERM	1
MANUFACTURING	1	REASONS	1	THEY	1
MATTER	1	REFLECT	1	THEY'RE	1
MEASURE	1	RELATIVELY	1	THING	1
MENTION	1	REMAINDER	1	THINK	1
MENTIONING	1	REPHRASE	1	THOSE	1
MIDDLE	1	REQUIREMENTS	1	THOUGHT	1
MIND	1	REQUIRES	1	TINTED	1
MINDED	1	RESULT	1	TOGETHER	1
MISLED	1	RIDER	1	TOO	1
MIXTURE	1	RIDICULOUS	1	TOP	1
MODERN	1	ROLL	1	TRAINING	1
MOTORWAY	1	ROUGH	1	TUBES	1
MOVING	1	RULE	1	TYPE	1
MULTITUDE	1	SALE	1	VAGUE	1
NEAR	1	SAYING	1	VARIOUS	1
NEARER	1	SCIENTIFIC	1	VIRTUALLY	1
VISIT	1				
WAY	1				
WE'LL	1				
WINDOWS	1				
WORKSHOP	1				
YEAR	1				
YOU'VE	1				
10	1				
1000	1				
10	1				
100	1				
1000	1				
12	1				
15	1				
15000	1				
16	1				
250000	1				
3	1				
3000	1				
37	1				
4	1				
40000	1				
5	1				
500	1				
5000	1				
7	1				

FREQUENCY	RELATIVE FREQUENCY	NUMBER SUCH	WORDS IN FREQUENCY	VOCAB TOTAL	WORD TOTAL	PERC VOCAB	PERC WORDS
1	0.05546	276	276	276	276	53.91	15.31
2	0.11093	82	164	358	440	69.92	24.40
3	0.16639	48	144	406	584	79.30	32.39
4	0.22185	27	108	433	692	84.57	38.38
5	0.27732	12	60	445	752	86.91	41.71
6	0.33278	13	78	458	830	89.45	46.03
7	0.38824	8	56	466	886	91.02	49.14
8	0.44370	4	32	470	918	91.80	50.92
9	0.49917	5	45	475	963	92.77	53.41
10	0.55463	3	30	478	993	93.36	55.07
11	0.61009	3	33	481	1026	93.95	56.91
12	0.66556	6	72	487	1098	95.12	60.90
13	0.72102	1	13	488	1111	95.31	61.62
14	0.77648	5	70	493	1181	96.29	65.50
15	0.83195	2	30	495	1211	96.68	67.17
18	0.99834	2	36	497	1247	97.07	69.16
22	1.22019	1	22	498	1269	97.27	70.38
23	1.27565	1	23	499	1292	97.46	71.66
24	1.33111	1	24	500	1316	97.66	72.99
25	1.38658	2	50	502	1366	98.05	75.76
27	1.49750	1	27	503	1393	98.24	77.26
29	1.60843	1	29	504	1422	98.44	78.87
31	1.71936	1	31	505	1453	98.63	80.59
37	2.05213	1	37	506	1490	98.83	82.64
38	2.10760	1	38	507	1528	99.02	84.75
41	2.27399	1	41	508	1569	99.22	87.02
46	2.55130	1	46	509	1615	99.41	89.57
59	3.27232	1	59	510	1674	99.61	92.85
62	3.43871	1	62	511	1736	99.80	96.28
67	3.71603	1	67	512	1803	100.00	100.00

TYPE/TOKEN RATIO:0.28397

TOTAL WORDS READ = 7431
TOTAL WORDS SELECTED = 1803
TOTAL WORDS PICKED = 1803
TOTAL WORDS SAMPLED = 1803
TOTAL WORDS KEPT = 1803
TOTAL VOCABULARY = 512
OCP TERMINATES SUCCESSFULLY

The above output file begins by providing a list of words spoken by the client, arranged in descending frequency. For example the word COST occurs 15 times.

The wordlist is followed by a statistical analysis of the wordlist. The statistics produced can be illustrated by explaining one row of figures from the above table.

(1) FREQUENCY	(2) RELATIVE FREQUENCY	(3) NUMBER SUCH	(4) WORDS IN FREQUENCY	(5) VOCAB TOTAL	(6) WORD TOTAL	(7) PERC VOCAB	(8) PERC WORDS
15	0.83195	2	30	495	1211	96.68	67.17

In column (1) the figure 15 represents the frequency of occurrence of a word or number of words. Relative frequency, column (2), is the frequency divided by the total number of words spoken by the client, expressed as a percentage:

$$\frac{\text{Frequency}}{\text{Total Words}} \times 100 = \frac{15}{1803} \times 100 = 0.83195$$

Column (3) gives the number of words with a frequency of occurrence of 15. In this case there are two words, namely COST and AT. Column (4) gives the number of words in the frequency, obtained by multiplying column (1) by column (3). Column (5) is a cumulative total of the number of different words, or vocabulary, used by the client. The word total, column (6), is a cumulative total of the number of words used by the client. Finally, columns (7) and (8) give cumulative percentages of vocabulary and words used respectively.

At the end of the statistical table the following summary figures are presented:

TYPE/TOKEN RATIO:0.28397

TOTAL WORDS READ = 7431
 TOTAL WORDS SELECTED = 1803
 TOTAL WORDS PICKED = 1803
 TOTAL WORDS SAMPLED = 1803
 TOTAL WORDS KEPT = 1803
 TOTAL VOCABULARY = 512
 OCP TERMINATES SUCCESSFULLY

TYPE/TOKEN RATIO presents a relationship between the vocabulary of the client and the total number of words (512 divided by 1803). TOTAL WORDS READ is the total number of words in the interview, spoken by both client and professional. The lines TOTAL

WORDS SELECTED, TOTAL WORDS PICKED, TOTAL WORDS SAMPLED and TOTAL WORDS KEPT all refer to the number of words spoken by the client. TOTAL VOCABULARY gives the total number of different words spoken by the client. The final line, OCP TERMINATES SUCCESSFULLY, indicates that no errors were found in the file during processing.

A virtually identical command file was used to produce wordlists and statistics for the professional participant in the interview.

A second type of command program was used to provide information relating to the occurrence of Bales' IPA categories in the interview files. Command files for this purpose were in the following format:

```
*INPUT  
REFERENCE COCOA.  
SELECT WHERE C = "C6-CLIENT" AND BETWEEN "(" TO ")".  
*ACTION  
DO WORDLIST AND STATS.  
PICK WORDS " 1 2 3 4 5 6 7 8 9 10 11 12 ".  
*FORMAT  
LAYOUT LENGTH 72 AND COLUMNS 3.  
TITLE "BALES' IPA SCORES & STATS - CLIENT C6 - INT 21" LEFT.  
*GO
```

This command file is similar to the one described previously with the exception of two lines. SELECT WHERE C = "C6-CLIENT" AND BETWEEN "(" TO ")" selects only those portions of the text following the COCOA reference to the client: <C C6-CLIENT> and within the double brackets, such as ((6.)). PICK WORDS " 1 2 3 4 5 6 7 8 9 10 11 12 " limits the selection of words to the ones listed. In this case the command file is requesting that a search be made for the Bales' IPA categories 1 to 12 only.

When the command file has been executed the following output file is produced:

BALES' IPA SCORES & STATS CLIENT C6 INT 21

CATEGORY	SCORE
3	31
5	44
6	59
7	11
8	4
9	1

FREQUENCY	RELATIVE FREQUENCY	NUMBER WORDS IN SUCH	WORDS IN FREQUENCY	VOCAB TOTAL	WORD TOTAL	PERC VOCAB	PERC WORDS
1	0.66667	1	1	1	1	16.67	0.67
4	2.66667	1	4	2	5	33.33	3.33
11	7.33333	1	11	3	16	50.00	10.67
31	20.66666	1	31	4	47	66.67	31.33
44	29.33333	1	44	5	91	83.33	60.67
59	39.33333	1	59	6	150	100.00	100.00

TYPE/TOKEN RATIO:0.04000

TOTAL WORDS READ = 7951
 TOTAL WORDS SELECTED = 150
 TOTAL WORDS PICKED = 150
 TOTAL WORDS SAMPLED = 150
 TOTAL WORDS KEPT = 150
 TOTAL VOCABULARY = 6
 OCP TERMINATES SUCCESSFULLY

In this output file the column headed **CATEGORY** lists the Bales IPA categories found in the interview data file. The second column, **SCORE**, gives the number of occurrences of each category found. For example, 59 occurrences of Bales' category 6 were found. The statistical analysis and summary figures are in an identical format to the one described previously.

From these OCP output files information was extracted and summarised, for each client set of 4 interviews. A summary table of information for each client was produced in the following format:

BALES' I.P.A. NUMERICAL INTERVIEW SCORES

CLIENT :- (C6) LABORATORY EQUIPMENT MANUFACTURER

		INTERVIEW 1		INTERVIEW 2		INTERVIEW 3		INTERVIEW 4	
PROFESSIONAL		QS2 - (21)		CE2 - (26)		CON2 - (31)		A2 - (20)	
IPA CATEGORY		CL.	PR.	CL.	PR.	CL.	PR.	CL.	PR.
(1)	No.	0	0	0	0	0	0	0	0
(2)	No.	0	0	0	0	0	0	0	0
(3)	No.	31	33	4	3	1	2	1	1
(4)	No.	0	7	0	9	0	12	0	6
(5)	No.	44	142	21	75	13	136	21	134
(6)	No.	59	159	37	112	25	80	16	83
(7)	No.	11	16	19	16	13	6	17	5
(8)	No.	4	10	4	1	4	0	0	0
(9)	No.	1	0	0	0	2	0	0	0
(10)	No.	0	0	0	0	0	0	0	0
(11)	No.	0	0	0	0	0	0	0	0
(12)	No.	0	0	0	0	0	0	0	0
IPA	No.	150	367	85	216	58	236	55	230
	%	29.0	71.0	28.2	71.8	19.7	80.3	19.3	80.7
TOTALS	No.	517		301		294		285	
WORD COUNT	No.	1803	5628	893	1984	677	3102	709	3395
	%	24.3	75.7	31.0	69.0	17.9	82.1	17.3	82.3
TOTALS	No.	7431		2877		3779		4104	
T.T. RATIO	No.	.2840	.1969	.3729	.3019	.3988	.2592	.4062	.2510
VOCAB.	No.	512	1108	333	599	270	804	288	852

The first row denotes the headings for the 4 interviews conducted with client (C6). The second row shows the identity of the professional involved in the interview and the interview number.

In the first section of the table Bales' IPA categories are listed in the first column, with subsequent columns giving IPA scores for client, **CL.**, and professional, **PR.**, in each interview. This shows the number of interactions per interview, sub-divided by IPA category and participant.

The second and third sections give IPA and word count totals in numerical and percentage format per participant per interview. Finally two other items of information are shown. Firstly, a vocabulary (**VOCAB.**), giving the number of different words used in an interview by a participant and, secondly, the type token ratio (**T.T.RATIO**), which is obtained by dividing the vocabulary of the individual into the number of words used during an interview by that individual.

To enable a comparison to be made between interviews Bales' IPA numerical scores for each category were normalised by converting scores into percentages of the total IPA score for each interview. This can be illustrated by the following example.

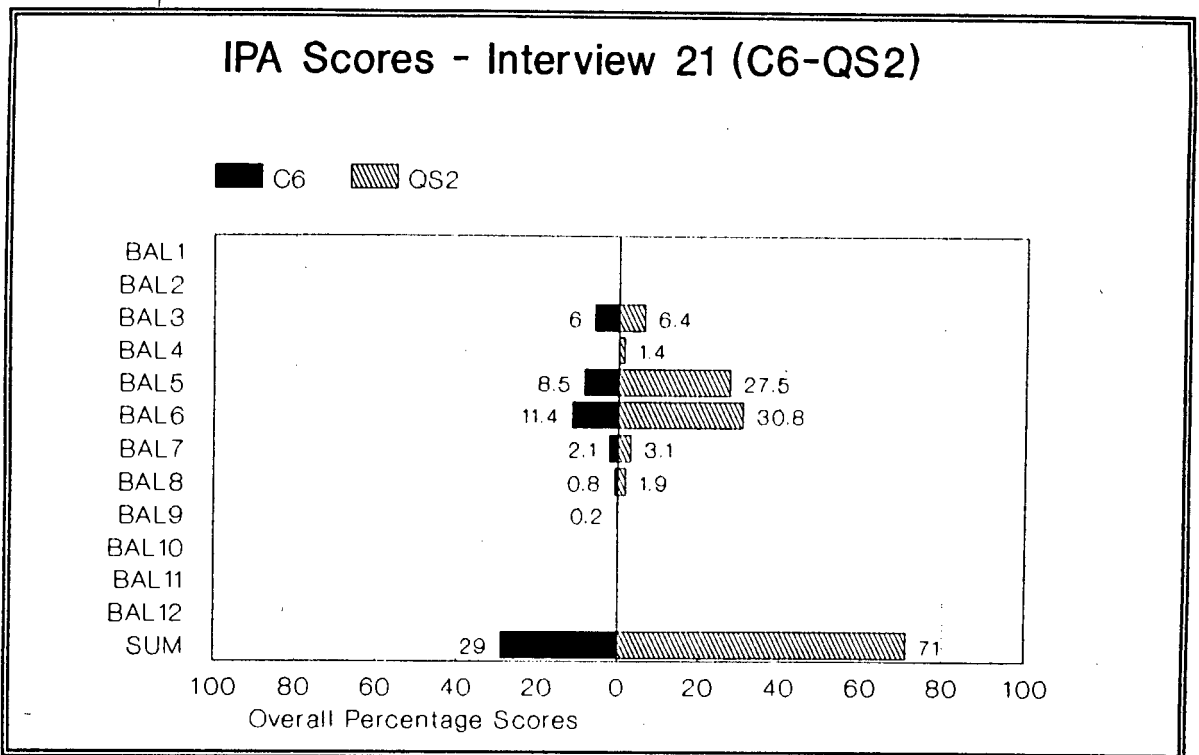
On the summary of IPA scores in interview 21, with (QS2), client (C6) had a category 6 (Gives Orientation) score of 59. The total IPA score for the interview was 517. This was converted into a category 6 percentage by applying the following formula:

$\frac{\text{Category 6 Score}}{\text{IPA Interview Total}} \times 100 = \text{Category 6 Percentage}$
$\frac{59}{517} \times 100 = 11.4\%$

Therefore each category percentage, for both client and professional, was calculated using the above formula with the percentages obtained illustrated of the following page:

		INTERVIEW 1		INTERVIEW 2		INTERVIEW 3		INTERVIEW 4	
PROFESSIONAL		QS2 - (21)		CE2 - (26)		CON2 - (31)		A2 - (20)	
IPA CATEGORY		CL.	PR.	CL.	PR.	CL.	PR.	CL.	PR.
(1)	%	0	0	0	0	0	0	0	0
(2)	%	0	0	0	0	0	0	0	0
(3)	%	6.0	6.4	1.3	1.0	0.3	0.7	0.4	0.4
(4)	%	0	1.4	0	3.0	0	4.1	0	2.1
(5)	%	8.5	27.5	7.0	24.9	4.4	46.3	7.4	47.0
(6)	%	11.4	30.8	12.3	37.2	8.5	27.2	5.6	29.1
(7)	%	2.1	3.1	6.3	5.3	4.4	2.0	6.0	1.8
(8)	%	0.8	1.9	1.3	0.3	1.4	0	0	0.4
(9)	%	0.2	0	0	0	0.7	0	0	0
(10)	%	0	0	0	0	0	0	0	0
(11)	%	0	0	0	0	0	0	0	0
(12)	%	0	0	0	0	0	0	0	0

The above data was translated into a graphical representation in the form of a twinned bar chart to show the interaction profiles of both the client and professional in each interview. The following example is a twinned bar chart for interview number 21 between client (C6) and professional (QS2).



In the bar chart above the vertical scale indicates the 12 Bales IPA categories (BAL1 to BAL12), with the final line, SUM, providing a total percentage for all of the Bales' category scores. The horizontal axis represents the percentage scale for category scores. Bars to the left of zero show client percentage scores per category, and to the right professional scores per category. A full set of interaction profiles for all of the interviews are shown in Appendix 4.

The analysis of the interview data using Bales' IPA produced quantitative results consisting purely of interaction factors. Therefore an additional and complementary analysis was also conducted which allowed for more qualitative results to be produced relating to the subject content of the interviews.

Again a computer software package was used to format, code and produce results from the interview data files. The program used is called, "The Ethnograph", (Seidel *et al* (1988)), which allows data files to be coded, and then sections to be retrieved based upon the coding system used.

Wordprocessed interview data files were input to the program which produces a printed output file in the following format:

NUMBERED VERSION OF INT21P1	2/15/1990	13:44	Page 1
+INT21 PER1			1
QS2: I THOUGHT THAT I WOULD START BY			3
JUST GIVING YOU AN OVERVIEW OF WHAT A			4
QUANTITY SURVEYOR IS UNLESS YOU			5
ACTUALLY REALLY KNOW WHAT ONE			6
DOES.			7
C6: NO, THAT WOULD CERTAINLY			9
HELP.			10
QS2: BECAUSE AT LEAST THEN YOU'D KNOW			12
WHY I'M GIVING YOU THIS INTERVIEW,			13
NEVER MIND IT BEING THE FIRST ONE			14
TODAY, YOU'RE GOING TO BE INTERVIEWED			15
BY AN ARCHITECT, AN ENGINEER, A			16
CONTRACTOR AND A QUANTITY			17
SURVEYOR.			18
THE QUANTITY SURVEYOR REALLY, IN A			19
NUTSHELL, IS BASICALLY THE FINANCIAL			20
MANAGER OF ANY CONSTRUCTION			21
PROJECT.			22
SO WE DEAL WITH IF YOU LIKE RISK			23
MANAGEMENT IN ALL ITS ASPECTS,			24
PARTICULARLY ALL THE COSTS INVOLVED,			25
AND WE WILL BE ADVISING ON CONTRACT,			26
LAW, INSURANCES AND THE PROCUREMENT OF			27
THE BUILDING ET AL.			28
SO THAT WE HAVE AN EXPERTISE, THERE'S			29
A BOOK AVAILABLE OF COURSE.			30
C6: I SEE.			32

+INT21 PER1 gives a contextual reference to the interview number and time period. C6: and QS2: are identifiers for the interview participants, as outlined in Appendix 1. As part of the processing procedure The Ethnograph assigns line numbers to data files, shown on the right of the text, which are used in the coding process.

Interview files were coded manually, using the coding system detailed in Appendix 3. Each sentence was assigned relevant codes, and these codes were then input to the program. Individual files were coded in segments relating to time periods, normally four, for practical purposes relating to overall size of interview files. This produced the following printed

a request was made to find codeword **CB3**, the segment on line 32 would be presented on screen, printer, or saved on a disk. A request to search for multiple codes, for example **PB6** and **PSD4** in the sample file, would present the segment beginning on line 19 and ending on line 22.

As well as being able to retrieve segments of interview data the Ethnograph also produces a table consisting of a frequency of occurrences of the code words and speakers for each file as follows:

ALPHABETICAL LIST OF CODEWORDS USED IN CODING INT21P1

N	CODEWORD	N	CODEWORD	N	CODEWORD	N	CODEWORD
33	C	4	CB3	8	CB5	21	CB6
1	CR15	2	CSA6	2	CSB12	1	CSB14
4	CSB23	6	CSB5	1	CSB6	11	CSE12
3	CSE13	3	CSE14	4	CSE16	7	CSE2
1	CSE9	55	P	11	PB3	11	PB5
24	PB6	8	PB7	1	PB8	2	PR1
1	PR10	4	PR14	1	PR15	8	PR2
2	PR3	3	PR4	1	PR7	2	PR8
3	PSA4	1	PSA6	1	PSB11	2	PSB12
1	PSB23	6	PSB24	1	PSB3	6	PSB5
7	PSB6	1	PSB9	4	PSD1	1	PSD11
5	PSD14	1	PSD13	2	PSD14	1	PSD17
4	PSD4	1	PSD5	1	PSD7	1	PSD9
2	PSE1	2	PSE11	6	PSE12	5	PSE14
1	PSE15	2	PSE16	4	PSE2	2	PSE4
2	PSE9						

ALPHABETICAL LIST OF SPEAKERS USED IN CODING INT21P1

N	SPEAKER	N	SPEAKER	N	SPEAKER	N	SPEAKER
23	C6	24	QS2				

The first set of figures give the number of occurrences of codewords in each file, and the second show the number of times each participant spoke in the interview.

Because The Ethnograph is primarily a qualitative analysis tool its quantitative analysis is limited to the tables of code occurrences shown above.

Results obtained using the Bales IPA coding system concentrate on interaction and not content of the interviews. Scores can be analysed with regard to the frequency of opinions expressed by a client in an interview, but the subject matter on which opinions were expressed cannot be analysed in frequency terms.

To obtain additional quantitative results, concerning subject matter discussed during the interviews, using the above data provided by The Ethnograph, two small computer programs were written. Both programs were written in BASIC and were run on an IBM-PC compatible microcomputer. The objective of these programs was to translate output, produced by The Ethnograph program, into formats in which the data could be analysed further and discussed.

The first program takes the alphabetical table of codewords and allows categories to be sorted to produce percentages relating to the subject context of a sentence. The coding scheme used to categorise the context of the sentence is detailed fully in Appendix 3. The major sub-categories used in coding sentence context are:

- A Site Factors
- B Building Factors
- C Planning Factors
- D Project Organisation Factors
- E Client Organisation / Policy Factors

The listing of the program is as follows:

```

10  REM ETHNOGRAPH DATA READ PROGRAM (1)
20  DIM FILE$(10)
30  DIM F(10)
40  DIM T(10)
50  DIM D$(10,50)
60  DIM W$(10,200)
70  DIM N$(2000)
80  CLS
90  PRINT "ETHNOGRAPH CODEWORD ANALYSIS PROGRAM"
100 PRINT "===== "
110 PRINT
120 PRINT "HOW MANY FILES DO YOU WISH TO READ";
130 INPUT N
140 FOR I=1 TO N
150 PRINT "FILE NAME";I;
160 INPUT FILE$(I)
170 NEXT I
180 FOR P=1 TO N
190 OPEN "I",#1,FILE$(P)
200 FOR J=1 TO 4
210 INPUT#1,D$(P,J)
220 NEXT J
230 FOR J=5 TO 40
240 INPUT#1,D$(P,J)
250 IF ASC(RIGHT$(D$(P,J),1))=12 THEN 270
260 NEXT J
270 CLOSE
280 F(P)=J
290 FOR J=5 TO F(P)
300 W$(P,1+4*(J-5))=MID$(D$(P,J),1,15)
310 W$(P,2+4*(J-5))=MID$(D$(P,J),19,15)
320 W$(P,3+4*(J-5))=MID$(D$(P,J),38,15)
330 W$(P,4+4*(J-5))=MID$(D$(P,J),57,15)
340 NEXT J
350 IF LEN(D$(P,F(P)))=17 THEN F(P)=4*(F(P)-5)+1:GOTO 400
360 IF LEN(D$(P,F(P)))=36 THEN F(P)=4*(F(P)-5)+2:GOTO 400
370 IF LEN(D$(P,F(P)))=55 THEN F(P)=4*(F(P)-5)+3:GOTO 400
380 IF LEN(D$(P,F(P)))=56 THEN F(P)=4*(F(P)-5)+3:GOTO 400
390 IF LEN(D$(P,F(P)))=1 THEN F(P)=4*(F(P)-5)
400 FOR J=1 TO F(P)
410 IF INT((J+3)/4)=(J+3)/4 THEN W$(P,J)=" "+W$(P,J)
420 IF ASC(MID$(W$(P,J),3,1))=32 THEN W$(P,J)=" "+W$(P,J)
430 NEXT J
440 NEXT P
450 FOR I=1 TO F(1)
460 N$(I)=W$(1,I)
470 NEXT I
480 T(1)=F(1)

```

```

490 FOR I=2 TO N
500 T(I)=T(I-1)+F(I)
510 FOR J=T(I-1)+1 TO T(I)
520 N$(J)=W$(I,J-T(I-1))
530 NEXT J
540 NEXT I
550 F=T(N)
560 C=0
570 FOR J=1 TO F
580 IF MID$(N$(J),5,3)="CSA" THEN CSA=CSA+VAL(MID$(N$(J),1,3))
590 IF MID$(N$(J),5,3)="CSB" THEN CSB=CSB+VAL(MID$(N$(J),1,3))
600 IF MID$(N$(J),5,3)="CSC" THEN CSC=CSC+VAL(MID$(N$(J),1,3))
610 IF MID$(N$(J),5,3)="CSD" THEN CSD=CSD+VAL(MID$(N$(J),1,3))
620 IF MID$(N$(J),5,3)="CSE" THEN CSE=CSE+VAL(MID$(N$(J),1,3))
630 IF MID$(N$(J),5,2)="CS" THEN CS=CS+VAL(MID$(N$(J),1,3))
640 IF MID$(N$(J),5,3)="PSA" THEN PSA=PSA+VAL(MID$(N$(J),1,3))
650 IF MID$(N$(J),5,3)="PSB" THEN PSB=PSB+VAL(MID$(N$(J),1,3))
660 IF MID$(N$(J),5,3)="PSC" THEN PSC=PSC+VAL(MID$(N$(J),1,3))
670 IF MID$(N$(J),5,3)="PSD" THEN PSD=PSD+VAL(MID$(N$(J),1,3))
680 IF MID$(N$(J),5,3)="PSE" THEN PSE=PSE+VAL(MID$(N$(J),1,3))
690 IF MID$(N$(J),5,2)="PS" THEN PS=PS+VAL(MID$(N$(J),1,3))
700 NEXT J
710 LET T=CS+PS
720 PRINT
730 PRINT "CLIENT RESULTS - INT No.";A;B$
740 PRINT "===== "
750 PRINT "CODE","No. OCCUR","% OF CLIENT","% OF OVERALL"
760 PRINT "----","-----","-----","-----"
770 PRINT "CSA", CSA,((CSA/CS)*100,((CSA/T)*100)
780 PRINT "CSB", CSB,((CSB/CS)*100,((CSB/T)*100)
790 PRINT "CSC", CSC,((CSC/CS)*100,((CSC/T)*100)
800 PRINT "CSD", CSD,((CSD/CS)*100,((CSD/T)*100)
810 PRINT "CSE", CSE,((CSE/CS)*100,((CSE/T)*100)
820 PRINT
830 PRINT "TOTAL CS", CS,"-----",(CS/T)*100
840 PRINT "PROFESSIONAL RESULTS" - INT No.";A;B$
850 PRINT "===== "
860 PRINT "CODE","No. OCCUR","% OF PROF","% OF OVERALL"
870 PRINT "----","-----","-----","-----"
880 PRINT "PSA", PSA,((PSA/PS)*100,(PSA/T)*100
890 PRINT "PSB", PSB,((PSB/PS)*100,(PSB/T)*100
900 PRINT "PSC", PSC,((PSC/PS)*100,(PSC/T)*100
910 PRINT "PSD", PSD,((PSD/PS)*100,(PSD/T)*100
920 PRINT "PSE", PSE,((PSE/PS)*100,(PSE/T)*100
930 PRINT
940 PRINT "TOTAL PS", PS,"(;T;)",(PS/T)*100

```

The program first reads in the required Ethnograph formatted codeword lists. Using again the example of interview 21, between (C6) and (QS2), the data files, of lists and frequencies of occurrence of codes, are read into the program (lines 10 to 570). Then a summary of number of occurrences of sentence contexts is produced along with percentages for each subcategory (lines 580 to 940).

The program output appears in the following format:

CLIENT RESULTS - INT No. 21 ALL

CODE	No. OCCUR	% OF CLIENT	% OF OVERALL
CSA	26	13.612575	5.038760
CSB	83	43.4555	16.08527
CSC	1	.5235602	.1937985
CSD	19	9.947644	3.682171
CSE	62	32.46074	12.0155
TOTAL CS	191		37.0155

PROFESSIONAL RESULTS - INT No. 21 ALL

CODE	No. OCCUR	% OF CLIENT	% OF OVERALL
PSA	38	11.69231	7.364341
PSB	184	56.61539	35.65891
PSC	8	2.461539	1.550388
PSD	39	12	7.55814
PSE	56	17.23077	10.85271
TOTAL PS	325	(516)	62.9845

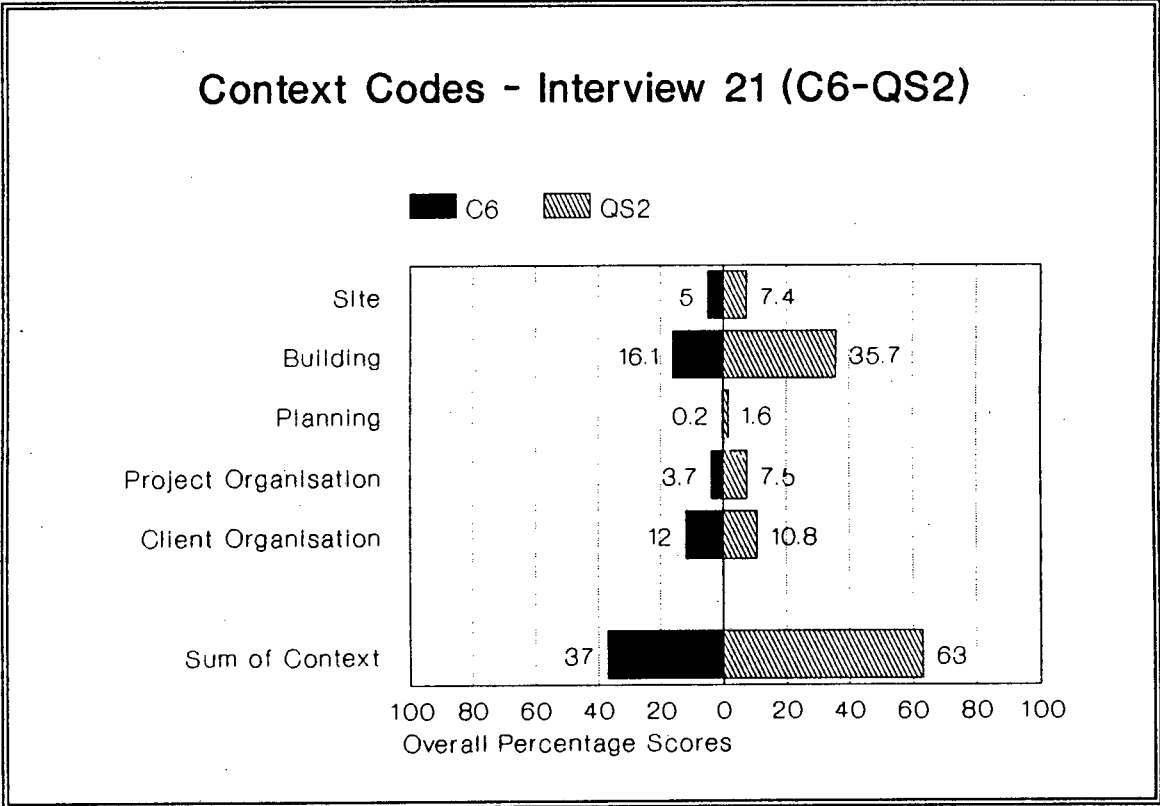
This output file is split into two sections. The first produces results relating to the client, **CLIENT RESULTS**, and the second for the professional, **PROFESSIONAL RESULTS**.

The content of the output file can be explained by considering the relevance of the figures presented under the **CLIENT RESULTS** heading, as the professional results are presented in an identical format.

The first column, headed **CODE**, lists the codes used to classify the sentence context, from CSA to CSE. The second column, headed **No. OCCUR**, gives the number of times codewords relating to the sentence context factor occur. For example, there are 83

occurrences of code CSB. The final figure in the column gives a total for the number of codes appearing in the file: **TOTAL CS 191**. **% OF CLIENT**, the third column, gives a breakdown in percentages of the proportions of codes relating to the client only in the interview. For example, **43.4555%** of client interview context codes relate to code category CSB. The final column, **% OF OVERALL**, gives a breakdown in percentages of the proportions of codes relating to the client, but in this instance taking into account codes assigned to both client and professional. The figure **16.08527** is the percentage of code category CSB as a proportion of the total number of codes in the interview, **516**. The final figure in the column, **37.0155**, is the percentage of client codes as a proportion of the total of interview codes.

The above data was translated into a graphical representation in the form of a twinned bar chart to show the sentence context profiles of both the client and professional in each interview. These profiles illustrate the main subject areas of discussion in each interview. The following example is a twinned bar chart for interview number 21 between client (C6) and professional (QS2).



In the bar chart above the vertical scale indicates the 5 main sentence context sub-categories, and on the horizontal scale the percentage for category scores. The additional bar, **Sum of Context**, provides a total percentage for the interview of the 5 sub-categories. Bars to the left of zero show client percentage scores per sub-category, and to the right professional scores per sub-category. A full set of sentence context profiles for all of the interviews are shown in Appendix 5.

A second program was written to again take the alphabetical tables and arrange the data into a format where client and professional results, for each sentence context sub-category, could be compared.

The listing of the program is as follows:

```
10 REM ETHNOGRAPH DATA READ PROGRAM (2) FACTORS
20 DIM FILE$(10)
30 DIM F(10)
40 DIM T(10)
50 DIM D$(10,50)
60 DIM W$(10,200)
70 DIM N$(2000)
80 CLS
90 PRINT "ETHNO CODEWORD ANALYSIS PROGRAM (2)"
100 PRINT "=====
110 PRINT
120 INPUT "TYPE IN INTERVIEW No";A
130 INPUT "TYPE IN INTERVIEW PART/ALL";B$
132 INPUT "TYPE IN CLIENT IDENTIFIER";X$
133 INPUT "TYPE IN PROFESSIONAL IDENTIFIER";Y$
140 PRINT "HOW MANY FILES DO YOU WISH TO READ";
150 INPUT N
160 FOR I=1 TO N
170 PRINT "FILE NAME";I;
180 INPUT FILE$(I)
190 NEXT I
200 FOR P=1 TO N
210 OPEN "I",#1,FILE$(P)
220 FOR J=1 TO 4
230 INPUT#1,D$(P,J)
240 NEXT J
250 FOR J=5 TO 40
260 INPUT#1,D$(P,J)
```

```

270 IF ASC(RIGHT$(D$(P,J),1))=12 THEN 290
280 NEXT J
290 CLOSE
300 F(P)=J
310 FOR J=5 TO F(P)
320 W$(P,1+4*(J-5))=MID$(D$(P,J),1,15)
330 W$(P,2+4*(J-5))=MID$(D$(P,J),19,15)
340 W$(P,3+4*(J-5))=MID$(D$(P,J),38,15)
350 W$(P,4+4*(J-5))=MID$(D$(P,J),57,15)
360 NEXT J
370 IF LEN(D$(P,F(P)))=17 OR LEN(D$(P,F(P)))=18 THEN F(P)=4*(F(P)-5)+1:GOTO
    420
380 IF LEN(D$(P,F(P)))=36 OR LEN(D$(P,F(P)))=37 THEN F(P)=4*(F(P)-5)+2:GOTO
    420
390 IF LEN(D$(P,F(P)))=55 OR LEN(D$(P,F(P)))=56 THEN F(P)=4*(F(P)-5)+3:GOTO
    420
400 IF LEN(D$(P,F(P)))=56 THEN F(P)=4*(F(P)-5)+3:GOTO 420
410 IF LEN(D$(P,F(P)))=1 THEN F(P)=4*(F(P)-5)
420 FOR J=1 TO F(P)
430 IF INT((J+3)/4)=(J+3)/4 THEN W$(P,J)=" "+W$(P,J)
440 IF ASC(MID$(W$(P,J),3,1))=32 THEN W$(P,J)=" "+W$(P,J)
450 NEXT J
460 NEXT P
470 FOR I=1 TO F(1)
480 N$(I)=W$(1,I)
490 NEXT I
500 T(1)=F(1)
510 FOR I=2 TO N
520 T(I)=T(I-1)+F(I)
530 FOR J=T(I-1)+1 TO T(I)
540 N$(J)=W$(I,J-T(I-1))
550 NEXT J
560 NEXT I
570 F=T(N)
580 C=0
590 FOR J=1 TO F
600 REM (2) REFERENCES TO OTHERS
610 IF MID$(N$(J),5,4)="CR1 " THEN CR1=CR1+VAL(MID$(N$(J),1,3))
620 IF MID$(N$(J),5,3)="CR2" THEN CR2=CR2+VAL(MID$(N$(J),1,3))
630 IF MID$(N$(J),5,3)="CR3" THEN CR3=CR3+VAL(MID$(N$(J),1,3))
640 IF MID$(N$(J),5,3)="CR4" THEN CR4=CR4+VAL(MID$(N$(J),1,3))
650 IF MID$(N$(J),5,3)="CR5" THEN CR5=CR5+VAL(MID$(N$(J),1,3))
660 IF MID$(N$(J),5,3)="CR6" THEN CR6=CR6+VAL(MID$(N$(J),1,3))
670 IF MID$(N$(J),5,3)="CR7" THEN CR7=CR7+VAL(MID$(N$(J),1,3))
680 IF MID$(N$(J),5,3)="CR8" THEN CR8=CR8+VAL(MID$(N$(J),1,3))
690 IF MID$(N$(J),5,3)="CR9" THEN CR9=CR9+VAL(MID$(N$(J),1,3))
700 IF MID$(N$(J),5,4)="CR10" THEN CR10=CR10+VAL(MID$(N$(J),1,3))
710 IF MID$(N$(J),5,4)="CR11" THEN CR11=CR11+VAL(MID$(N$(J),1,3))

```

```

720 IF MID$(N$(J),5,4)="CR12" THEN CR12=CR12+VAL(MID$(N$(J),1,3))
730 IF MID$(N$(J),5,4)="CR13" THEN CR13=CR13+VAL(MID$(N$(J),1,3))
740 IF MID$(N$(J),5,4)="CR14" THEN CR14=CR14+VAL(MID$(N$(J),1,3))
750 IF MID$(N$(J),5,4)="CR15" THEN CR15=CR15+VAL(MID$(N$(J),1,3))
760 IF MID$(N$(J),5,4)="CR16" THEN CR16=CR16+VAL(MID$(N$(J),1,3))
770 IF MID$(N$(J),5,2)="CR" THEN CR=CR+VAL(MID$(N$(J),1,3))
780 IF MID$(N$(J),5,4)="PR1 " THEN PR1=PR1+VAL(MID$(N$(J),1,3))
790 IF MID$(N$(J),5,3)="PR2" THEN PR2=PR2+VAL(MID$(N$(J),1,3))
800 IF MID$(N$(J),5,3)="PR3" THEN PR3=PR3+VAL(MID$(N$(J),1,3))
810 IF MID$(N$(J),5,3)="PR4" THEN PR4=PR4+VAL(MID$(N$(J),1,3))
820 IF MID$(N$(J),5,3)="PR5" THEN PR5=PR5+VAL(MID$(N$(J),1,3))
830 IF MID$(N$(J),5,3)="PR6" THEN PR6=PR6+VAL(MID$(N$(J),1,3))
840 IF MID$(N$(J),5,3)="PR7" THEN PR7=PR7+VAL(MID$(N$(J),1,3))
850 IF MID$(N$(J),5,3)="PR8" THEN PR8=PR8+VAL(MID$(N$(J),1,3))
860 IF MID$(N$(J),5,3)="PR9" THEN PR9=PR9+VAL(MID$(N$(J),1,3))
870 IF MID$(N$(J),5,4)="PR10" THEN PR10=PR10+VAL(MID$(N$(J),1,3))
880 IF MID$(N$(J),5,4)="PR11" THEN PR11=PR11+VAL(MID$(N$(J),1,3))
890 IF MID$(N$(J),5,4)="PR12" THEN PR12=PR12+VAL(MID$(N$(J),1,3))
900 IF MID$(N$(J),5,4)="PR13" THEN PR13=PR13+VAL(MID$(N$(J),1,3))
910 IF MID$(N$(J),5,4)="PR14" THEN PR14=PR14+VAL(MID$(N$(J),1,3))
920 IF MID$(N$(J),5,4)="PR15" THEN PR15=PR15+VAL(MID$(N$(J),1,3))
930 IF MID$(N$(J),5,3)="PR16" THEN PR16=PR16+VAL(MID$(N$(J),1,3))
940 IF MID$(N$(J),5,2)="PR" THEN PR=PR+VAL(MID$(N$(J),1,3))
950 REM (3) SITE FACTORS (a)
960 IF MID$(N$(J),5,5)="CSA1 " THEN CSA1=CSA1+VAL(MID$(N$(J),1,3))
970 IF MID$(N$(J),5,4)="CSA2" THEN CSA2=CSA2+VAL(MID$(N$(J),1,3))
980 IF MID$(N$(J),5,4)="CSA3" THEN CSA3=CSA3+VAL(MID$(N$(J),1,3))
990 IF MID$(N$(J),5,4)="CSA4" THEN CSA4=CSA4+VAL(MID$(N$(J),1,3))
1000 IF MID$(N$(J),5,4)="CSA5" THEN CSA5=CSA5+VAL(MID$(N$(J),1,3))
1010 IF MID$(N$(J),5,4)="CSA6" THEN CSA6=CSA6+VAL(MID$(N$(J),1,3))
1020 IF MID$(N$(J),5,4)="CSA7" THEN CSA7=CSA7+VAL(MID$(N$(J),1,3))
1030 IF MID$(N$(J),5,4)="CSA8" THEN CSA8=CSA8+VAL(MID$(N$(J),1,3))
1040 IF MID$(N$(J),5,4)="CSA9" THEN CSA9=CSA9+VAL(MID$(N$(J),1,3))
1050 IF MID$(N$(J),5,5)="CSA10" THEN CSA10=CSA10+VAL(MID$(N$(J),1,3))
1060 IF MID$(N$(J),5,5)="CSA11" THEN CSA11=CSA11+VAL(MID$(N$(J),1,3))
1070 IF MID$(N$(J),5,5)="CSA12" THEN CSA12=CSA12+VAL(MID$(N$(J),1,3))
1080 IF MID$(N$(J),5,5)="CSA13" THEN CSA13=CSA13+VAL(MID$(N$(J),1,3))
1090 IF MID$(N$(J),5,5)="CSA14" THEN CSA14=CSA14+VAL(MID$(N$(J),1,3))
1100 IF MID$(N$(J),5,3)="CSA" THEN CSA=CSA+VAL(MID$(N$(J),1,3))
1110 IF MID$(N$(J),5,5)="PSA1 " THEN PSA1=PSA1+VAL(MID$(N$(J),1,3))
1120 IF MID$(N$(J),5,4)="PSA2" THEN PSA2=PSA2+VAL(MID$(N$(J),1,3))
1130 IF MID$(N$(J),5,4)="PSA3" THEN PSA3=PSA3+VAL(MID$(N$(J),1,3))
1140 IF MID$(N$(J),5,4)="PSA4" THEN PSA4=PSA4+VAL(MID$(N$(J),1,3))
1150 IF MID$(N$(J),5,4)="PSA5" THEN PSA5=PSA5+VAL(MID$(N$(J),1,3))
1160 IF MID$(N$(J),5,4)="PSA6" THEN PSA6=PSA6+VAL(MID$(N$(J),1,3))
1170 IF MID$(N$(J),5,4)="PSA7" THEN PSA7=PSA7+VAL(MID$(N$(J),1,3))
1180 IF MID$(N$(J),5,4)="PSA8" THEN PSA8=PSA8+VAL(MID$(N$(J),1,3))
1190 IF MID$(N$(J),5,4)="PSA9" THEN PSA9=PSA9+VAL(MID$(N$(J),1,3))

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```

1200 IF MID$(N$(J),5,5)="PSA10" THEN PSA10=PSA10+VAL(MID$(N$(J),1,3))
1210 IF MID$(N$(J),5,5)="PSA11" THEN PSA11=PSA11+VAL(MID$(N$(J),1,3))
1220 IF MID$(N$(J),5,5)="PSA12" THEN PSA12=PSA12+VAL(MID$(N$(J),1,3))
1230 IF MID$(N$(J),5,5)="PSA13" THEN PSA13=PSA13+VAL(MID$(N$(J),1,3))
1240 IF MID$(N$(J),5,5)="PSA14" THEN PSA14=PSA14+VAL(MID$(N$(J),1,3))
1250 IF MID$(N$(J),5,3)="PSA" THEN PSA=PSA+VAL(MID$(N$(J),1,3))
1260 REM (3) BUILDING FACTORS (b)
1270 IF MID$(N$(J),5,5)="CSB1 " THEN CSB1=CSB1+VAL(MID$(N$(J),1,3))
1280 IF MID$(N$(J),5,5)="CSB2 " THEN CSB2=CSB2+VAL(MID$(N$(J),1,3))
1290 IF MID$(N$(J),5,5)="CSB3 " THEN CSB3=CSB3+VAL(MID$(N$(J),1,3))
1300 IF MID$(N$(J),5,4)="CSB4" THEN CSB4=CSB4+VAL(MID$(N$(J),1,3))
1310 IF MID$(N$(J),5,4)="CSB5" THEN CSB4=CSB4+VAL(MID$(N$(J),1,3))
1320 IF MID$(N$(J),5,4)="CSB6" THEN CSB6=CSB6+VAL(MID$(N$(J),1,3))
1330 IF MID$(N$(J),5,4)="CSB7" THEN CSB7=CSB7+VAL(MID$(N$(J),1,3))
1340 IF MID$(N$(J),5,4)="CSB8" THEN CSB8=CSB8+VAL(MID$(N$(J),1,3))
1350 IF MID$(N$(J),5,4)="CSB9" THEN CSB9=CSB9+VAL(MID$(N$(J),1,3))
1360 IF MID$(N$(J),5,5)="CSB10" THEN CSB10=CSB10+VAL(MID$(N$(J),1,3))
1370 IF MID$(N$(J),5,5)="CSB11" THEN CSB11=CSB11+VAL(MID$(N$(J),1,3))
1380 IF MID$(N$(J),5,5)="CSB12" THEN CSB12=CSB12+VAL(MID$(N$(J),1,3))
1390 IF MID$(N$(J),5,5)="CSB13" THEN CSB13=CSB13+VAL(MID$(N$(J),1,3))
1400 IF MID$(N$(J),5,5)="CSB14" THEN CSB14=CSB14+VAL(MID$(N$(J),1,3))
1410 IF MID$(N$(J),5,5)="CSB15" THEN CSB15=CSB15+VAL(MID$(N$(J),1,3))
1420 IF MID$(N$(J),5,5)="CSB16" THEN CSB16=CSB16+VAL(MID$(N$(J),1,3))
1430 IF MID$(N$(J),5,5)="CSB17" THEN CSB17=CSB17+VAL(MID$(N$(J),1,3))
1440 IF MID$(N$(J),5,5)="CSB18" THEN CSB18=CSB18+VAL(MID$(N$(J),1,3))
1450 IF MID$(N$(J),5,5)="CSB19" THEN CSB19=CSB19+VAL(MID$(N$(J),1,3))
1460 IF MID$(N$(J),5,5)="CSB20" THEN CSB20=CSB20+VAL(MID$(N$(J),1,3))
1470 IF MID$(N$(J),5,5)="CSB21" THEN CSB21=CSB21+VAL(MID$(N$(J),1,3))
1480 IF MID$(N$(J),5,5)="CSB22" THEN CSB22=CSB22+VAL(MID$(N$(J),1,3))
1490 IF MID$(N$(J),5,5)="CSB23" THEN CSB23=CSB23+VAL(MID$(N$(J),1,3))
1500 IF MID$(N$(J),5,5)="CSB24" THEN CSB24=CSB24+VAL(MID$(N$(J),1,3))
1510 IF MID$(N$(J),5,5)="CSB25" THEN CSB25=CSB25+VAL(MID$(N$(J),1,3))
1520 IF MID$(N$(J),5,5)="CSB26" THEN CSB26=CSB26+VAL(MID$(N$(J),1,3))
1530 IF MID$(N$(J),5,5)="CSB27" THEN CSB27=CSB27+VAL(MID$(N$(J),1,3))
1540 IF MID$(N$(J),5,5)="CSB28" THEN CSB28=CSB28+VAL(MID$(N$(J),1,3))
1550 IF MID$(N$(J),5,5)="CSB29" THEN CSB29=CSB29+VAL(MID$(N$(J),1,3))
1560 IF MID$(N$(J),5,5)="CSB30" THEN CSB30=CSB30+VAL(MID$(N$(J),1,3))
1570 IF MID$(N$(J),5,5)="CSB31" THEN CSB31=CSB31+VAL(MID$(N$(J),1,3))
1580 IF MID$(N$(J),5,3)="CSB" THEN CSB=CSB+VAL(MID$(N$(J),1,3))
1590 IF MID$(N$(J),5,5)="PSB1 " THEN PSB1=PSB1+VAL(MID$(N$(J),1,3))
1600 IF MID$(N$(J),5,5)="PSB2 " THEN PSB2=PSB2+VAL(MID$(N$(J),1,3))
1610 IF MID$(N$(J),5,5)="PSB3 " THEN PSB3=PSB3+VAL(MID$(N$(J),1,3))
1620 IF MID$(N$(J),5,4)="PSB4" THEN PSB4=PSB4+VAL(MID$(N$(J),1,3))
1630 IF MID$(N$(J),5,4)="PSB5" THEN PSB4=PSB4+VAL(MID$(N$(J),1,3))
1640 IF MID$(N$(J),5,4)="PSB6" THEN PSB6=PSB6+VAL(MID$(N$(J),1,3))
1650 IF MID$(N$(J),5,4)="PSB7" THEN PSB7=PSB7+VAL(MID$(N$(J),1,3))
1660 IF MID$(N$(J),5,4)="PSB8" THEN PSB8=PSB8+VAL(MID$(N$(J),1,3))
1670 IF MID$(N$(J),5,4)="PSB9" THEN PSB9=PSB9+VAL(MID$(N$(J),1,3))

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1680 IF MID$(N$(J),5,5)="PSB10" THEN PSB10=PSB10+VAL(MID$(N$(J),1,3))
1690 IF MID$(N$(J),5,5)="PSB11" THEN PSB11=PSB11+VAL(MID$(N$(J),1,3))
1700 IF MID$(N$(J),5,5)="PSB12" THEN PSB12=PSB12+VAL(MID$(N$(J),1,3))
1710 IF MID$(N$(J),5,5)="PSB13" THEN PSB13=PSB13+VAL(MID$(N$(J),1,3))
1720 IF MID$(N$(J),5,5)="PSB14" THEN PSB14=PSB14+VAL(MID$(N$(J),1,3))
1730 IF MID$(N$(J),5,5)="PSB15" THEN PSB15=PSB15+VAL(MID$(N$(J),1,3))
1740 IF MID$(N$(J),5,5)="PSB16" THEN PSB16=PSB16+VAL(MID$(N$(J),1,3))
1750 IF MID$(N$(J),5,5)="PSB17" THEN PSB17=PSB17+VAL(MID$(N$(J),1,3))
1760 IF MID$(N$(J),5,5)="PSB18" THEN PSB18=PSB18+VAL(MID$(N$(J),1,3))
1770 IF MID$(N$(J),5,5)="PSB19" THEN PSB19=PSB19+VAL(MID$(N$(J),1,3))
1780 IF MID$(N$(J),5,5)="PSB20" THEN PSB20=PSB20+VAL(MID$(N$(J),1,3))
1790 IF MID$(N$(J),5,5)="PSB21" THEN PSB21=PSB21+VAL(MID$(N$(J),1,3))
1800 IF MID$(N$(J),5,5)="PSB22" THEN PSB22=PSB22+VAL(MID$(N$(J),1,3))
1810 IF MID$(N$(J),5,5)="PSB23" THEN PSB23=PSB23+VAL(MID$(N$(J),1,3))
1820 IF MID$(N$(J),5,5)="PSB24" THEN PSB24=PSB24+VAL(MID$(N$(J),1,3))
1830 IF MID$(N$(J),5,5)="PSB25" THEN PSB25=PSB25+VAL(MID$(N$(J),1,3))
1840 IF MID$(N$(J),5,5)="PSB26" THEN PSB26=PSB26+VAL(MID$(N$(J),1,3))
1850 IF MID$(N$(J),5,5)="PSB27" THEN PSB27=PSB27+VAL(MID$(N$(J),1,3))
1860 IF MID$(N$(J),5,5)="PSB28" THEN PSB28=PSB28+VAL(MID$(N$(J),1,3))
1870 IF MID$(N$(J),5,5)="PSB29" THEN PSB29=PSB29+VAL(MID$(N$(J),1,3))
1880 IF MID$(N$(J),5,5)="PSB30" THEN PSB30=PSB30+VAL(MID$(N$(J),1,3))
1890 IF MID$(N$(J),5,5)="PSB31" THEN PSB31=PSB31+VAL(MID$(N$(J),1,3))
1900 IF MID$(N$(J),5,3)="PSB" THEN PSB=PSB+VAL(MID$(N$(J),1,3))
1910 REM (3) PLANNING FACTORS (c)
1920 IF MID$(N$(J),5,5)="CSC1 " THEN CSC1=CSC1+VAL(MID$(N$(J),1,3))
1930 IF MID$(N$(J),5,5)="CSC2 " THEN CSC2=CSC2+VAL(MID$(N$(J),1,3))
1940 IF MID$(N$(J),5,5)="CSC3 " THEN CSC3=CSC3+VAL(MID$(N$(J),1,3))
1950 IF MID$(N$(J),5,4)="CSC4" THEN CSC4=CSC4+VAL(MID$(N$(J),1,3))
1960 IF MID$(N$(J),5,4)="CSC5" THEN CSC4=CSC4+VAL(MID$(N$(J),1,3))
1970 IF MID$(N$(J),5,4)="CSC6" THEN CSC6=CSC6+VAL(MID$(N$(J),1,3))
1980 IF MID$(N$(J),5,4)="CSC7" THEN CSC7=CSC7+VAL(MID$(N$(J),1,3))
1990 IF MID$(N$(J),5,4)="CSC8" THEN CSC8=CSC8+VAL(MID$(N$(J),1,3))
2000 IF MID$(N$(J),5,4)="CSC9" THEN CSC9=CSC9+VAL(MID$(N$(J),1,3))
2010 IF MID$(N$(J),5,5)="CSC10" THEN CSC10=CSC10+VAL(MID$(N$(J),1,3))
2020 IF MID$(N$(J),5,5)="CSC11" THEN CSC11=CSC11+VAL(MID$(N$(J),1,3))
2030 IF MID$(N$(J),5,5)="CSC12" THEN CSC12=CSC12+VAL(MID$(N$(J),1,3))
2040 IF MID$(N$(J),5,3)="CSC" THEN CSC=CSC+VAL(MID$(N$(J),1,3))
2050 IF MID$(N$(J),5,5)="PSC1 " THEN PSC1=PSC1+VAL(MID$(N$(J),1,3))
2060 IF MID$(N$(J),5,5)="PSC2 " THEN PSC2=PSC2+VAL(MID$(N$(J),1,3))
2070 IF MID$(N$(J),5,5)="PSC3 " THEN PSC3=PSC3+VAL(MID$(N$(J),1,3))
2080 IF MID$(N$(J),5,4)="PSC4" THEN PSC4=PSC4+VAL(MID$(N$(J),1,3))
2090 IF MID$(N$(J),5,4)="PSC5" THEN PSC4=PSC4+VAL(MID$(N$(J),1,3))
2100 IF MID$(N$(J),5,4)="PSC6" THEN PSC6=PSC6+VAL(MID$(N$(J),1,3))
2110 IF MID$(N$(J),5,4)="PSC7" THEN PSC7=PSC7+VAL(MID$(N$(J),1,3))
2120 IF MID$(N$(J),5,4)="PSC8" THEN PSC8=PSC8+VAL(MID$(N$(J),1,3))
2130 IF MID$(N$(J),5,4)="PSC9" THEN PSC9=PSC9+VAL(MID$(N$(J),1,3))
2140 IF MID$(N$(J),5,5)="PSC10" THEN PSC10=PSC10+VAL(MID$(N$(J),1,3))
2150 IF MID$(N$(J),5,5)="PSC11" THEN PSC11=PSC11+VAL(MID$(N$(J),1,3))

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2160 IF MID$(N$(J),5,5)="PSC12" THEN PSC12=PSC12+VAL(MID$(N$(J),1,3))
2170 IF MID$(N$(J),5,3)="PSC" THEN PSC=PSC+VAL(MID$(N$(J),1,3))
2180 REM (3) PROJECT ORGANISATION FACTORS (d)
2190 IF MID$(N$(J),5,5)="CSD1 " THEN CSD1=CSD1+VAL(MID$(N$(J),1,3))
2200 IF MID$(N$(J),5,5)="CSD2 " THEN CSD2=CSD2+VAL(MID$(N$(J),1,3))
2210 IF MID$(N$(J),5,5)="CSD3 " THEN CSD3=CSD3+VAL(MID$(N$(J),1,3))
2220 IF MID$(N$(J),5,4)="CSD4" THEN CSD4=CSD4+VAL(MID$(N$(J),1,3))
2230 IF MID$(N$(J),5,4)="CSD5" THEN CSD4=CSD4+VAL(MID$(N$(J),1,3))
2240 IF MID$(N$(J),5,4)="CSD6" THEN CSD6=CSD6+VAL(MID$(N$(J),1,3))
2250 IF MID$(N$(J),5,4)="CSD7" THEN CSD7=CSD7+VAL(MID$(N$(J),1,3))
2260 IF MID$(N$(J),5,4)="CSD8" THEN CSD8=CSD8+VAL(MID$(N$(J),1,3))
2270 IF MID$(N$(J),5,4)="CSD9" THEN CSD9=CSD9+VAL(MID$(N$(J),1,3))
2280 IF MID$(N$(J),5,5)="CSD10" THEN CSD10=CSD10+VAL(MID$(N$(J),1,3))
2290 IF MID$(N$(J),5,5)="CSD11" THEN CSD11=CSD11+VAL(MID$(N$(J),1,3))
2300 IF MID$(N$(J),5,5)="CSD12" THEN CSD12=CSD12+VAL(MID$(N$(J),1,3))
2310 IF MID$(N$(J),5,5)="CSD13" THEN CSD13=CSD13+VAL(MID$(N$(J),1,3))
2320 IF MID$(N$(J),5,5)="CSD14" THEN CSD14=CSD14+VAL(MID$(N$(J),1,3))
2330 IF MID$(N$(J),5,5)="CSD15" THEN CSD15=CSD15+VAL(MID$(N$(J),1,3))
2340 IF MID$(N$(J),5,5)="CSD16" THEN CSD16=CSD16+VAL(MID$(N$(J),1,3))
2350 IF MID$(N$(J),5,5)="CSD17" THEN CSD17=CSD17+VAL(MID$(N$(J),1,3))
2360 IF MID$(N$(J),5,5)="CSD18" THEN CSD18=CSD18+VAL(MID$(N$(J),1,3))
2370 IF MID$(N$(J),5,5)="CSD19" THEN CSD19=CSD19+VAL(MID$(N$(J),1,3))
2380 IF MID$(N$(J),5,5)="CSD20" THEN CSD20=CSD20+VAL(MID$(N$(J),1,3))
2390 IF MID$(N$(J),5,5)="CSD21" THEN CSD21=CSD21+VAL(MID$(N$(J),1,3))
2400 IF MID$(N$(J),5,3)="CSD" THEN CSD=CSD+VAL(MID$(N$(J),1,3))
2410 IF MID$(N$(J),5,5)="PSD1 " THEN PSD1=PSD1+VAL(MID$(N$(J),1,3))
2420 IF MID$(N$(J),5,5)="PSD2 " THEN PSD2=PSD2+VAL(MID$(N$(J),1,3))
2430 IF MID$(N$(J),5,5)="PSD3 " THEN PSD3=PSD3+VAL(MID$(N$(J),1,3))
2440 IF MID$(N$(J),5,4)="PSD4" THEN PSD4=PSD4+VAL(MID$(N$(J),1,3))
2450 IF MID$(N$(J),5,4)="PSD5" THEN PSD4=PSD4+VAL(MID$(N$(J),1,3))
2460 IF MID$(N$(J),5,4)="PSD6" THEN PSD6=PSD6+VAL(MID$(N$(J),1,3))
2470 IF MID$(N$(J),5,4)="PSD7" THEN PSD7=PSD7+VAL(MID$(N$(J),1,3))
2480 IF MID$(N$(J),5,4)="PSD8" THEN PSD8=PSD8+VAL(MID$(N$(J),1,3))
2490 IF MID$(N$(J),5,4)="PSD9" THEN PSD9=PSD9+VAL(MID$(N$(J),1,3))
2500 IF MID$(N$(J),5,5)="PSD10" THEN PSD10=PSD10+VAL(MID$(N$(J),1,3))
2510 IF MID$(N$(J),5,5)="PSD11" THEN PSD11=PSD11+VAL(MID$(N$(J),1,3))
2520 IF MID$(N$(J),5,5)="PSD12" THEN PSD12=PSD12+VAL(MID$(N$(J),1,3))
2530 IF MID$(N$(J),5,5)="PSD13" THEN PSD13=PSD13+VAL(MID$(N$(J),1,3))
2540 IF MID$(N$(J),5,5)="PSD14" THEN PSD14=PSD14+VAL(MID$(N$(J),1,3))
2550 IF MID$(N$(J),5,5)="PSD15" THEN PSD15=PSD15+VAL(MID$(N$(J),1,3))
2560 IF MID$(N$(J),5,5)="PSD16" THEN PSD16=PSD16+VAL(MID$(N$(J),1,3))
2570 IF MID$(N$(J),5,5)="PSD17" THEN PSD17=PSD17+VAL(MID$(N$(J),1,3))
2580 IF MID$(N$(J),5,5)="PSD18" THEN PSD18=PSD18+VAL(MID$(N$(J),1,3))
2590 IF MID$(N$(J),5,5)="PSD19" THEN PSD19=PSD19+VAL(MID$(N$(J),1,3))
2600 IF MID$(N$(J),5,5)="PSD20" THEN PSD20=PSD20+VAL(MID$(N$(J),1,3))
2610 IF MID$(N$(J),5,5)="PSD21" THEN PSD21=PSD21+VAL(MID$(N$(J),1,3))
2620 IF MID$(N$(J),5,3)="PSD" THEN PSD=PSD+VAL(MID$(N$(J),1,3))
2630 REM (3) CLIENT ORGANISATION / POLICY FACTORS (e)

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2640 IF MID$(N$(J),5,5)="CSE1 " THEN CSE1=CSE1+VAL(MID$(N$(J),1,3))
2650 IF MID$(N$(J),5,5)="CSE2 " THEN CSE2=CSE2+VAL(MID$(N$(J),1,3))
2660 IF MID$(N$(J),5,5)="CSE3 " THEN CSE3=CSE3+VAL(MID$(N$(J),1,3))
2670 IF MID$(N$(J),5,4)="CSE4" THEN CSE4=CSE4+VAL(MID$(N$(J),1,3))
2680 IF MID$(N$(J),5,4)="CSE5" THEN CSE4=CSE4+VAL(MID$(N$(J),1,3))
2690 IF MID$(N$(J),5,4)="CSE6" THEN CSE6=CSE6+VAL(MID$(N$(J),1,3))
2700 IF MID$(N$(J),5,4)="CSE7" THEN CSE7=CSE7+VAL(MID$(N$(J),1,3))
2710 IF MID$(N$(J),5,4)="CSE8" THEN CSE8=CSE8+VAL(MID$(N$(J),1,3))
2720 IF MID$(N$(J),5,4)="CSE9" THEN CSE9=CSE9+VAL(MID$(N$(J),1,3))
2730 IF MID$(N$(J),5,5)="CSE10" THEN CSE10=CSE10+VAL(MID$(N$(J),1,3))
2740 IF MID$(N$(J),5,5)="CSE11" THEN CSE11=CSE11+VAL(MID$(N$(J),1,3))
2750 IF MID$(N$(J),5,5)="CSE12" THEN CSE12=CSE12+VAL(MID$(N$(J),1,3))
2760 IF MID$(N$(J),5,5)="CSE13" THEN CSE13=CSE13+VAL(MID$(N$(J),1,3))
2770 IF MID$(N$(J),5,5)="CSE14" THEN CSE14=CSE14+VAL(MID$(N$(J),1,3))
2780 IF MID$(N$(J),5,5)="CSE15" THEN CSE15=CSE15+VAL(MID$(N$(J),1,3))
2790 IF MID$(N$(J),5,5)="CSE16" THEN CSE16=CSE16+VAL(MID$(N$(J),1,3))
2800 IF MID$(N$(J),5,3)="CSE" THEN CSE=CSE+VAL(MID$(N$(J),1,3))
2810 IF MID$(N$(J),5,5)="PSE1 " THEN PSE1=PSE1+VAL(MID$(N$(J),1,3))
2820 IF MID$(N$(J),5,5)="PSE2 " THEN PSE2=PSE2+VAL(MID$(N$(J),1,3))
2830 IF MID$(N$(J),5,5)="PSE3 " THEN PSE3=PSE3+VAL(MID$(N$(J),1,3))
2840 IF MID$(N$(J),5,4)="PSE4" THEN PSE4=PSE4+VAL(MID$(N$(J),1,3))
2850 IF MID$(N$(J),5,4)="PSE5" THEN PSE4=PSE4+VAL(MID$(N$(J),1,3))
2860 IF MID$(N$(J),5,4)="PSE6" THEN PSE6=PSE6+VAL(MID$(N$(J),1,3))
2870 IF MID$(N$(J),5,4)="PSE7" THEN PSE7=PSE7+VAL(MID$(N$(J),1,3))
2880 IF MID$(N$(J),5,4)="PSE8" THEN PSE8=PSE8+VAL(MID$(N$(J),1,3))
2890 IF MID$(N$(J),5,4)="PSE9" THEN PSE9=PSE9+VAL(MID$(N$(J),1,3))
2900 IF MID$(N$(J),5,5)="PSE10" THEN PSE10=PSE10+VAL(MID$(N$(J),1,3))
2910 IF MID$(N$(J),5,5)="PSE11" THEN PSE11=PSE11+VAL(MID$(N$(J),1,3))
2920 IF MID$(N$(J),5,5)="PSE12" THEN PSE12=PSE12+VAL(MID$(N$(J),1,3))
2930 IF MID$(N$(J),5,5)="PSE13" THEN PSE13=PSE13+VAL(MID$(N$(J),1,3))
2940 IF MID$(N$(J),5,5)="PSE14" THEN PSE14=PSE14+VAL(MID$(N$(J),1,3))
2950 IF MID$(N$(J),5,5)="PSE15" THEN PSE15=PSE15+VAL(MID$(N$(J),1,3))
2960 IF MID$(N$(J),5,5)="PSE16" THEN PSE16=PSE16+VAL(MID$(N$(J),1,3))
2970 IF MID$(N$(J),5,3)="PSE" THEN PSE=PSE+VAL(MID$(N$(J),1,3))
2980 REM OVERALL COUNT
2990 IF MID$(N$(J),5,2)="CS" THEN CS=CS+VAL(MID$(N$(J),1,3))
3000 IF MID$(N$(J),5,2)="PS" THEN PS=PS+VAL(MID$(N$(J),1,3))
3010 NEXT J
3020 LET T=CS+PS
3030 LPRINT
3040 LPRINT "CODE TOTALS BREAKDOWN - INT No.";A;B$,"(";X$;"-";Y$;)"
3050 LPRINT "===== "
3060 LPRINT
3061 LPRINT "CLIENT =",X$
3062 LPRINT
3063 LPRINT "PROFESSIONAL=",Y$
3064 LPRINT
3065 LPRINT

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3070 LPRINT "(2) REFERENCES TO OTHERS"
 3080 LPRINT "-----"
 3090 LPRINT
 3100 LPRINT "CLIENT",,"PROFESSIONAL"
 3110 LPRINT "-----",,"-----"
 3120 LPRINT
 3130 LPRINT "CODE","No. OCCUR","CODE","No. OCCUR"
 3140 LPRINT "-----","-----","-----","-----"
 3150 LPRINT "CR1",CR1,"PR1",PR1
 3160 LPRINT "CR2",CR2,"PR2",PR2
 3170 LPRINT "CR3",CR3,"PR3",PR3
 3180 LPRINT "CR4",CR4,"PR4",PR4
 3190 LPRINT "CR5",CR5,"PR5",PR5
 3200 LPRINT "CR6",CR6,"PR6",PR6
 3210 LPRINT "CR7",CR7,"PR7",PR7
 3220 LPRINT "CR8",CR8,"PR8",PR8
 3230 LPRINT "CR9",CR9,"PR9",PR9
 3240 LPRINT "CR10",CR10,"PR10",PR10
 3250 LPRINT "CR11",CR11,"PR11",PR11
 3260 LPRINT "CR12",CR12,"PR12",PR12
 3270 LPRINT "CR13",CR13,"PR13",PR13
 3280 LPRINT "CR14",CR14,"PR14",PR14
 3290 LPRINT "CR15",CR15,"PR15",PR15
 3300 LPRINT "CR16",CR16,"PR16",PR16
 3310 LPRINT
 3320 LPRINT "TOTAL CR",CR,"TOTAL PR",PR
 3330 LPRINT
 3340 LPRINT
 3350 LPRINT "(3) (a) SITE FACTORS"
 3360 LPRINT "-----"
 3370 LPRINT
 3380 LPRINT "CLIENT",,"PROFESSIONAL"
 3390 LPRINT "-----",,"-----"
 3400 LPRINT
 3410 LPRINT "CODE","No. OCCUR","CODE","No. OCCUR"
 3420 LPRINT "----","-----","----","-----"
 3430 LPRINT "CSA1",CSA1,"PSA1",PSA1
 3440 LPRINT "CSA2",CSA2,"PSA2",PSA2
 3450 LPRINT "CSA3",CSA3,"PSA3",PSA3
 3460 LPRINT "CSA4",CSA4,"PSA4",PSA4
 3470 LPRINT "CSA5",CSA5,"PSA5",PSA5
 3480 LPRINT "CSA6",CSA6,"PSA6",PSA6
 3490 LPRINT "CSA7",CSA7,"PSA7",PSA7
 3500 LPRINT "CSA8",CSA8,"PSA8",PSA8
 3510 LPRINT "CSA9",CSA9,"PSA9",PSA9
 3520 LPRINT "CSA10",CSA10,"PSA10",PSA10
 3530 LPRINT "CSA11",CSA11,"PSA11",PSA11
 3540 LPRINT "CSA12",CSA12,"PSA12",PSA12

3550 LPRINT "CSA13",CSA13,"PSA13",PSA13
3560 LPRINT "CSA14",CSA14,"PSA14",PSA14
3570 LPRINT
3580 LPRINT "TOTAL CSA",CSA,"TOTAL PSA",PSA
3590 LPRINT
3600 LPRINT
3610 LPRINT "(3) (b) BUILDING FACTORS"
3620 LPRINT "-----"
3630 LPRINT
3640 LPRINT "CLIENT",,"PROFESSIONAL"
3650 LPRINT "-----",,"-----"
3660 LPRINT
3670 LPRINT "CODE", "No. OCCUR", "CODE", "No. OCCUR"
3680 LPRINT "-----", "-----", "-----", "-----"
3690 LPRINT "CSB1",CSB1,"PSB1",PSB1
3700 LPRINT "CSB2",CSB2,"PSB2",PSB2
3710 LPRINT "CSB3",CSB3,"PSB3",PSB3
3720 LPRINT "CSB4",CSB4,"PSB4",PSB4
3730 LPRINT "CSB5",CSB5,"PSB5",PSB5
3740 LPRINT "CSB6",CSB6,"PSB6",PSB6
3750 LPRINT "CSB7",CSB7,"PSB7",PSB7
3760 LPRINT "CSB8",CSB8,"PSB8",PSB8
3770 LPRINT "CSB9",CSB9,"PSB9",PSB9
3780 LPRINT "CSB10",CSB10,"PSB10",PSB10
3790 LPRINT "CSB11",CSB11,"PSB11",PSB11
3800 LPRINT "CSB12",CSB12,"PSB12",PSB12
3810 LPRINT "CSB13",CSB13,"PSB13",PSB13
3820 LPRINT "CSB14",CSB14,"PSB14",PSB14
3830 LPRINT "CSB15",CSB15,"PSB15",PSB15
3840 LPRINT "CSB16",CSB16,"PSB16",PSB16
3850 LPRINT "CSB17",CSB17,"PSB17",PSB17
3860 LPRINT "CSB18",CSB18,"PSB18",PSB18
3870 LPRINT "CSB19",CSB19,"PSB19",PSB19
3880 LPRINT "CSB20",CSB20,"PSB20",PSB20
3890 LPRINT "CSB21",CSB21,"PSB21",PSB21
3900 LPRINT "CSB22",CSB22,"PSB22",PSB22
3910 LPRINT "CSB23",CSB23,"PSB23",PSB23
3920 LPRINT "CSB24",CSB24,"PSB24",PSB24
3930 LPRINT "CSB25",CSB25,"PSB25",PSB25
3940 LPRINT "CSB26",CSB26,"PSB26",PSB26
3950 LPRINT "CSB27",CSB27,"PSB27",PSB27
3960 LPRINT "CSB28",CSB28,"PSB28",PSB28
3970 LPRINT "CSB29",CSB29,"PSB29",PSB29
3980 LPRINT "CSB30",CSB30,"PSB30",PSB30
3990 LPRINT "CSB31",CSB31,"PSB31",PSB31
4000 LPRINT
4010 LPRINT "TOTAL CSB",CSB,"TOTAL PSB",PSB
4020 LPRINT

4030 LPRINT
 4040 LPRINT "(3) (c) PLANNING FACTORS"
 4050 LPRINT "-----"
 4060 LPRINT
 4070 LPRINT "CLIENT",,"PROFESSIONAL"
 4080 LPRINT "-----",,"-----"
 4090 LPRINT
 4100 LPRINT "CODE","No. OCCUR","CODE","No. OCCUR"
 4110 LPRINT "-----","-----","-----","-----"
 4120 LPRINT "CSC1",CSC1,"PSC1",PSC1
 4130 LPRINT "CSC2",CSC2,"PSC2",PSC2
 4140 LPRINT "CSC3",CSC3,"PSC3",PSC3
 4150 LPRINT "CSC4",CSC4,"PSC4",PSC4
 4160 LPRINT "CSC5",CSC5,"PSC5",PSC5
 4170 LPRINT "CSC6",CSC6,"PSC6",PSC6
 4180 LPRINT "CSC7",CSC7,"PSC7",PSC7
 4190 LPRINT "CSC8",CSC8,"PSC8",PSC8
 4200 LPRINT "CSC9",CSC9,"PSC9",PSC9
 4210 LPRINT "CSC10",CSC10,"PSC10",PSC10
 4220 LPRINT "CSC11",CSC11,"PSC11",PSC11
 4230 LPRINT "CSC12",CSC12,"PSC12",PSC12
 4240 LPRINT
 4250 LPRINT "TOTAL CSC",CSC,"TOTAL PSC",PSC
 4260 LPRINT
 4270 LPRINT
 4280 LPRINT "(3) (d) PROJECT ORGANISATION FACTORS"
 4290 LPRINT "-----"
 4300 LPRINT
 4310 LPRINT "CLIENT",,"PROFESSIONAL"
 4320 LPRINT "-----",,"-----"
 4330 LPRINT
 4340 LPRINT "CODE","No. OCCUR","CODE","No. OCCUR"
 4350 LPRINT "-----","-----","-----","-----"
 4360 LPRINT "CSD1",CSD1,"PSD1",PSD1
 4370 LPRINT "CSD2",CSD2,"PSD2",PSD2
 4380 LPRINT "CSD3",CSD3,"PSD3",PSD3
 4390 LPRINT "CSD4",CSD4,"PSD4",PSD4
 4400 LPRINT "CSD5",CSD5,"PSD5",PSD5
 4410 LPRINT "CSD6",CSD6,"PSD6",PSD6
 4420 LPRINT "CSD7",CSD7,"PSD7",PSD7
 4430 LPRINT "CSD8",CSD8,"PSD8",PSD8
 4440 LPRINT "CSD9",CSD9,"PSD9",PSD9
 4450 LPRINT "CSD10",CSD10,"PSD10",PSD10
 4460 LPRINT "CSD11",CSD11,"PSD11",PSD11
 4470 LPRINT "CSD12",CSD12,"PSD12",PSD12
 4480 LPRINT "CSD13",CSD13,"PSD13",PSD13
 4490 LPRINT "CSD14",CSD14,"PSD14",PSD14
 4500 LPRINT "CSD15",CSD15,"PSD15",PSD15

4510 LPRINT "CSD16",CSD16,"PSD16",PSD16
4520 LPRINT "CSD17",CSD17,"PSD17",PSD17
4530 LPRINT "CSD18",CSD18,"PSD18",PSD18
4540 LPRINT "CSD19",CSD19,"PSD19",PSD19
4550 LPRINT "CSD20",CSD20,"PSD20",PSD20
4560 LPRINT "CSD21",CSD21,"PSD21",PSD21
4570 LPRINT
4580 LPRINT "TOTAL CSD",CSD,"TOTAL PSD",PSD
4590 LPRINT
4600 LPRINT
4610 LPRINT "(3) (e) CLIENT ORGANISATION / POLICY FACTORS"
4620 LPRINT "-----"
4630 LPRINT
4640 LPRINT "CLIENT",,"PROFESSIONAL"
4650 LPRINT "-----",,"-----"
4660 LPRINT
4670 LPRINT "CODE","No. OCCUR","CODE","No. OCCUR"
4680 LPRINT "-----","-----","-----","-----"
4690 LPRINT "CSE1",CSE1,"PSE1",PSE1
4700 LPRINT "CSE2",CSE2,"PSE2",PSE2
4710 LPRINT "CSE3",CSE3,"PSE3",PSE3
4720 LPRINT "CSE4",CSE4,"PSE4",PSE4
4730 LPRINT "CSE5",CSE5,"PSE5",PSE5
4740 LPRINT "CSE6",CSE6,"PSE6",PSE6
4750 LPRINT "CSE7",CSE7,"PSE7",PSE7
4760 LPRINT "CSE8",CSE8,"PSE8",PSE8
4770 LPRINT "CSE9",CSE9,"PSE9",PSE9
4780 LPRINT "CSE10",CSE10,"PSE10",PSE10
4790 LPRINT "CSE11",CSE11,"PSE11",PSE11
4800 LPRINT "CSE12",CSE12,"PSE12",PSE12
4810 LPRINT "CSE13",CSE13,"PSE13",PSE13
4820 LPRINT "CSE14",CSE14,"PSE14",PSE14
4830 LPRINT "CSE15",CSE15,"PSE15",PSE15
4840 LPRINT "CSE16",CSE16,"PSE16",PSE16
4850 LPRINT
4860 LPRINT "TOTAL CSE",CSE,"TOTAL PSE",PSE
4870 LPRINT
4880 LPRINT
4890 LPRINT "TOTAL SENTENCE CONTEXT FACTORS"
4900 LPRINT "-----"
4910 LPRINT
4920 LPRINT "CLIENT",,"PROFESSIONAL"
4930 LPRINT "-----",,"-----"
4940 LPRINT
4950 LPRINT "CODE","No. OCCUR","CODE","No. OCCUR"
4960 LPRINT "-----","-----","-----","-----"
4970 LPRINT "CS",CS,"PS",PS
4980 LPRINT

4990 LPRINT "END OF FILE"

The first section of the program is virtually identical to the previous program in that it reads in the Ethnograph codeword lists (lines 10 to 590). The second part takes to codes and arranges them in order of sentence context sub-category, and outputs the results to a printer (lines 600 to 4990).

The program output appears in the following format:

CODE TOTALS BREAKDOWN - INT No. 21 ALL (C6-QS2)

=====

CLIENT = C6

PROFESSIONAL = QS2

(2) REFERENCES TO OTHERS

CLIENT		PROFESSIONAL	
CODE	No. OCCUR	CODE	No. OCCUR
CR1	0	PR1	1
CR2	0	PR2	11
CR3	0	PR3	3
CR4	0	PR4	4
CR5	1	PR5	1
CR6	0	PR6	0
CR7	0	PR7	4
CR8	0	PR8	4
CR9	0	PR9	0
CR10	0	PR10	5
CR11	0	PR11	0
CR12	0	PR12	0
CR13	0	PR13	0
CR14	2	PR14	9
CR15	1	PR15	2
CR16	3	PR16	0
TOTAL CR	7	TOTAL PR	44

(3) (a) SITE FACTORS

CLIENT		PROFESSIONAL	
CODE	No. OCCUR	CODE	No. OCCUR
CSA1	8	PSA1	12

CSA2	0	PSA2	0
CSA3	0	PSA3	3
CSA4	7	PSA4	12
CSA5	0	PSA5	0
CSA6	2	PSA6	1
CSA7	2	PSA7	0
CSA8	0	PSA8	1
CSA9	0	PSA9	0
CSA10	0	PSA10	0
CSA11	0	PSA11	5
CSA12	0	PSA12	0
CSA13	2	PSA13	2
CSA14	5	PSA14	2
TOTAL CSA	26	TOTAL PSA	38

(3) (b) BUILDING FACTORS

CLIENT

PROFESSIONAL

CODE	No. OCCUR	CODE	No. OCCUR
-----	-----	-----	-----
CSB1	0	PSB1	0
CSB2	0	PSB2	0
CSB3	0	PSB3	1
CSB4	12	PSB4	29
CSB5	0	PSB5	0
CSB6	2	PSB6	16
CSB7	0	PSB7	6
CSB8	0	PSB8	0
CSB9	0	PSB9	2
CSB10	0	PSB10	0
CSB11	8	PSB11	1
CSB12	4	PSB12	7
CSB13	0	PSB13	0
CSB14	4	PSB14	0
CSB15	0	PSB15	9
CSB16	0	PSB16	0
CSB17	1	PSB17	0
CSB18	0	PSB18	0
CSB19	0	PSB19	0
CSB20	0	PSB20	0
CSB21	0	PSB21	0
CSB22	0	PSB22	0

CSB23	8	PSB23	26
CSB24	33	PSB24	71
CSB25	0	PSB25	0
CSB26	0	PSB26	0
CSB27	0	PSB27	0
CSB28	1	PSB28	2
CSB29	4	PSB29	6
CSB30	6	PSB30	0
CSB31	0	PSB31	8
TOTAL CSB	83	TOTAL PSB	184

(3) (c) PLANNING FACTORS

CLIENT		PROFESSIONAL	
CODE	No. OCCUR	CODE	No. OCCUR
-----	-----	-----	-----
CSC1	0	PSC1	0
CSC2	0	PSC2	0
CSC3	0	PSC3	0
CSC4	0	PSC4	0
CSC5	0	PSC5	0
CSC6	0	PSC6	0
CSC7	0	PSC7	1
CSC8	0	PSC8	0
CSC9	0	PSC9	1
CSC10	0	PSC10	0
CSC11	0	PSC11	0
CSC12	1	PSC12	6
TOTAL CSC	1	TOTAL PSC	8

(3) (d) PROJECT ORGANISATION FACTORS

CLIENT		PROFESSIONAL	
CODE	No. OCCUR	CODE	No. OCCUR
-----	-----	-----	-----
CSD1	0	PSD1	5

CSD2	7	PSD2	1
CSD3	0	PSD3	0
CSD4	3	PSD4	11
CSD5	0	PSD5	0
CSD6	0	PSD6	0
CSD7	0	PSD7	1
CSD8	0	PSD8	0
CSD9	0	PSD9	1
CSD10	0	PSD10	0
CSD11	0	PSD11	1
CSD12	9	PSD12	10
CSD13	0	PSD13	1
CSD14	0	PSD14	2
CSD15	0	PSD15	0
CSD16	0	PSD16	0
CSD17	0	PSD17	6
CSD18	0	PSD18	0
CSD19	0	PSD19	0
CSD20	0	PSD20	0
CSD21	0	PSD21	0
TOTAL CSD	19	TOTAL PSD	39

(3) (e) CLIENT ORGANISATION / POLICY FACTORS

CLIENT		PROFESSIONAL	
CODE	No. OCCUR	CODE	No. OCCUR
CSE1	3	PSE1	4
CSE2	3	PSE2	7
CSE3	2	PSE3	6
CSE4	0	PSE4	2
CSE5	0	PSE5	0
CSE6	0	PSE6	0
CSE7	0	PSE7	0
CSE8	0	PSE8	0
CSE9	2	PSE9	2
CSE10	2	PSE10	2
CSE11	6	PSE11	2
CSE12	13	PSE12	6
CSE13	6	PSE13	2
CSE14	3	PSE14	5

CSE15	11	PSE15	10
CSE16	11	PSE16	8
TOTAL CSE	62	TOTAL PSE	56

TOTAL SENTENCE CONTEXT FACTORS

CLIENT		PROFESSIONAL	
-----		-----	
CODE	No. OCCUR	CODE	No. OCCUR
-----	-----	-----	-----
CS	191	PS	325

END OF FILE

The printed output file is arranged into seven main sections, relating to the coding categories listed in Appendix 3. The first is references to others. The next five sections are the sub-categories of sentence context, with the final section being a total summary of all sentence context code scores.

The content of the file can be explained by considering figures in the first two columns of the section headed, "**(2) REFERENCES TO OTHERS**", which detail **CLIENT** contributions. The remaining two columns give details of professional contributions, which are presented in an identical format.

The first column, headed **CODE**, lists the codes used to classify references to people or groups of people, from CR1 to CR16. The second column, headed **No. OCCUR**, gives the number of times each codeword occurs. For example, there are 2 occurrences of code CR14 (reference to self). The final figure in the column gives a total for the number of reference to others codes; **TOTAL CR 7**.

Category (1) - SPEAKER IDENTITY

CODE	CONTRIBUTOR
C	Client
P	Professional

Example - C = Client speaks.

Category (2) - INTERACTION TYPE

CODE	INTERACTION
B1	Shows Solidarity
B2	Shows Tension Release
B3	Agrees
B4	Gives Suggestion
B5	Gives Opinion
B6	Gives Orientation
B7	Asks For Orientation
B8	Asks For Opinion
B9	Asks For Suggestion
B10	Disagrees
B11	Shows Tension
B12	Shows Antagonism

Example - CB6 = Client Gives Orientation.

PB7 = Professional Asks For Orientation.

Category (3) - REFERENCE TO OTHERS

CODE	REFERENCE TO
R1	Architect
R2	Quantity Surveyor
R3	Consulting Engineer
R4	Contractor
R5	Accountant
R6	Planner
R7	Other Client Organisations
R8	Professional Team / Consultants
R9	Services Engineer
R10	Client Representative
R11	Client Organisation
R12	Project Manager
R13	Subcontractor
R14	Self Reference
R15	Building Users
R16	Developers / Agents

Example - CR1 = Client Reference To Architect.

PR6 = Professional Reference To Planner.

Category (4) - SENTENCE CONTEXT

(a) SITE FACTORS

CODE	FACTOR
SA1	Location
SA2	Landscaping
SA3	Type
SA4	Existing Buildings
SA5	Environment / Surroundings
SA6	Future Expansion / Development
SA7	Size
SA8	Ground Conditions
SA9	Access
SA10	Services / Drainage
SA11	Selection
SA12	Usage
SA13	Ownership
SA14	Land Value

Example - CSA1 = Client Reference To Site Location.

PSA13 = Professional Reference To Site Ownership.

Category (4) - SENTENCE CONTEXT

(b) BUILDING FACTORS

CODE	FACTOR
SB1	Floor Type
SB2	Storey Height
SB3	Loadings
SB4	Services Installations
SB5	Space Requirements / Area
SB6	Building Function(s)
SB7	Maintenance / After Sales Service
SB8	Security
SB9	Defined Standards / Specification
SB10	Flexibility
SB11	Car Parking
SB12	Appearance / Aesthetics
SB13	Structural Frame
SB14	Environmental Conditions
SB15	Quality
SB16	Company Image
SB17	Staff Numbers
SB18	Future Expansion
SB19	Effeciency of Use
SB20	Internal Finishes
SB21	External Cladding
SB22	Foundations
SB23	Building Timescale / Programme
SB24	Building Cost
SB25	Departmental Interaction

(b) BUILDING FACTORS (Cont)

CODE	FACTOR
SB26	Materials Usage
SB27	Future Change of Use
SB28	Leasehold
SB29	Freehold
SB30	Furnishing / Fitting Out
SB31	Building Lifespan

Example - CSB11 = Client Reference To Flexibility.

PSB4 = Professional Reference To Services Installations

Category (4) - SENTENCE CONTEXT

(c) PLANNING FACTORS

CODE	INTERACTION
SC1	Outline Permission
SC2	Detailed Permission
SC3	Noise Generation
SC4	Traffic Generation
SC5	Environmental / Local Considerations
SC6	Presentations / Meetings
SC7	Building Regulations
SC8	Negotiations
SC9	Impact on Programme
SC10	Cost Implications
SC11	Appeals Procedure
SC12	Planning Permission

Example - CSC2 = Client Reference To Outline Permission.

PSC4 = Professional Reference To Traffic Generation.

Category (4) - SENTENCE CONTEXT

(d) PROJECT ORGANISATION FACTORS

CODE	FACTOR
SD1	Project Management
SD2	Professional Appointment / Fees
SD3	Client System
SD4	Responsibilities
SD5	Design Participation / Development
SD6	Buildability
SD7	Tendering
SD8	Negotiation
SD9	Guarantees / Insurances
SD10	Bonuses / Incentives
SD11	Form of Agreement / Contract
SD12	Procurement Selection
SD13	Traditional Method
SD14	Design & Build / Package Deal
SD15	Management Contracting
SD16	Construction Management
SD17	Risk Allocation
SD18	Previous Client Experience
SD19	Quality Control
SD20	Feasibility Study
SD21	Practical Completion

Example - CSD2 = Client Reference To Professional Fees.

PSD7 = Professional Reference To Tendering.

Category (4) - SENTENCE CONTEXT

(e) CLIENT ORGANISATION / POLICY FACTORS

CODE	FACTOR
SE1	Property Policy
SE2	Building Standards / Ideas
SE3	Client Brief
SE4	Client Philosophy / Image
SE5	Parent Company Influence
SE6	User Involvement
SE7	In-House Construction Professionals
SE8	Client Point of Contact
SE9	Previous Construction Experience
SE10	Client Project Involvement
SE11	Company Organisation
SE12	Client Product / Production Process
SE13	Future Company Development
SE14	Customer Influence
SE15	Source of Funding / Budget
SE16	Existing Buildings

Example - CSE1 = Client Reference To Property Policy.

PSE6 = Professional Reference To User Involvement.

APPENDIX 4

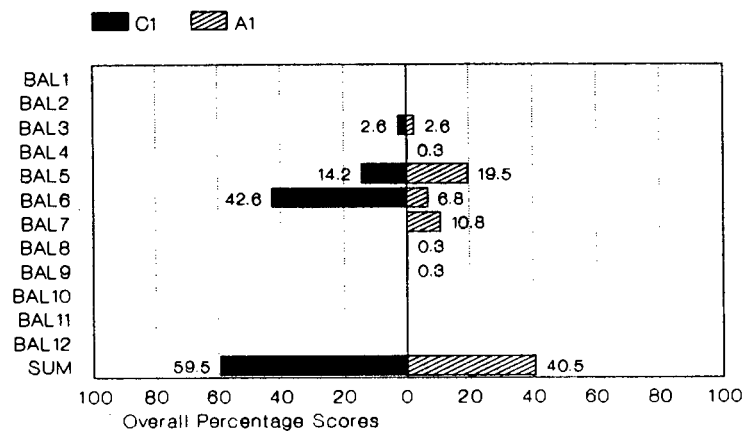
BALES' IPA INTERVIEW INTERACTION PROFILES

This appendix contains graphical interaction profiles for each of the 44 interviews conducted during this research project, and average profiles for: each case study, secondary inexperienced clients, secondary experienced clients and professionals.

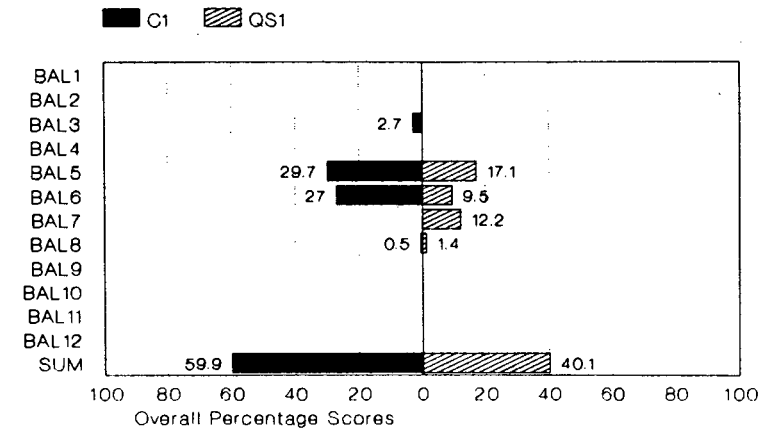
Figure A4.1

Bales' IPA Profiles - Case Study (1)

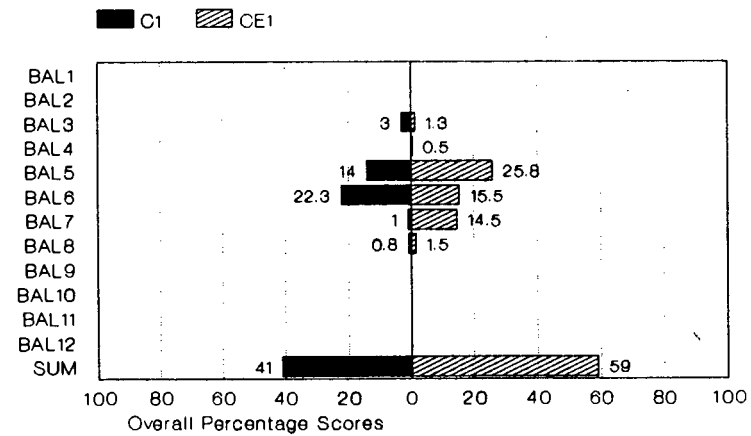
IPA Scores - Interview 1 (C1-A1)



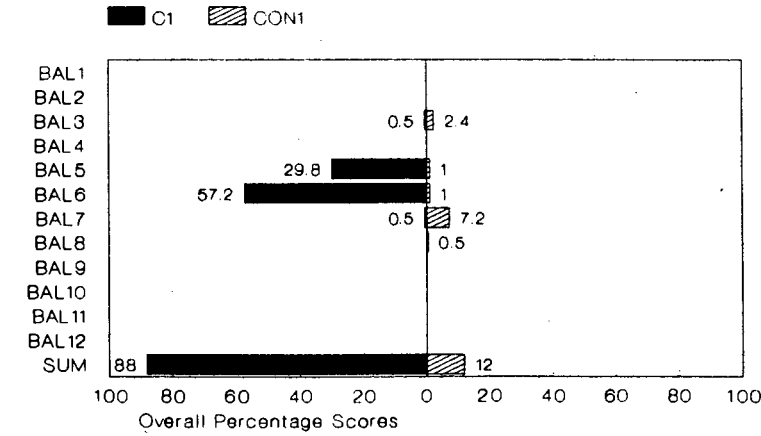
IPA Scores - Interview 2 (C1-QS1)



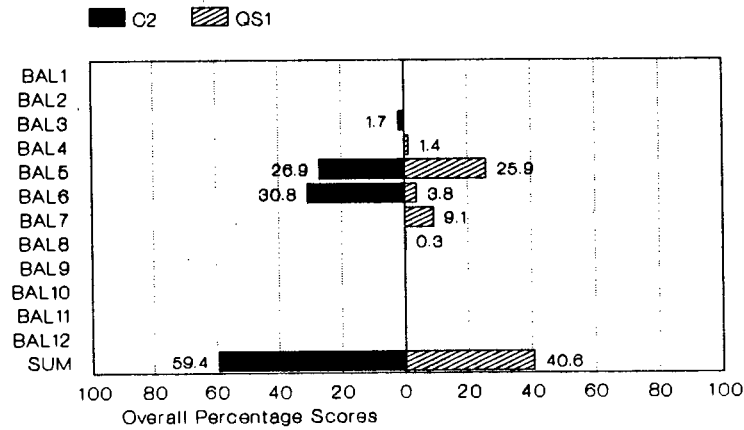
IPA Scores - Interview 3 (C1-CE1)



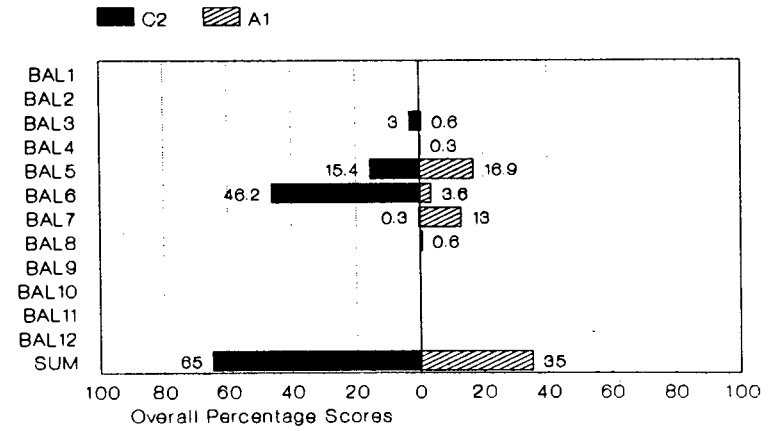
IPA Scores - Interview 4 (C1-CON1)



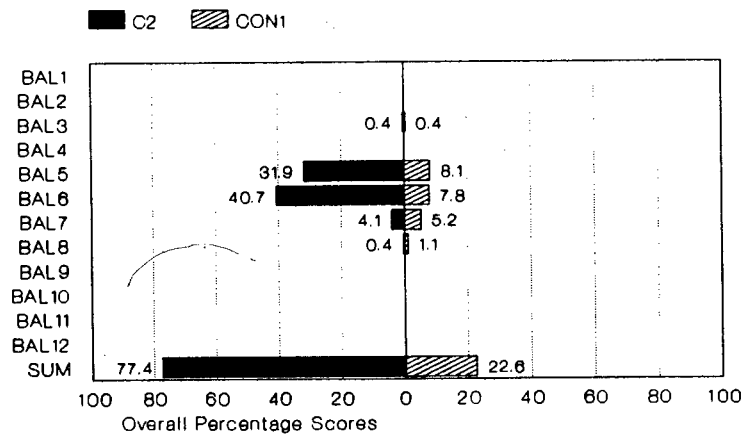
IPA Scores - Interview 5 (C2-QS1)



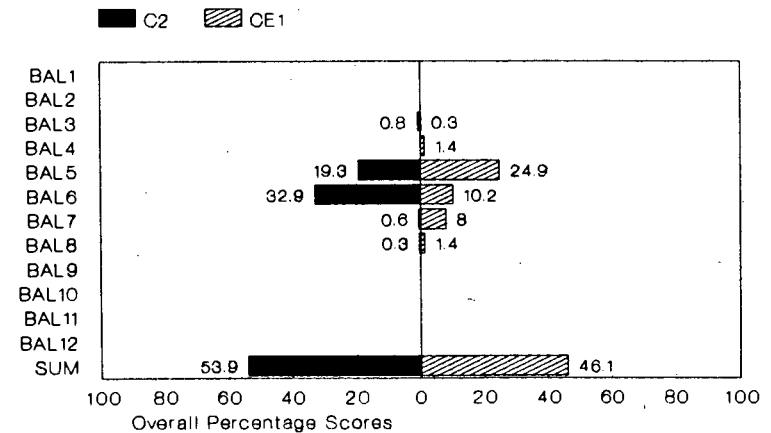
IPA Scores - Interview 6 (C2-A1)



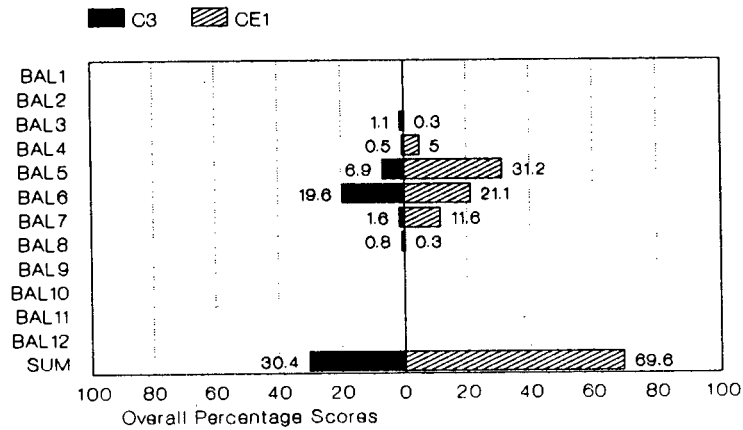
IPA Scores - Interview 7 (C2-CON1)



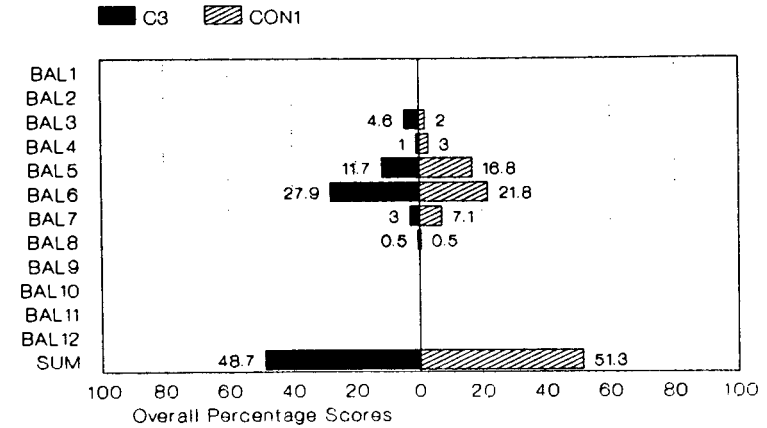
IPA Scores - Interview 8 (C2-CE1)



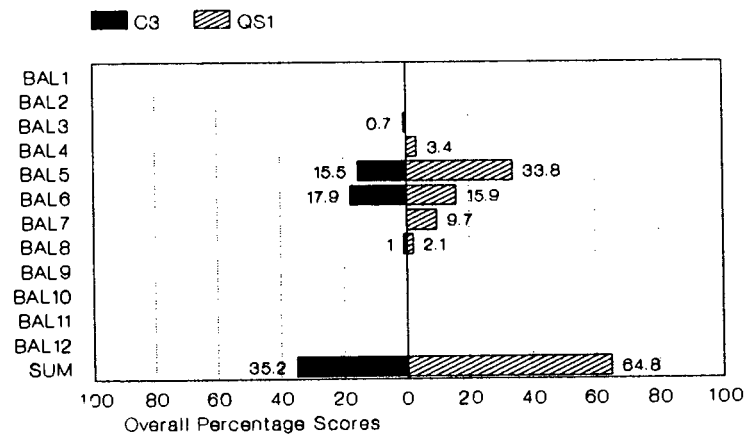
IPA Scores - Interview 9 (C3-CE1)



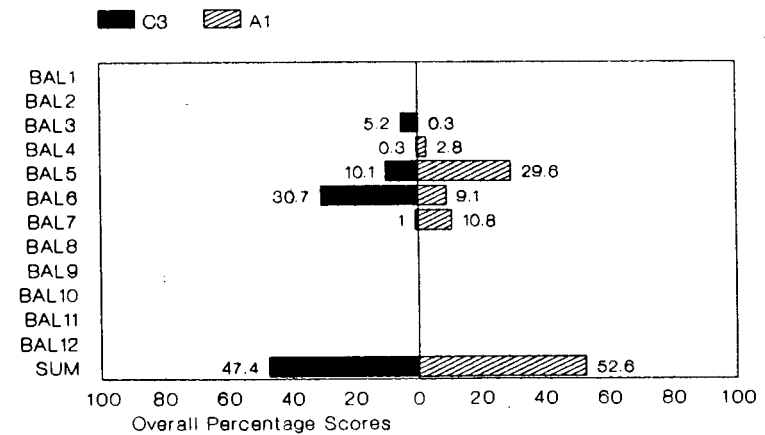
IPA Scores - Interview 10 (C3-CON1)



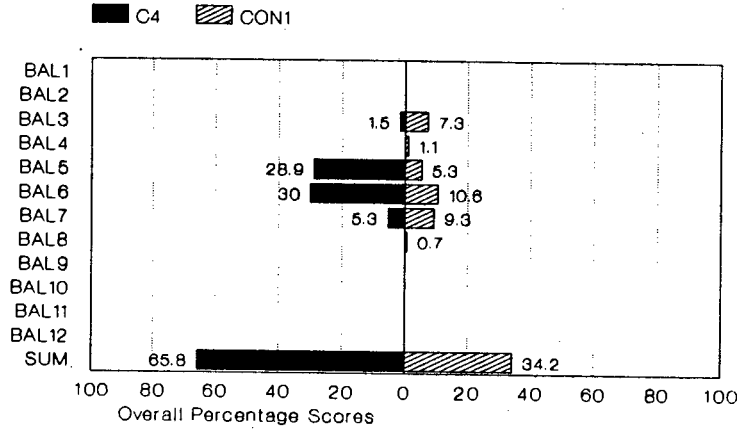
IPA Scores - Interview 11 (C3-QS1)



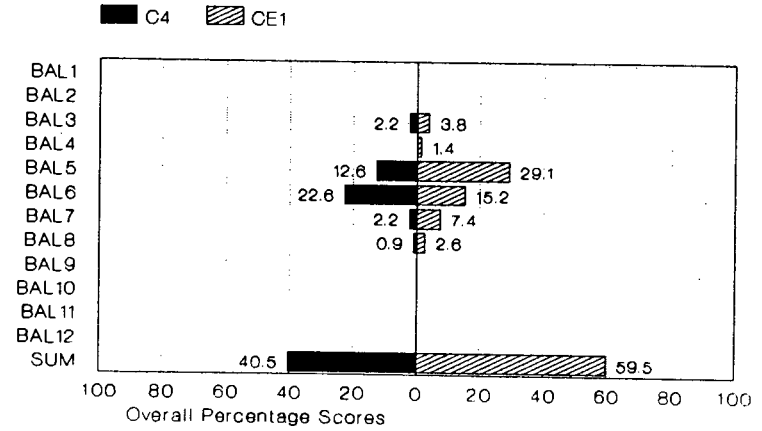
IPA Scores - Interview 12 (C3-A1)



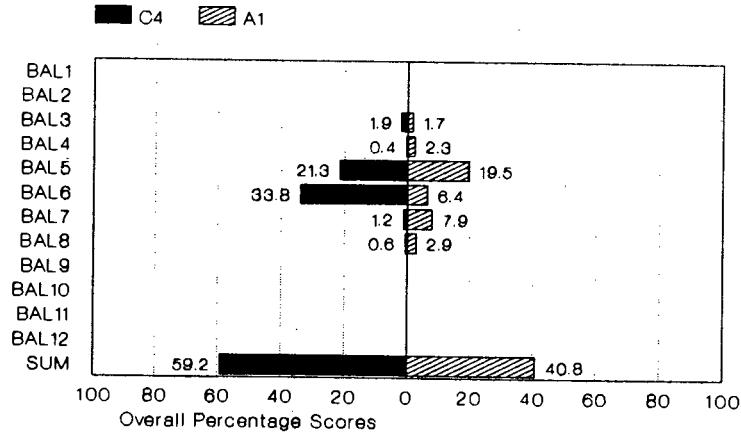
IPA Scores - Interview 13 (C4-CON1)



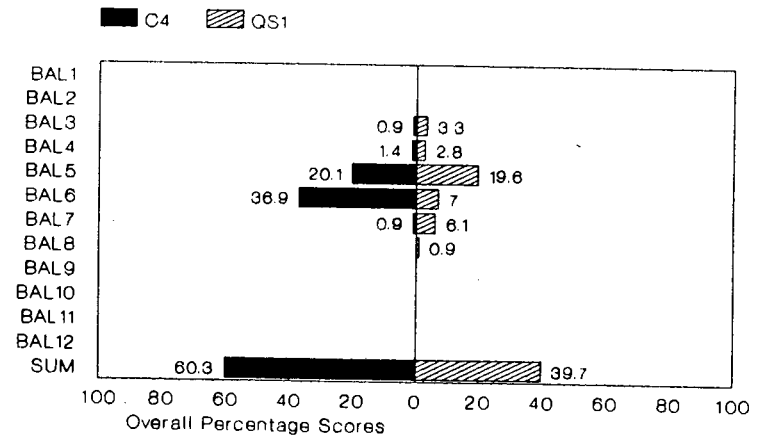
IPA Scores - Interview 14 (C4-CE1)



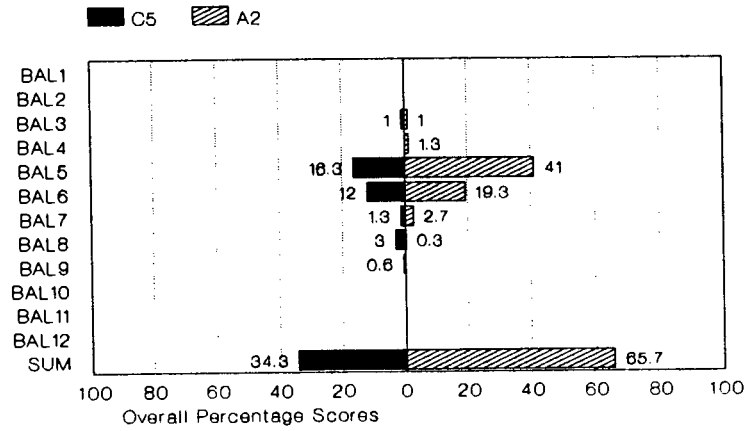
IPA Scores - Interview 15 (C4-A1)



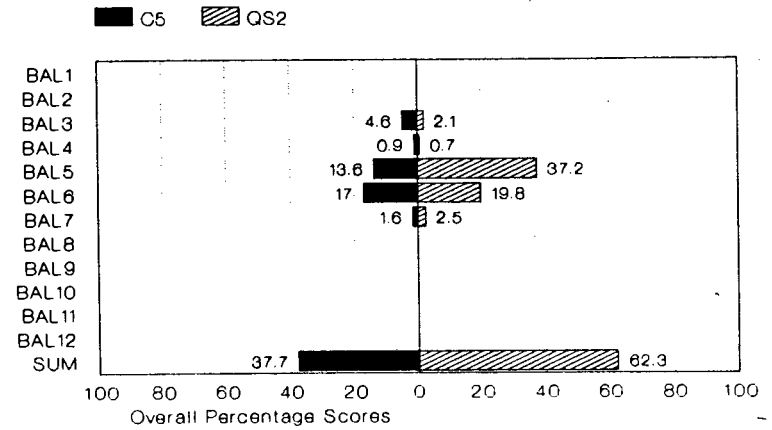
IPA Scores - Interview 16 (C4-QS1)



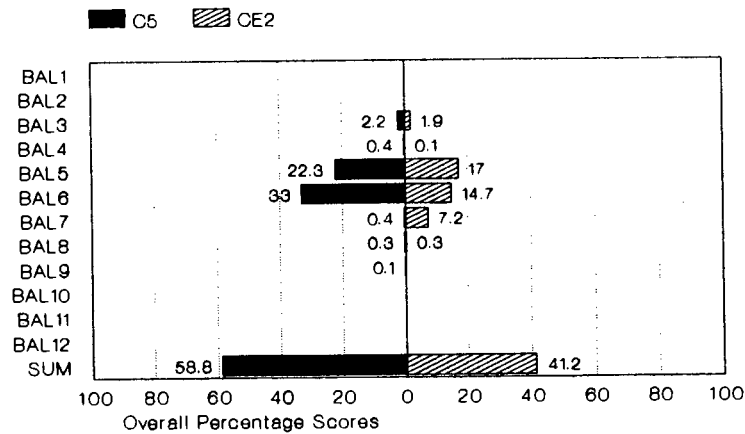
IPA Scores - Interview 17 (C5-A2)



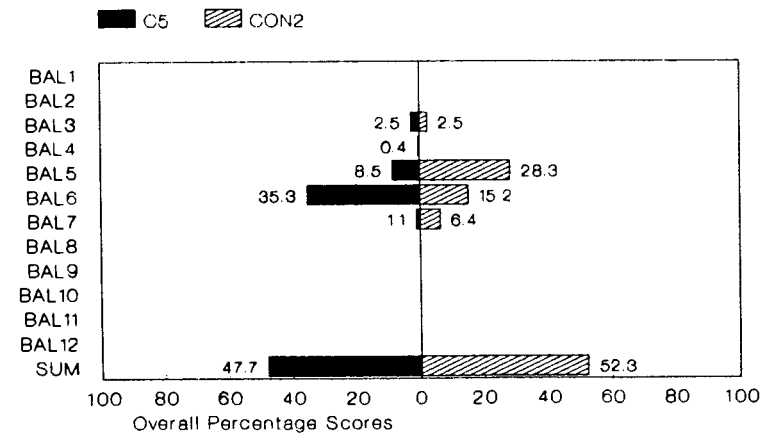
IPA Scores - Interview 22 (C5-QS2)



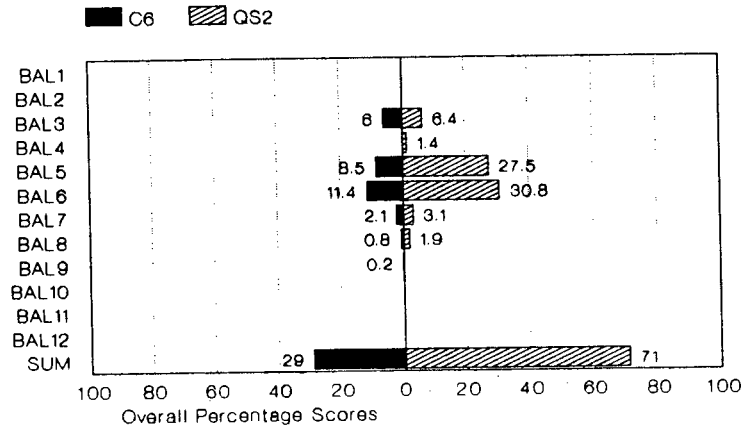
IPA Scores - Interview 27 (C5-CE2)



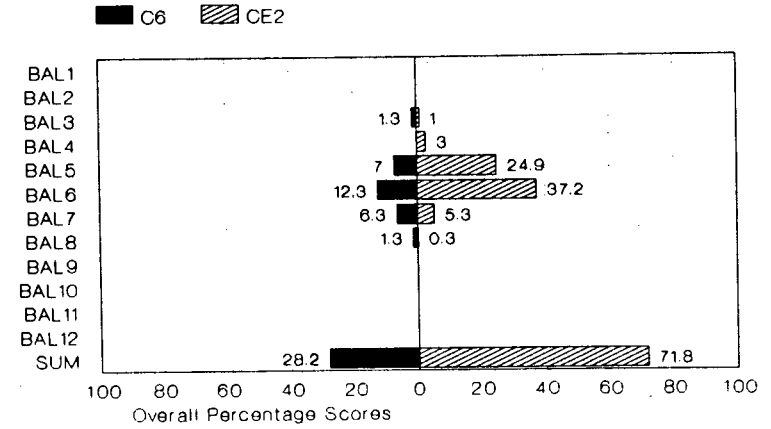
IPA Scores - Interview 32 (C5-CON2)



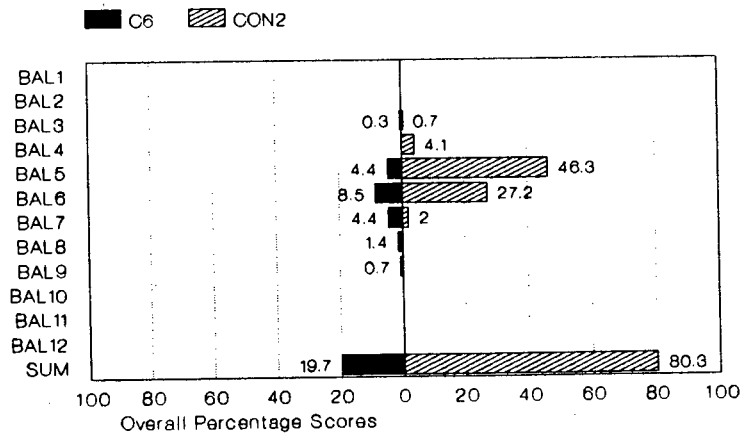
IPA Scores - Interview 21 (C6-QS2)



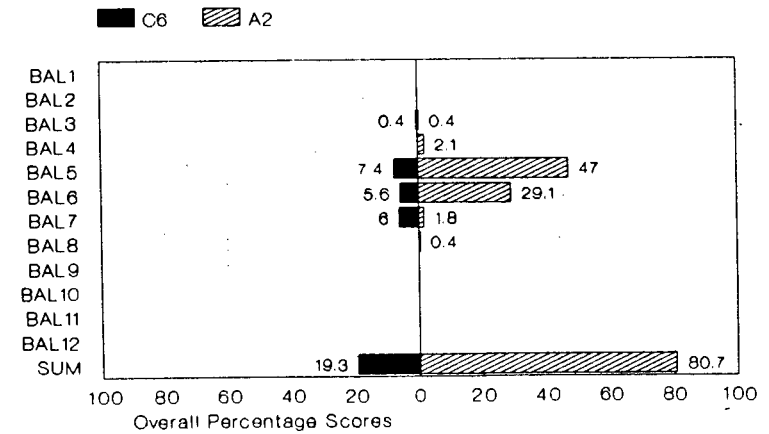
IPA Scores - Interview 26 (C6-CE2)



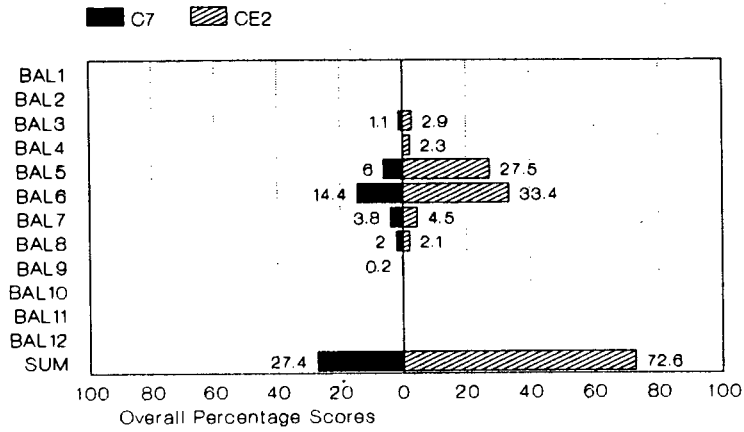
IPA Scores - Interview 31 (C6-CON2)



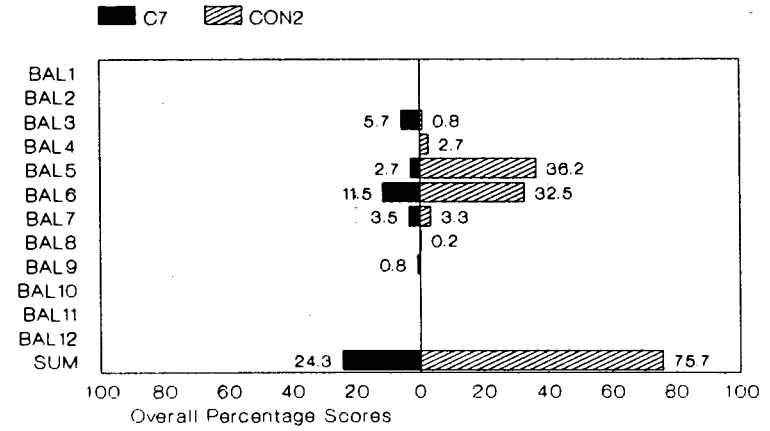
IPA Scores - Interview 20 (C6-A2)



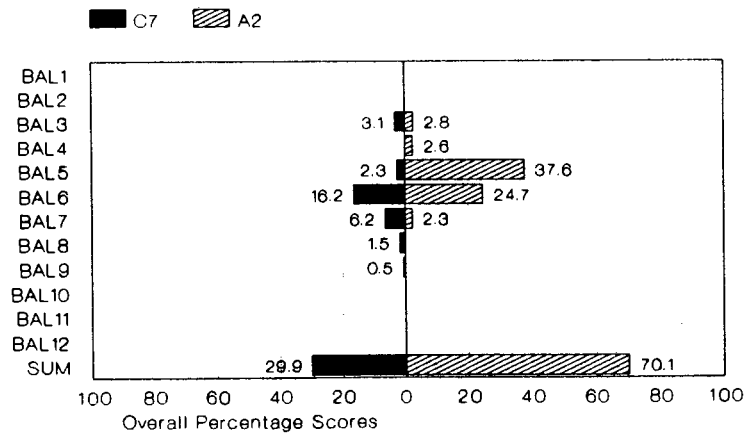
IPA Scores - Interview 25 (C7-CE2)



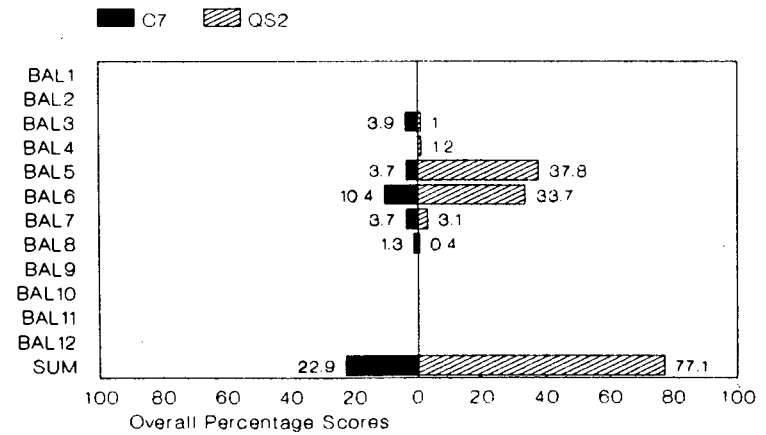
IPA Scores - Interview 30 (C7-CON2)



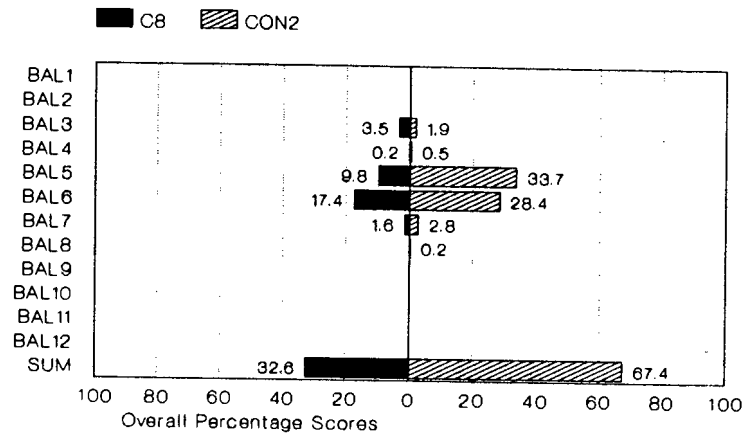
IPA Scores - Interview 19 (C7-A2)



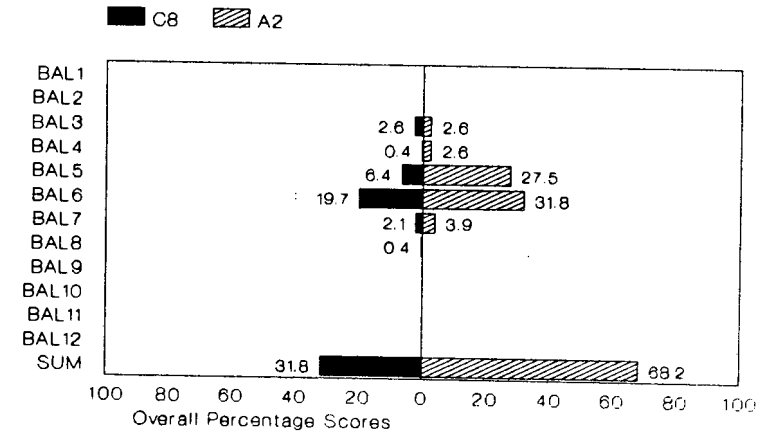
IPA Scores - Interview 24 (C7-QS2)



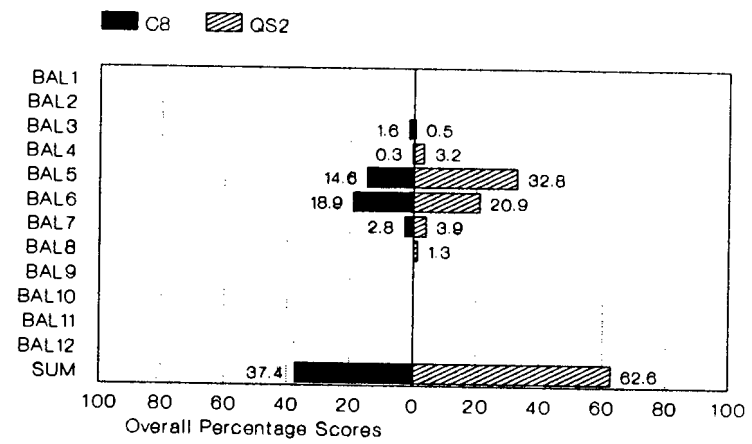
IPA Scores - Interview 29 (C8-CON2)



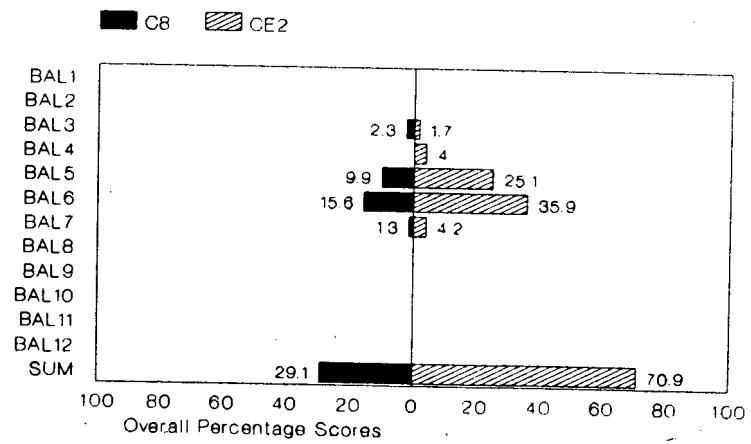
IPA Scores - Interview 18 (C8-A2)



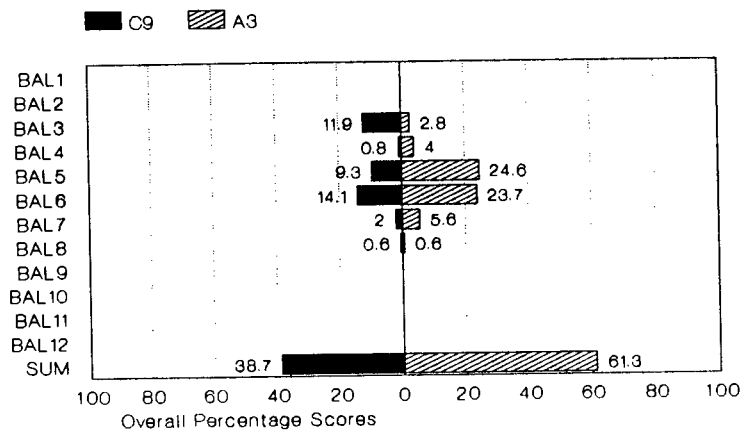
IPA Scores - Interview 23 (C8-QS2)



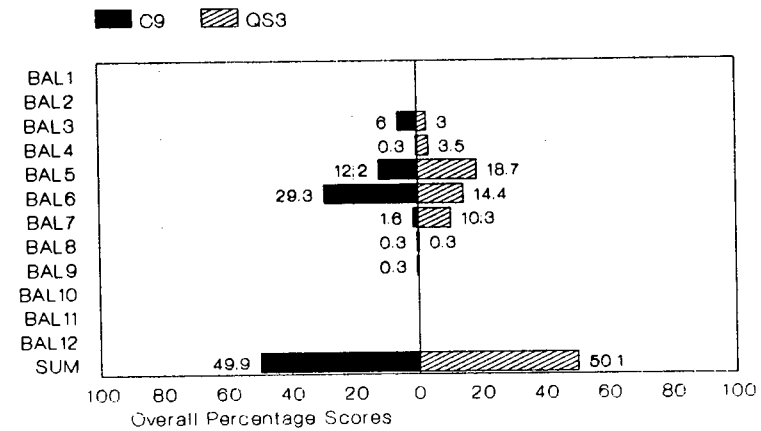
IPA Scores - Interview 28 (C8-CE2)



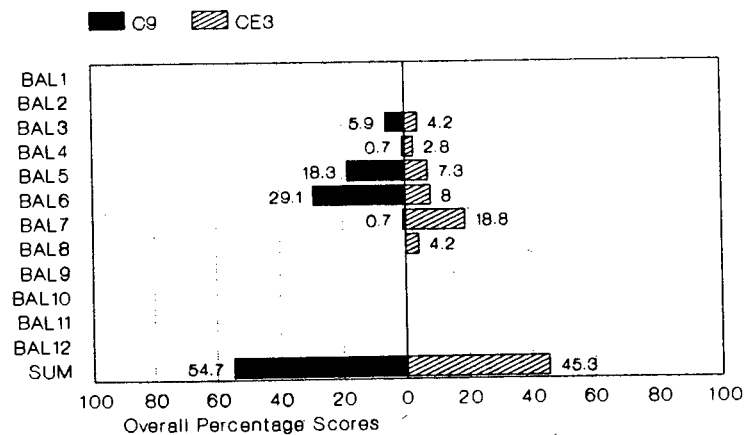
IPA Scores - Interview 33 (C9-A3)



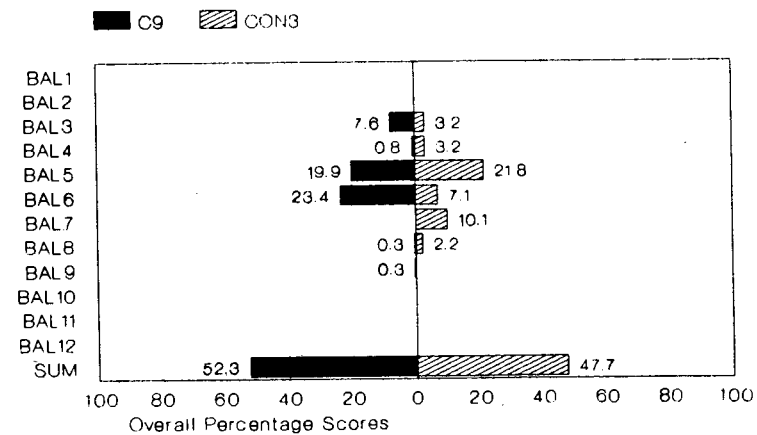
IPA Scores - Interview 34 (C9-QS3)



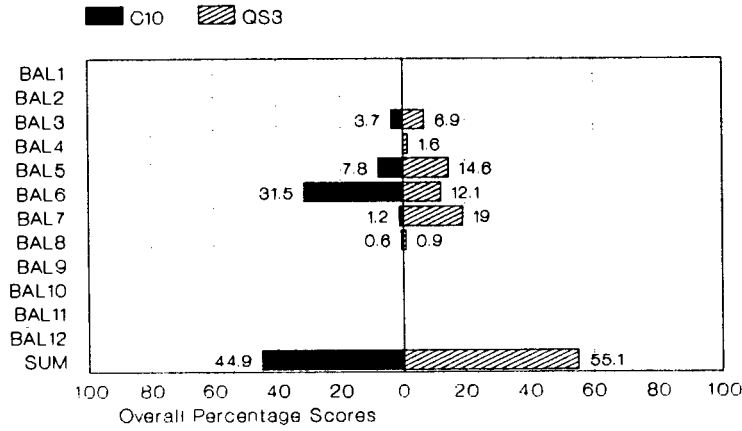
IPA Scores - Interview 35 (C9-CE3)



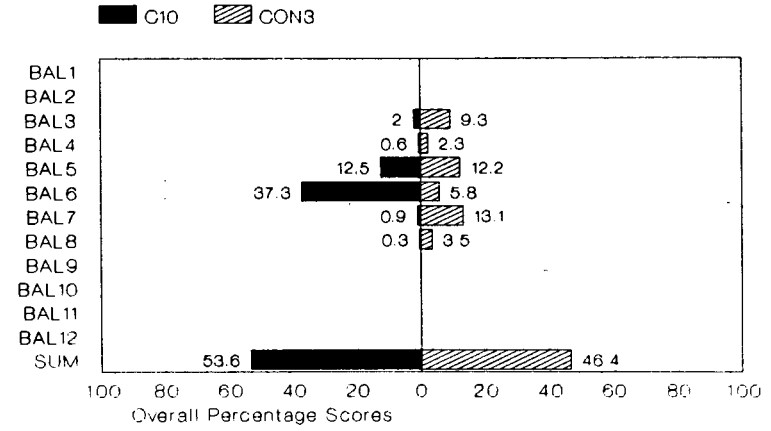
IPA Scores - Interview 36 (C9-CON3)



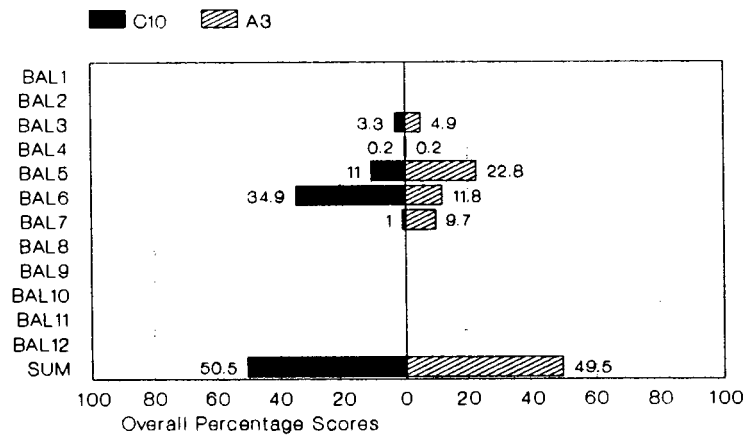
IPA Scores - Interview 37 (C10-QS3)



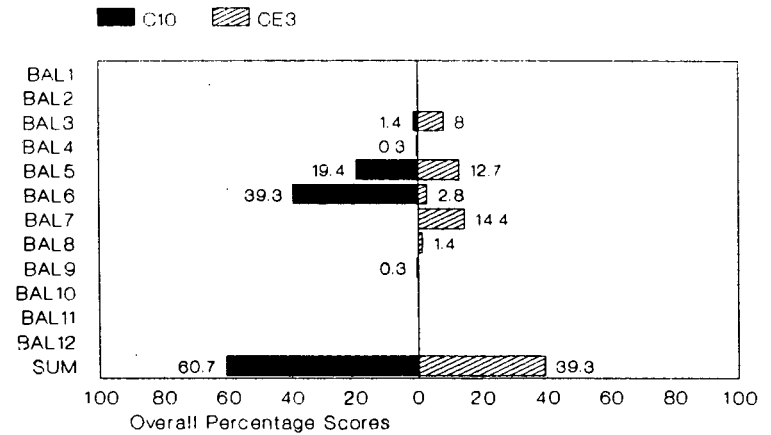
IPA Scores - Interview 38 (C10-CON3)



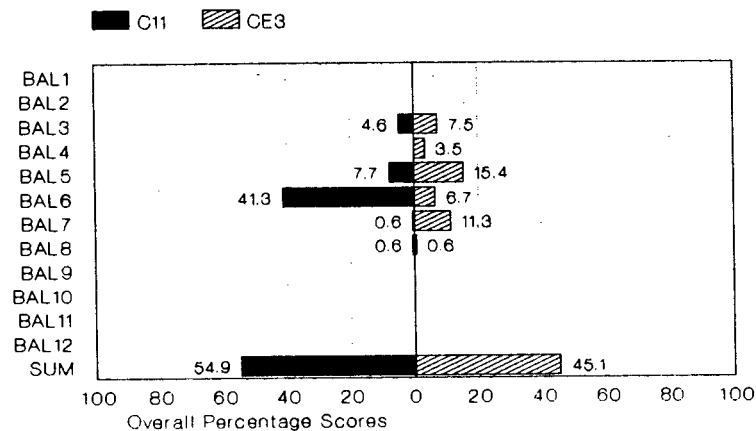
IPA Scores - Interview 39 (C10-A3)



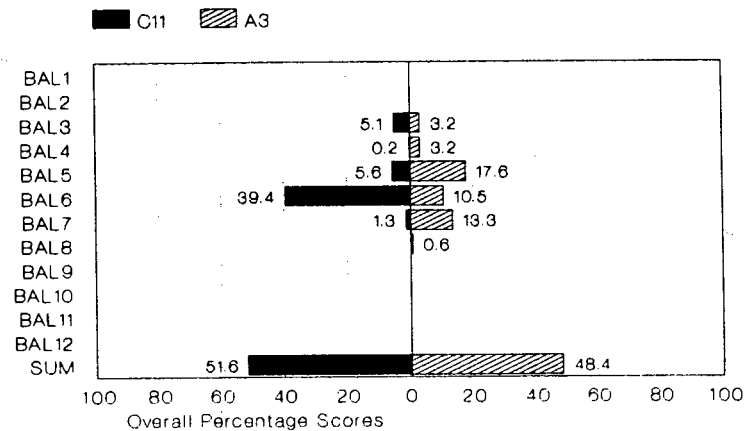
IPA Scores - Interview 40 (C10-CE3)



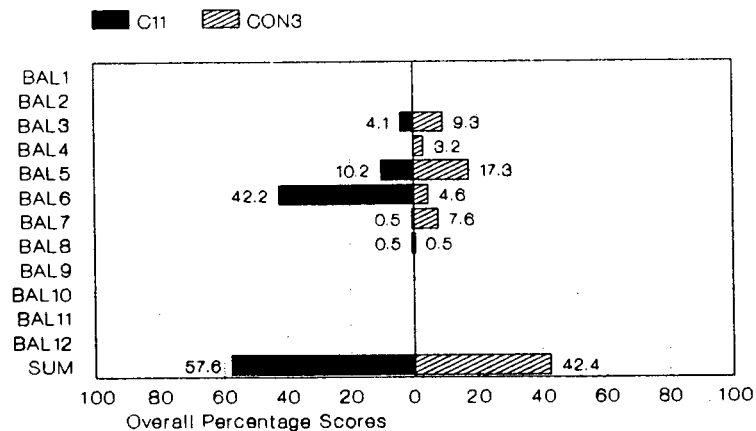
IPA Scores - Interview 41 (C11-CE3)



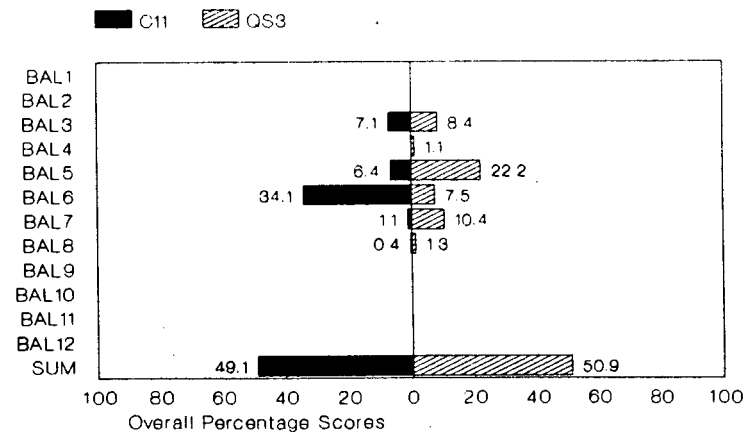
IPA Scores - Interview 42 (C11-A3)



IPA Scores - Interview 43 (C11-CON3)



IPA Scores - Interview 44 (C11-QS3)



Average IPA Scores - Case Study (1)

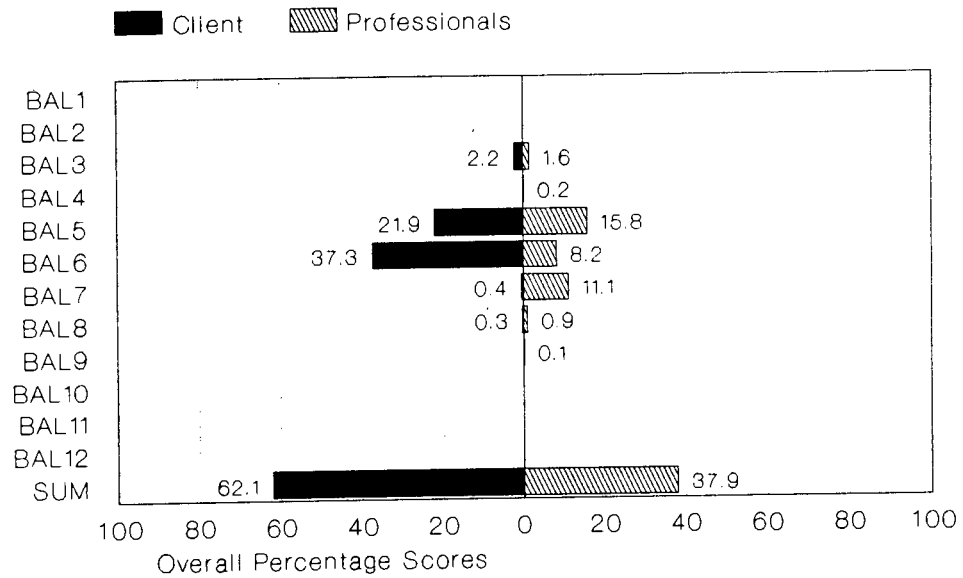


Figure A4.12 Bales' IPA Average Profiles - Case Study (1)

Average IPA Scores - Case Study (2)

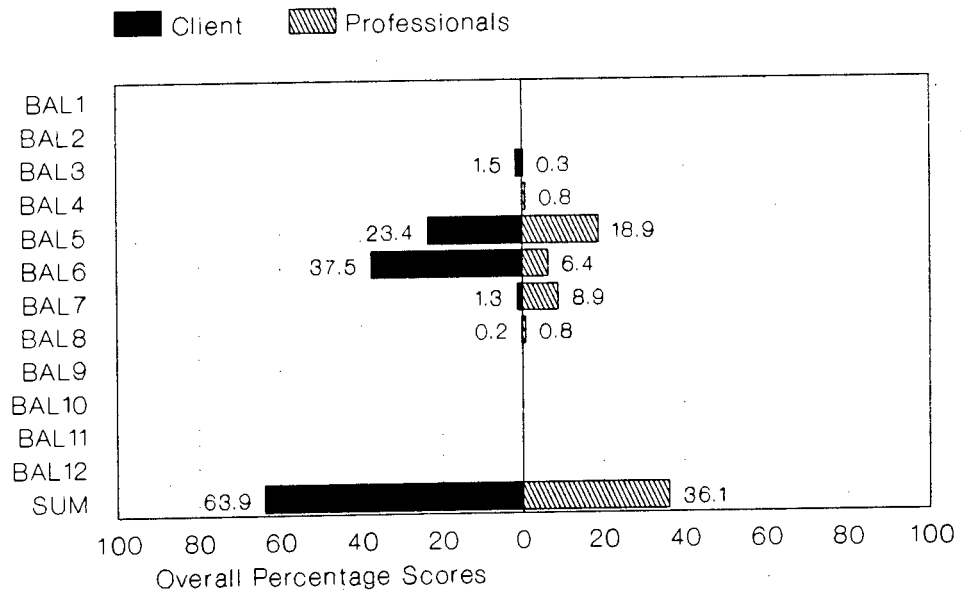


Figure A4.13 Bales' IPA Average Profiles - Case Study (2)

Average IPA Scores - Case Study (3)

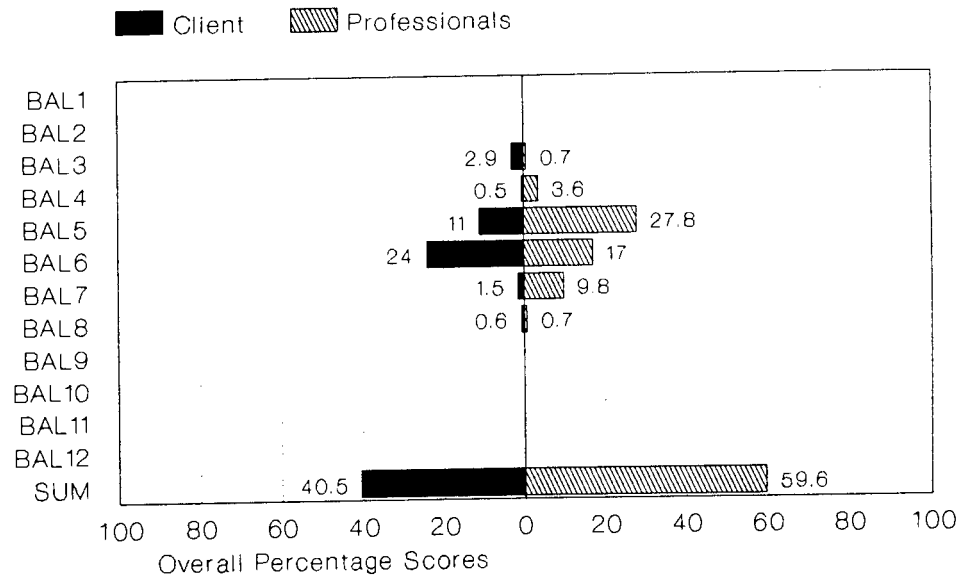


Figure A4.14 Bales' IPA Average Profiles - Case Study (3)

Average IPA Scores - Case Study (4)

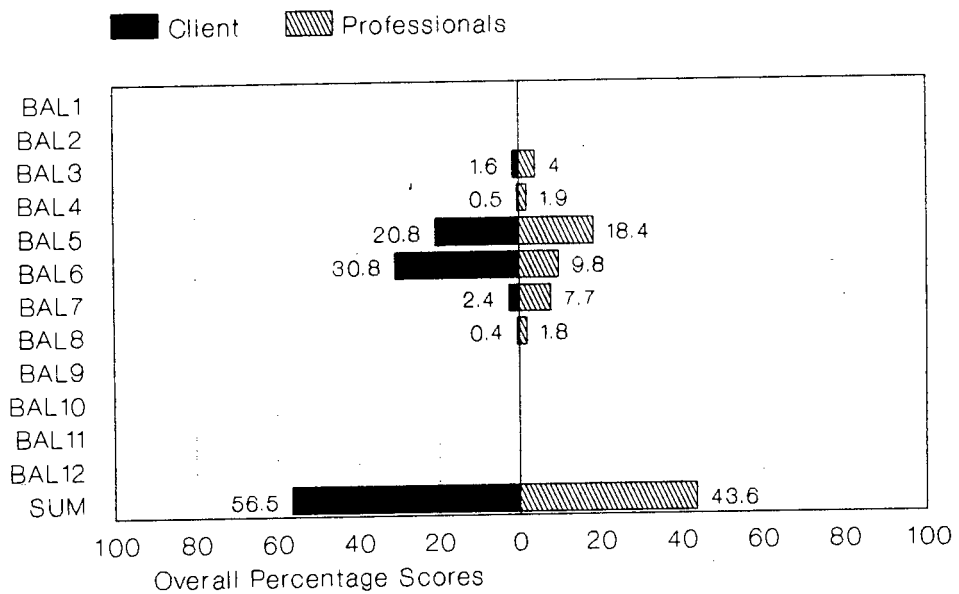


Figure A4.15 Bales' IPA Average Profiles - Case Study (4)

Average IPA Scores - Case Study (5)

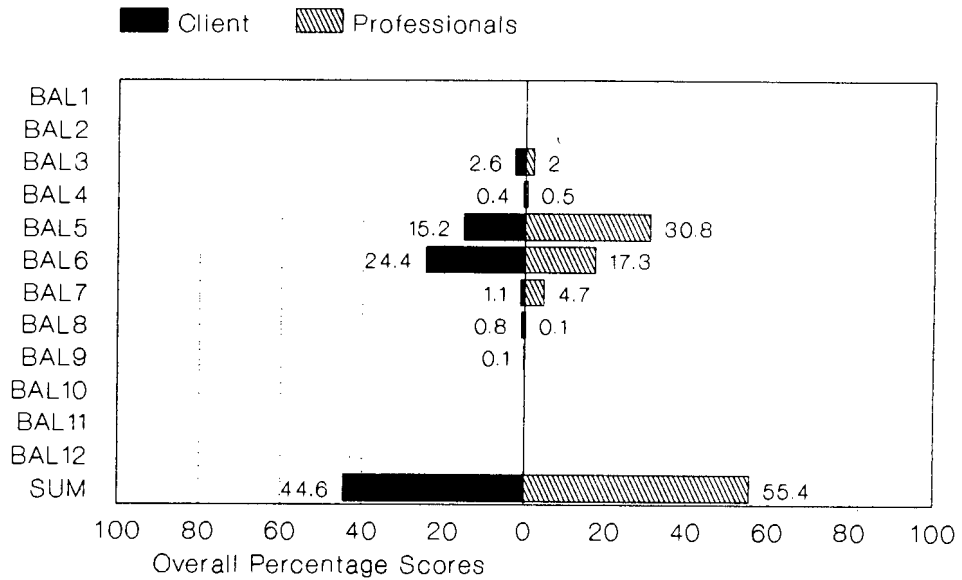


Figure A4.16 Bales' IPA Average Profiles - Case Study (5)

Average IPA Scores - Case Study (6)

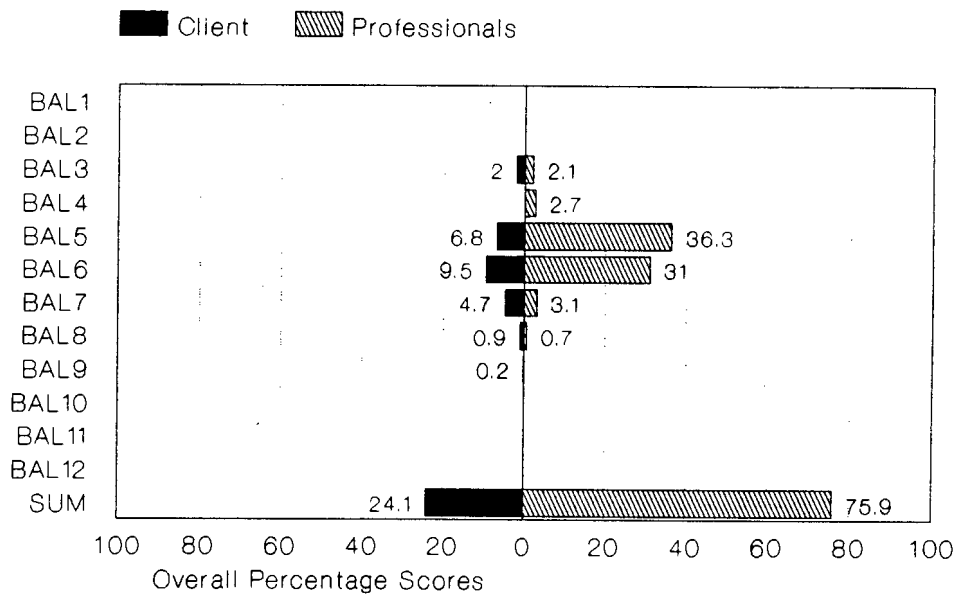


Figure A4.17 Bales' IPA Average Profiles - Case Study (6)

Average IPA Scores - Case Study (7)

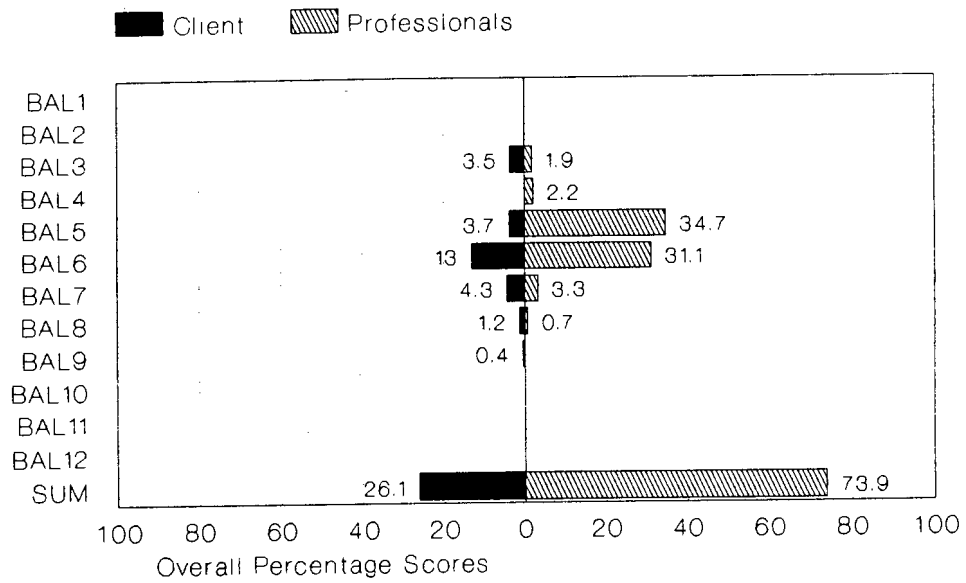


Figure A4.18 Bales' IPA Average Profiles - Case Study (7)

Average IPA Scores - Case Study (8)

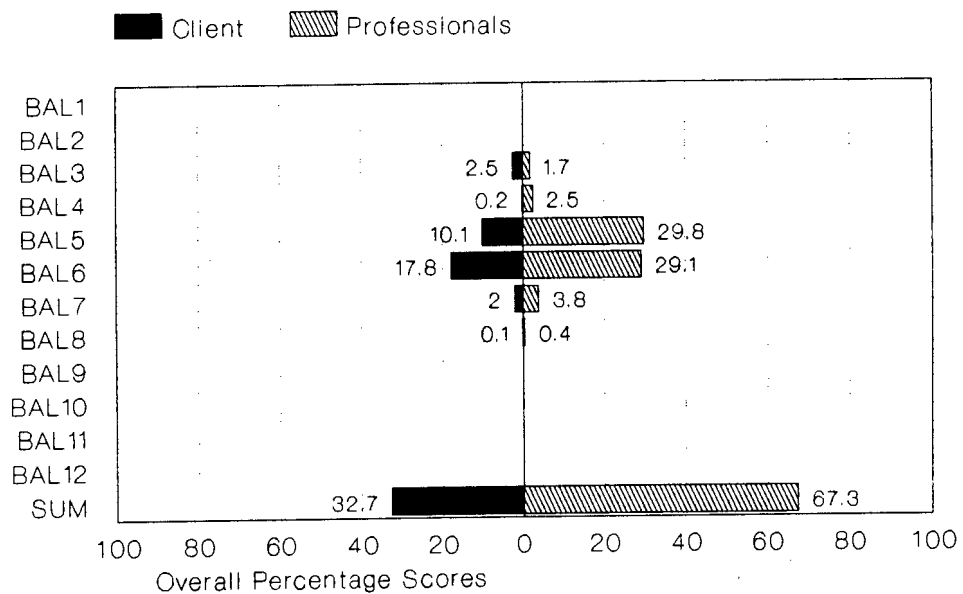


Figure A4.19 Bales' IPA Average Profiles - Case Study (8)

Average IPA Scores - Case Study (9)

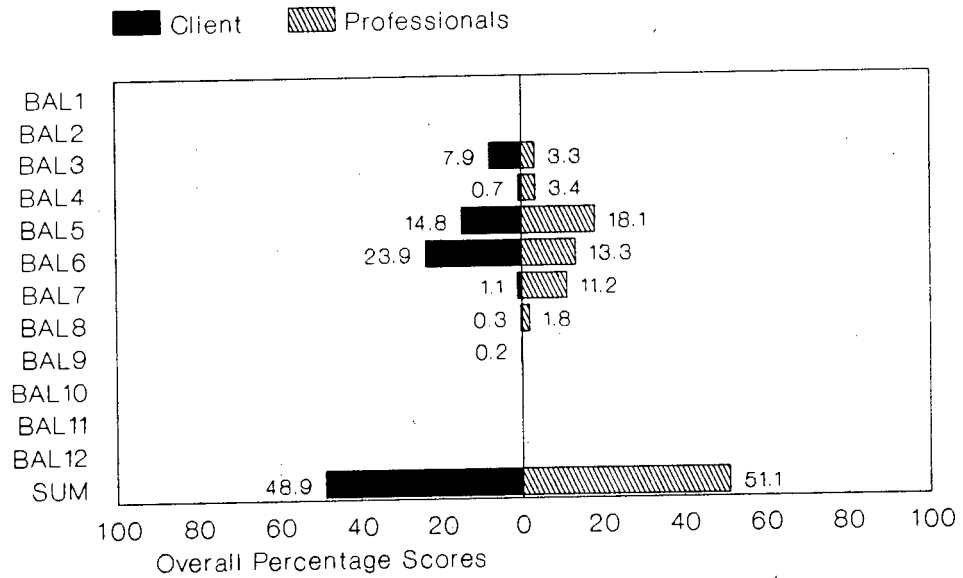


Figure A4.20 Bales' IPA Average Profiles - Case Study (9)

Average IPA Scores - Case Study (10)

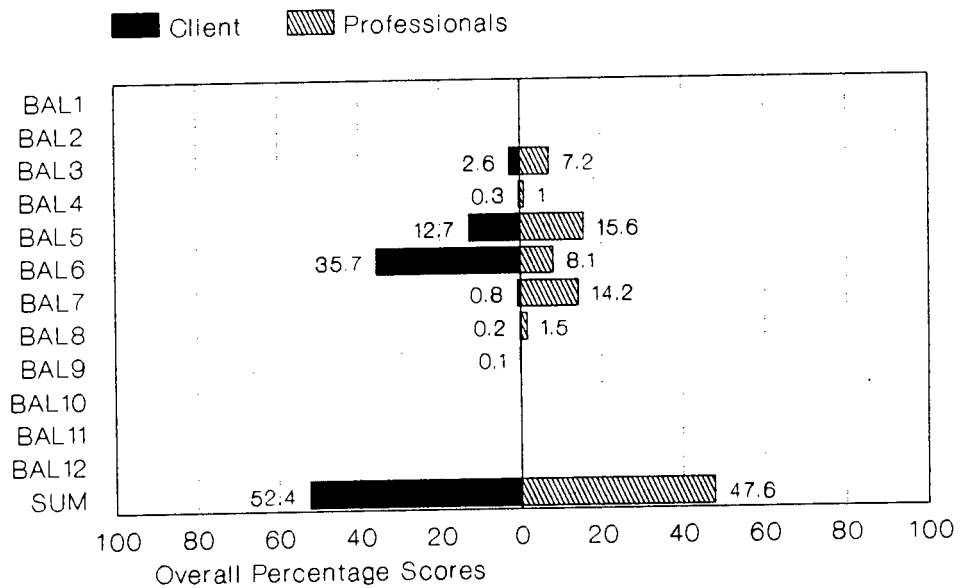


Figure A4.21 Bales' IPA Average Profiles - Case Study (10)

Average IPA Scores - Case Study (11)

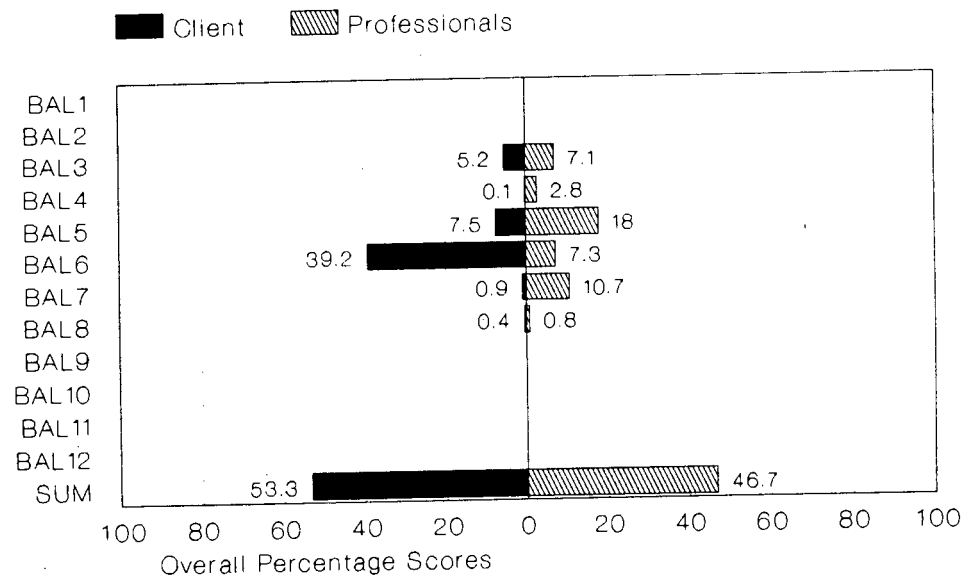


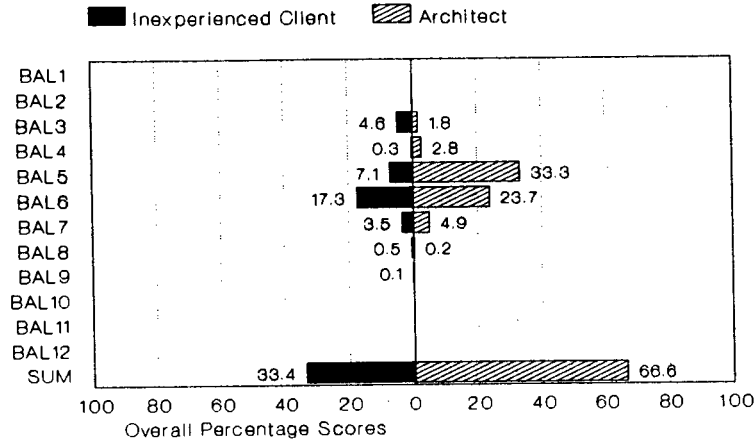
Figure A4.22

Bales' IPA Average Profiles - Case Study (11)

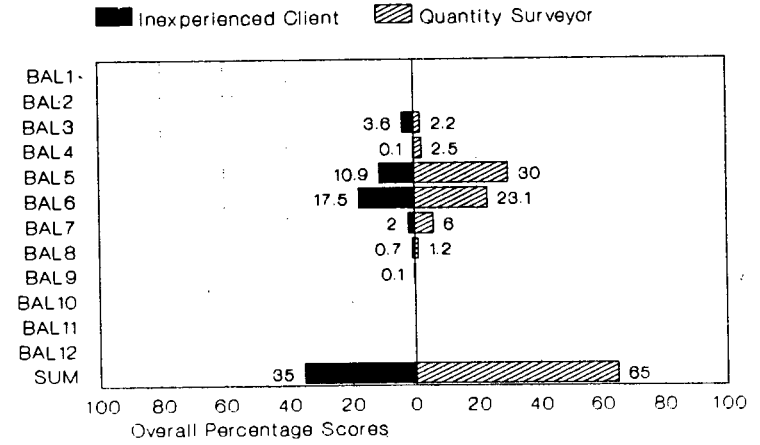
Figure A4.23

Bales' IPA Average Profiles - Inexperienced Clients

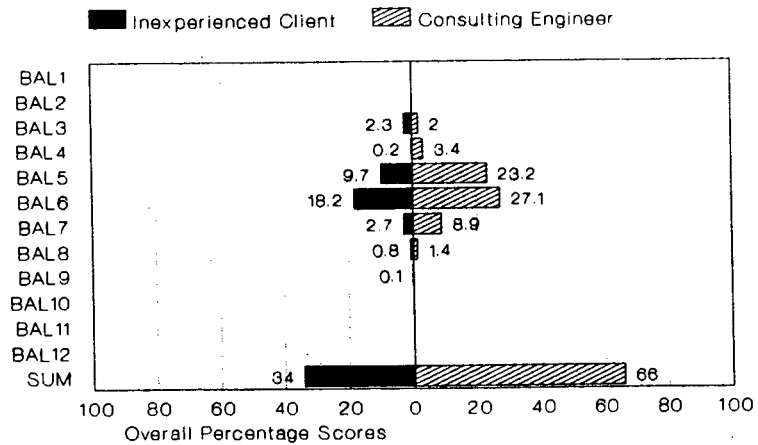
Average IPA Scores (Inexp C-A)



Average IPA Scores (Inexp C-QS)



Average IPA Scores (Inexp C-CE)



Average IPA Scores (Inexp C-CON)

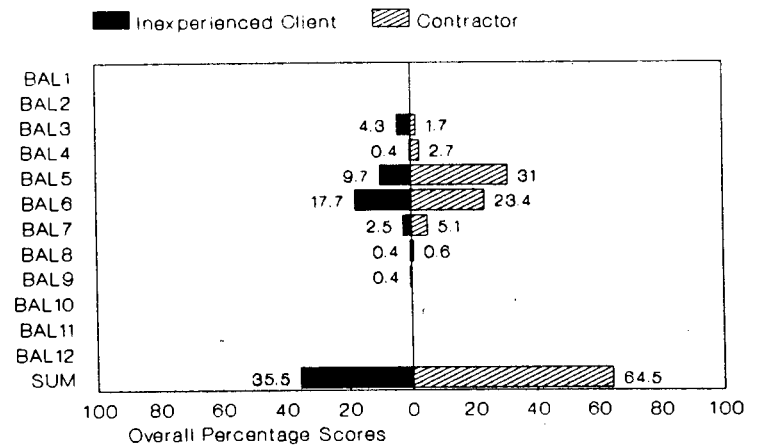
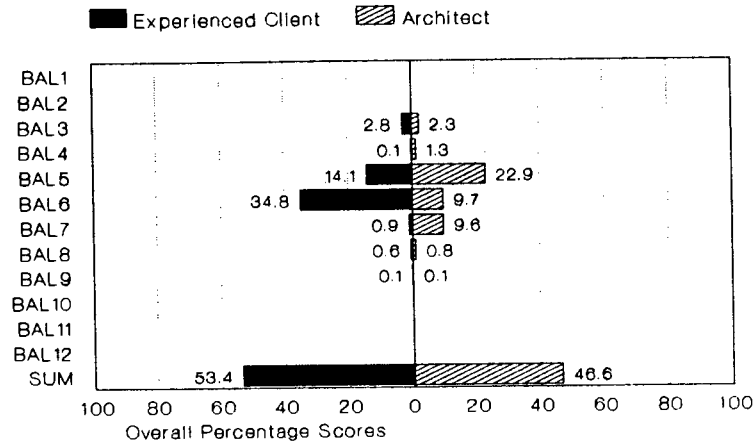


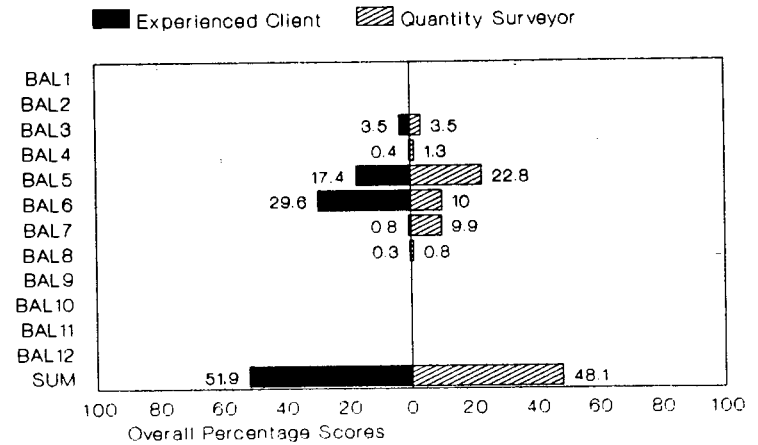
Figure A4.24

Bales' IPA Average Profiles - Experienced Clients

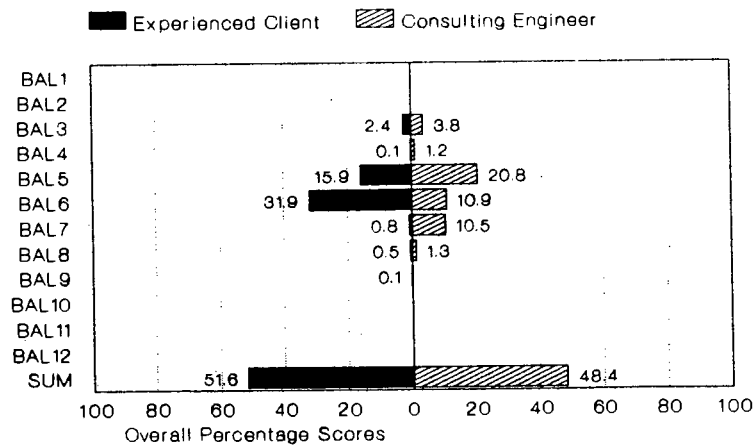
Average IPA Scores (Exp C-A)



Average IPA Scores (Exp C-QS)



Average IPA Scores (Exp C-CE)



Average IPA Scores (Exp C-CON)

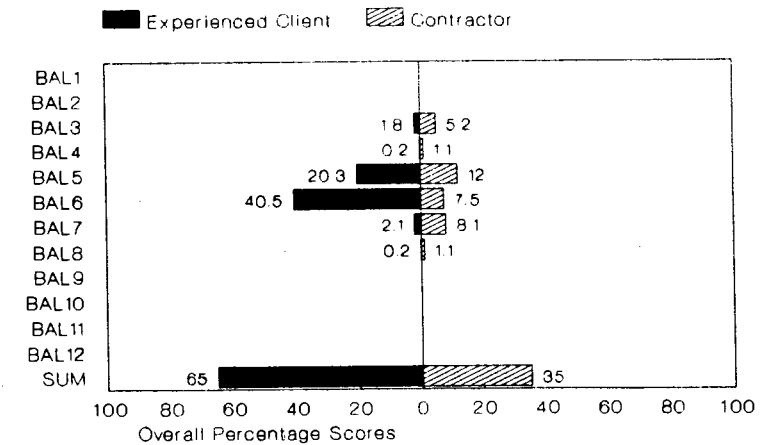
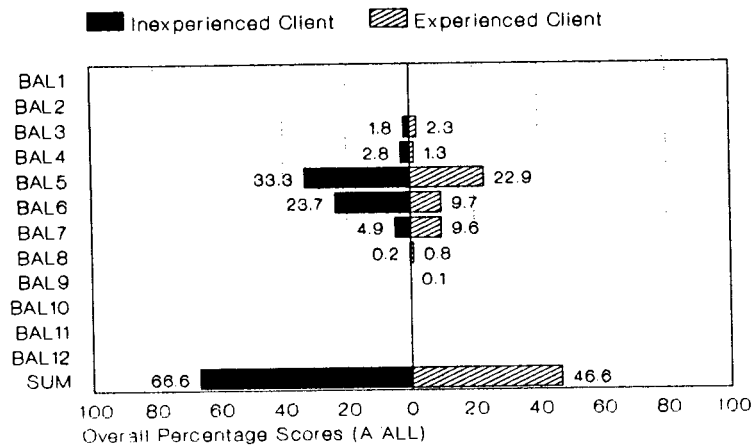


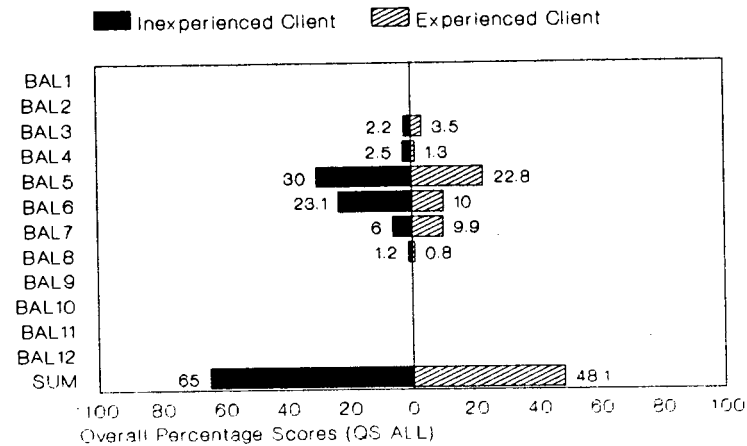
Figure A4.25

Bales' IPA Average Profiles - Professionals

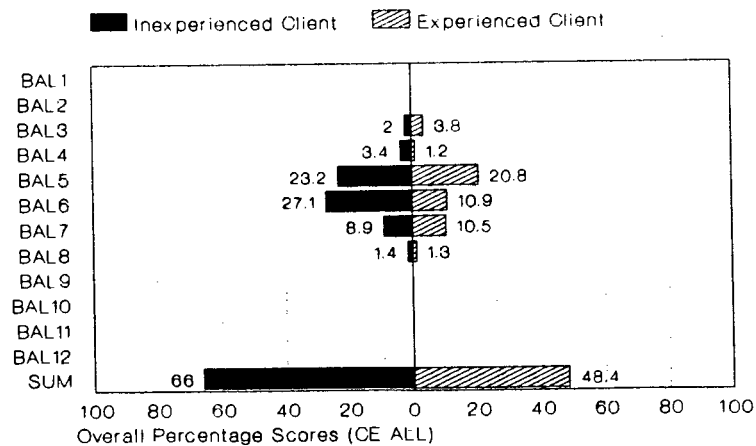
Average IPA Scores (Architect)



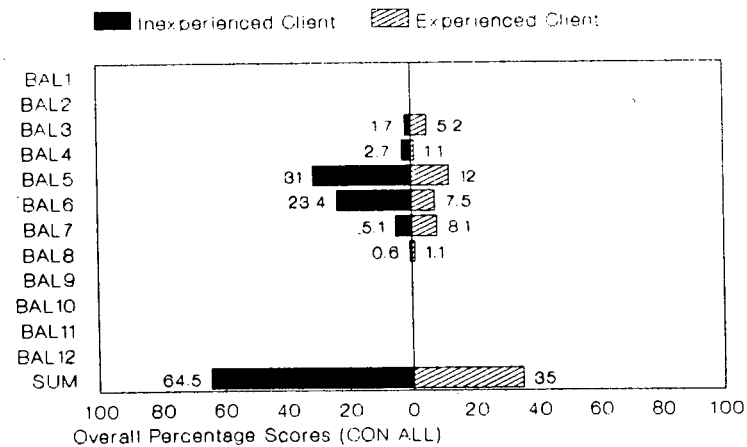
Average IPA Scores (Quantity Surveyor)



Average IPA Scores (Consulting Engineer)



Average IPA Scores (Contractor)

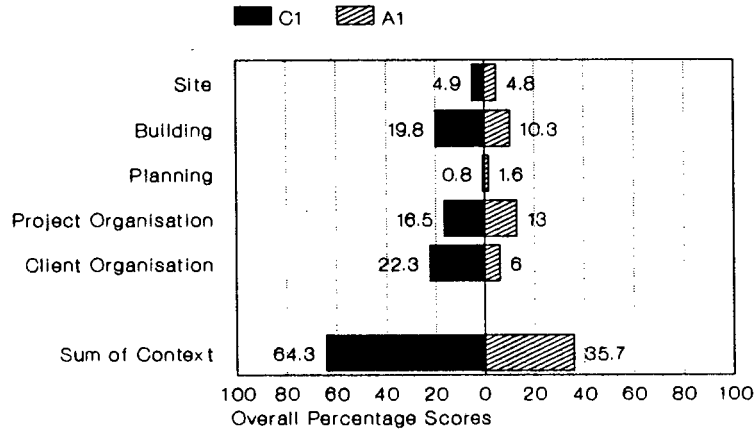


APPENDIX 5

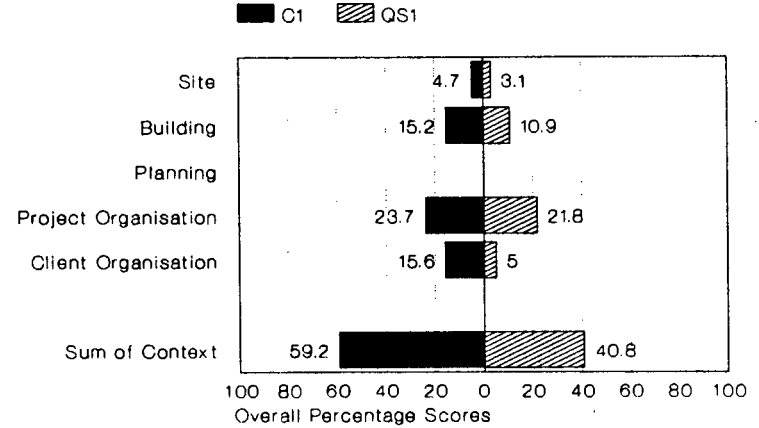
SENTENCE CONTEXT INTERVIEW PROFILES

This appendix contains graphical sentence context profiles for each of the 44 interviews conducted during this research project, and average profiles for: each case study, secondary inexperienced clients, secondary experienced clients and professionals.

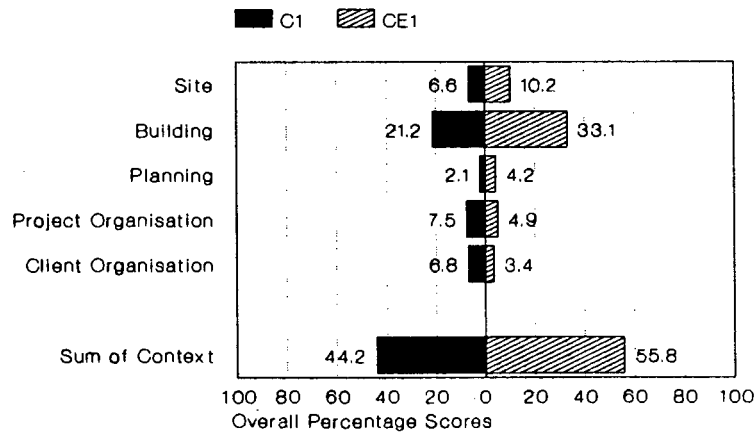
Context Codes - Interview 1 (C1-A1)



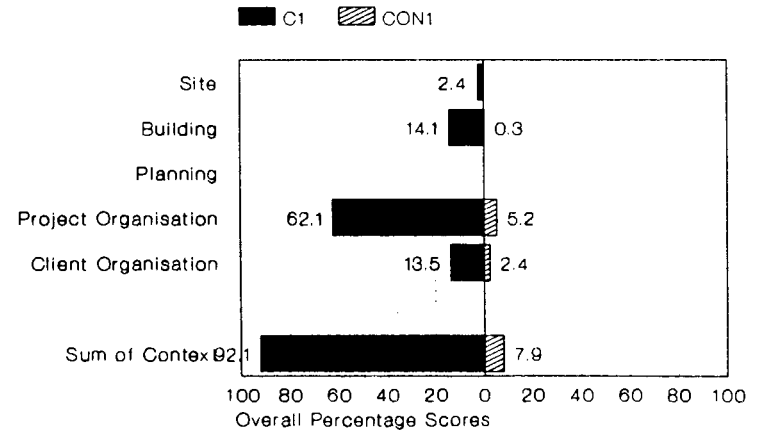
Context Codes - Interview 2 (C1-QS1)



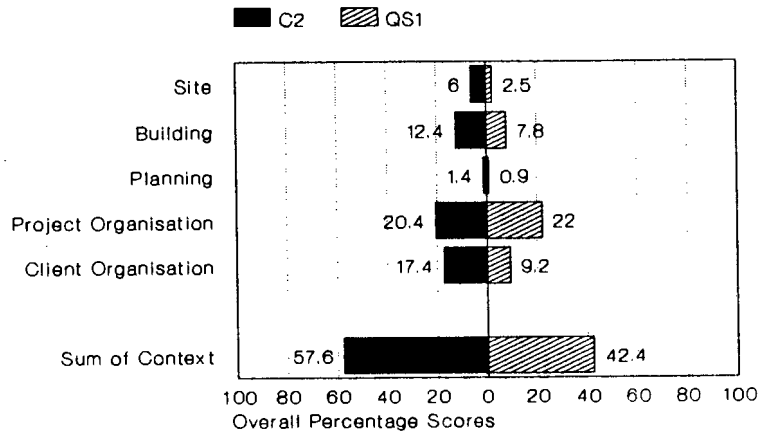
Context Codes - Interview 3 (C1-CE1)



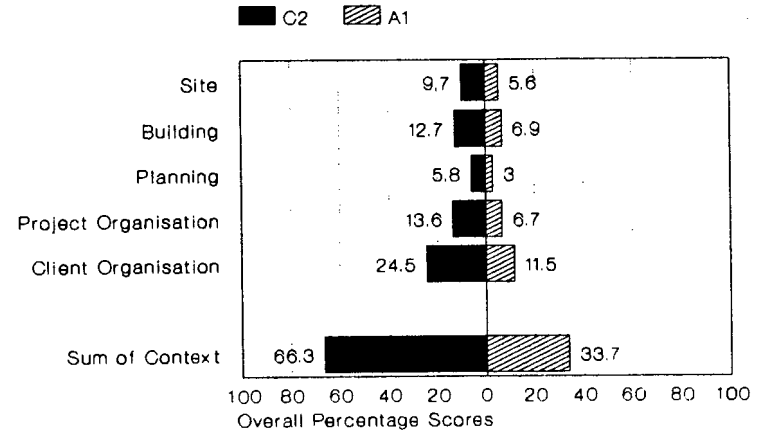
Context Codes - Interview 4 (C1-CON1)



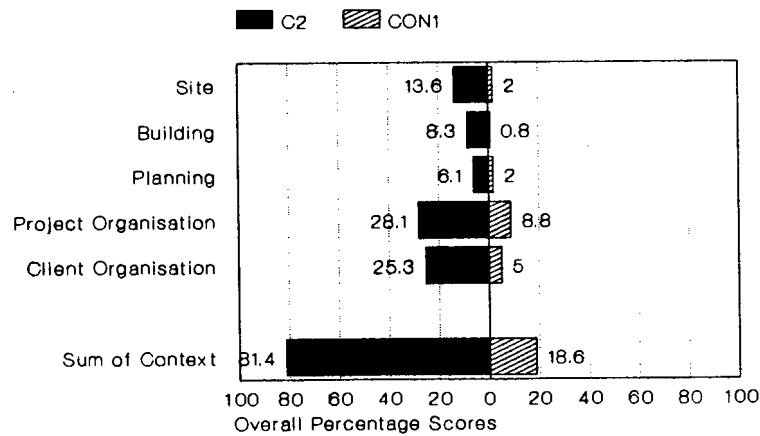
Context Codes - Interview 5 (C2-QS1)



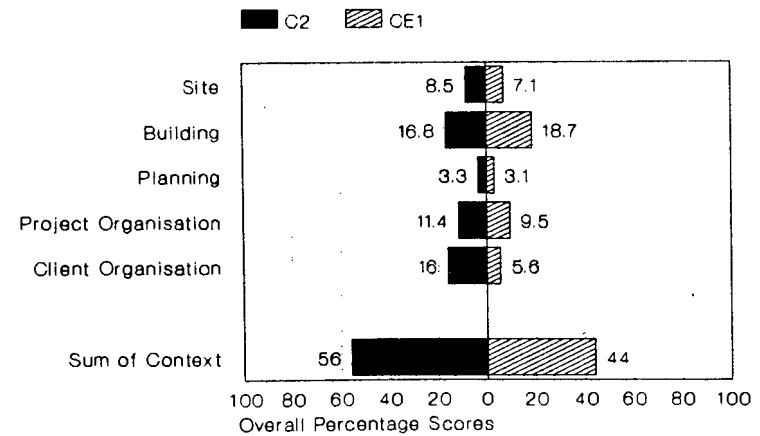
Context Codes - Interview 6 (C2-A1)



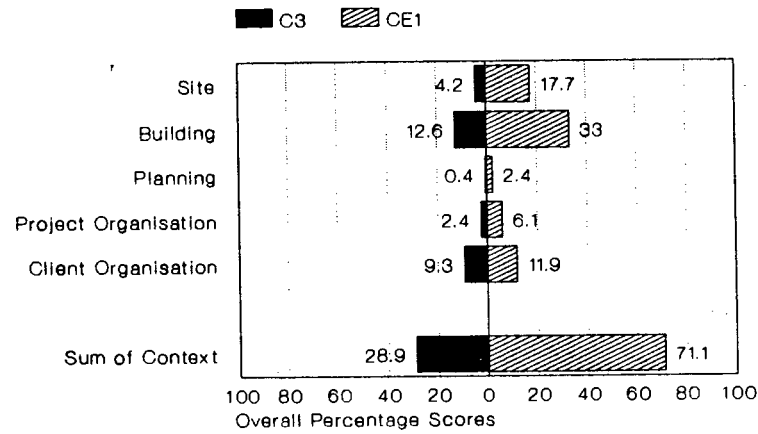
Context Codes - Interview 7 (C2-CON1)



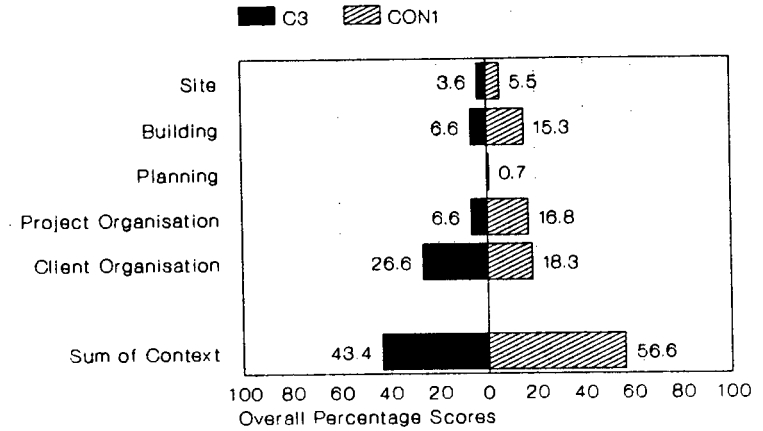
Context Codes - Interview 8 (C2-CE1)



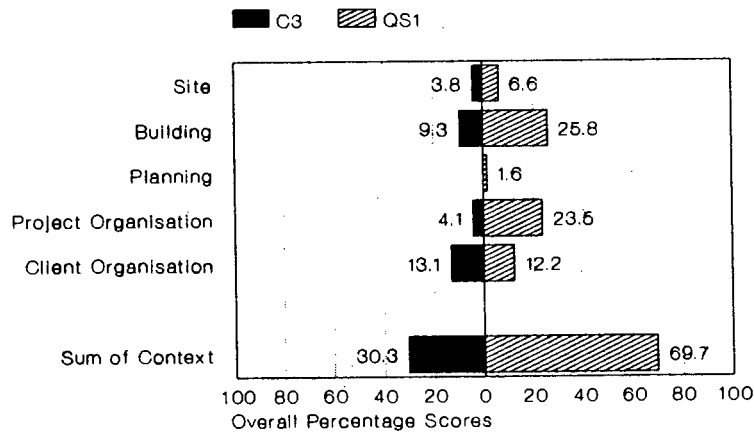
Context Codes - Interview 9 (C3-CE1)



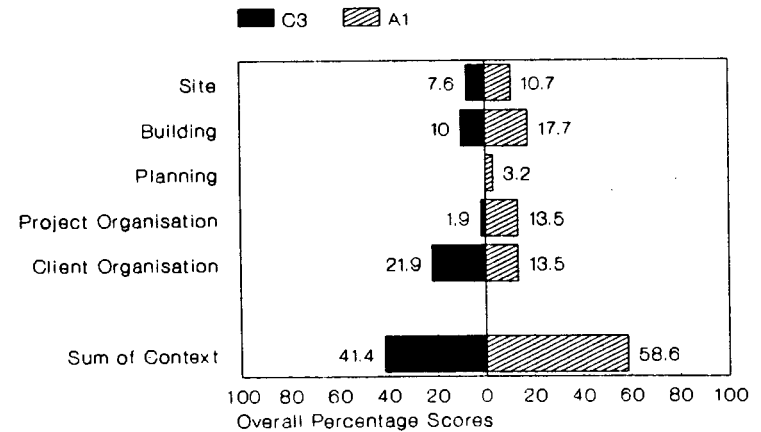
Context Codes - Interview 10 (C3-CON1)



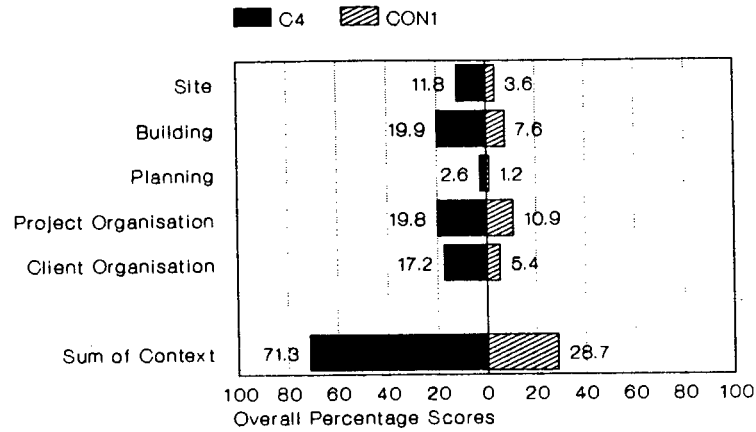
Context Codes - Interview 11 (C3-QS1)



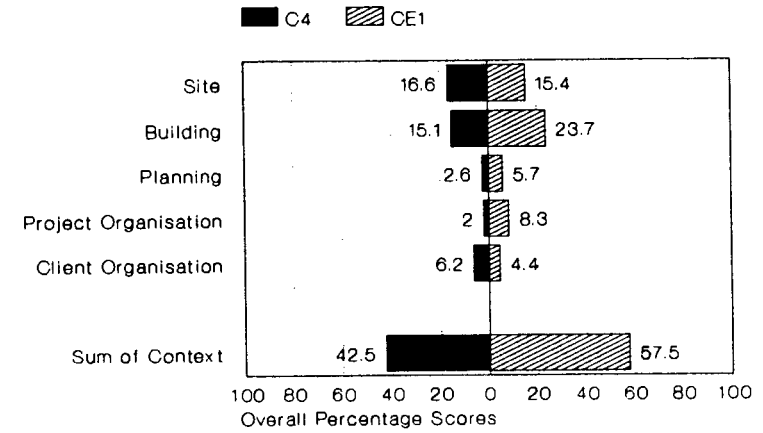
Context Codes - Interview 12 (C3-A1)



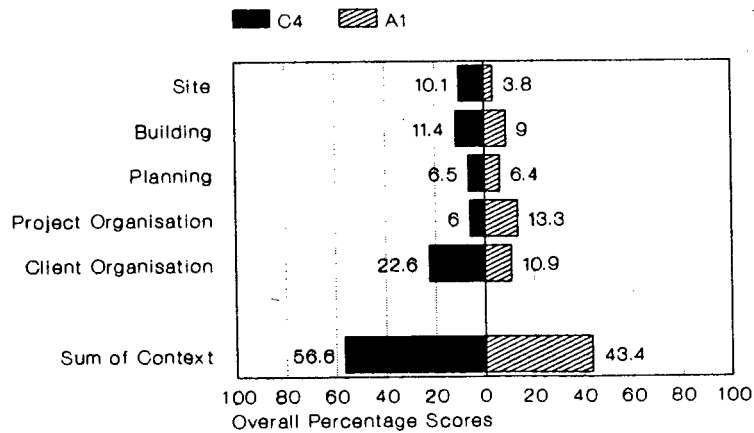
Context Codes - Interview 13 (C4-CON1)



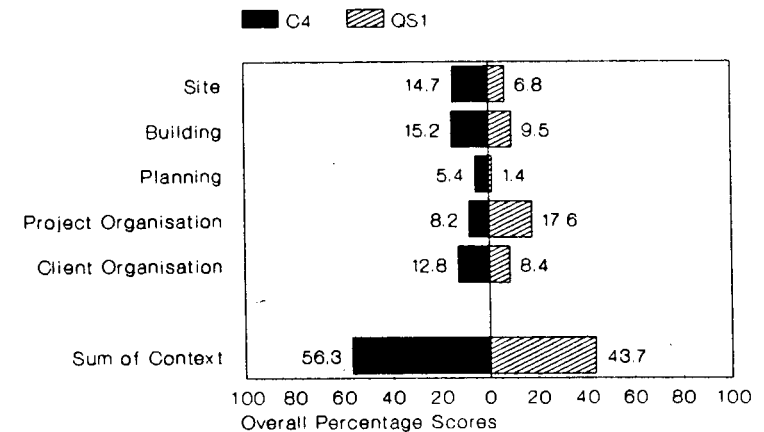
Context Codes - Interview 14 (C4-CE1)



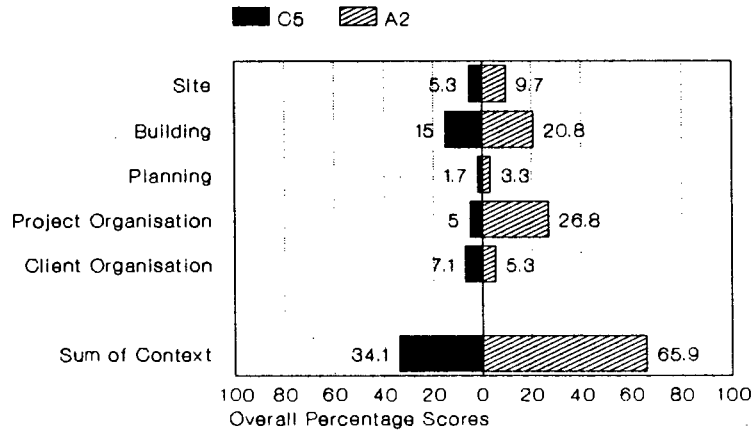
Context Codes - Interview 15 (C4-A1)



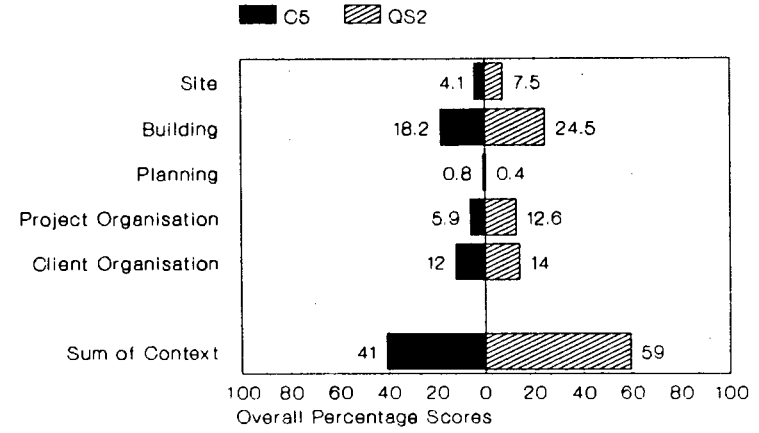
Context Codes - Interview 16 (C4-QS1)



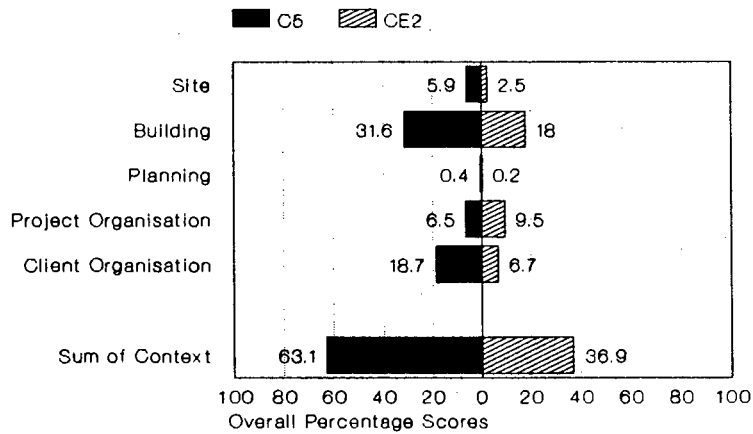
Context Codes - Interview 17 (C5-A2)



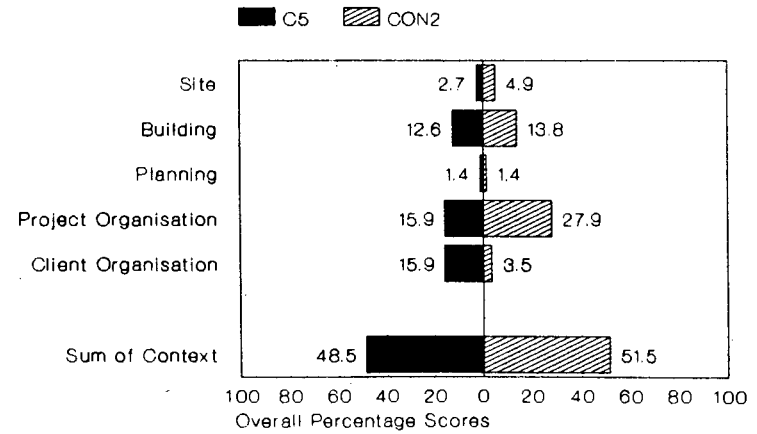
Context Codes - Interview 22 (C5-QS2)



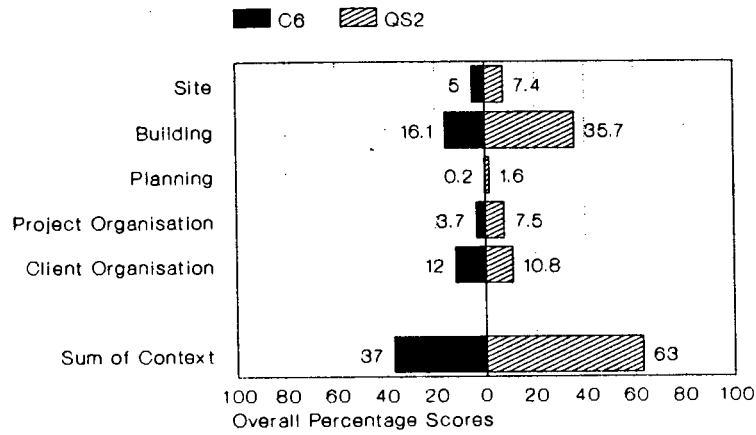
Context Codes - Interview 27 (C5-CE2)



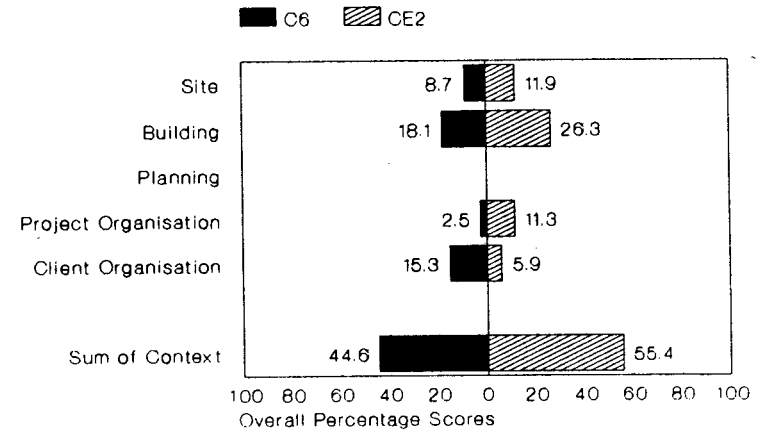
Context Codes - Interview 32 (C5-CON2)



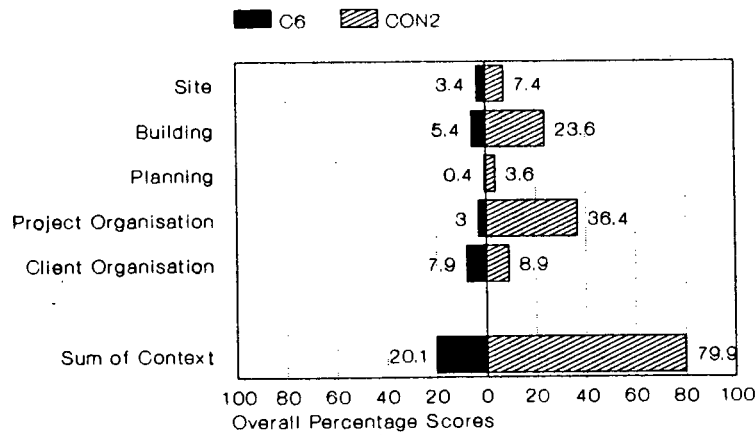
Context Codes - Interview 21 (C6-QS2)



Context Codes - Interview 26 (C6-CE2)



Context Codes - Interview 31 (C6-CON2)



Context Codes - Interview 20 (C6-A2)

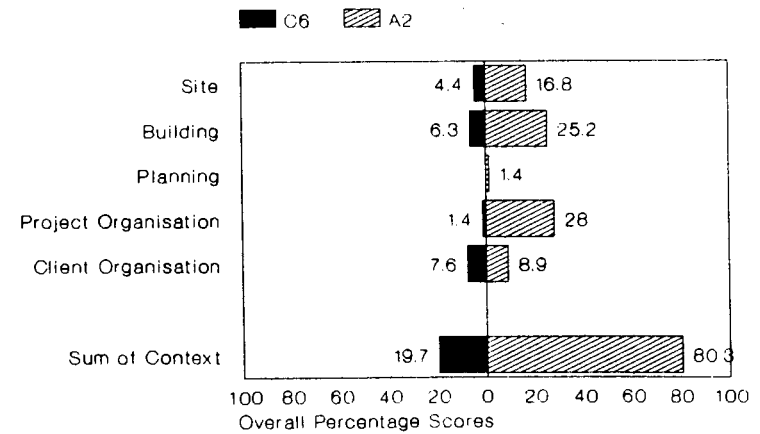
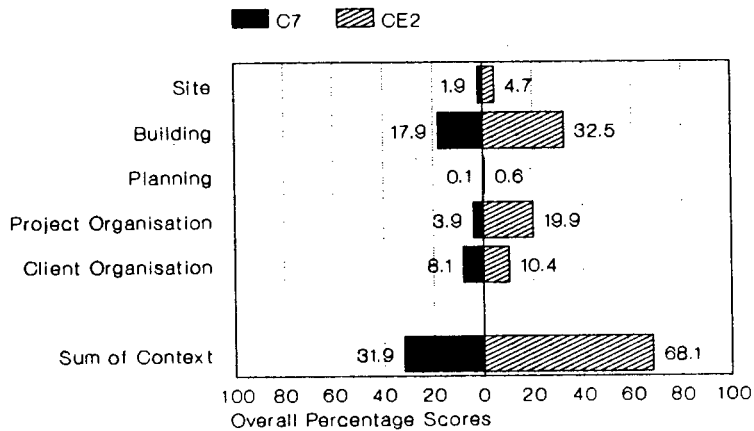


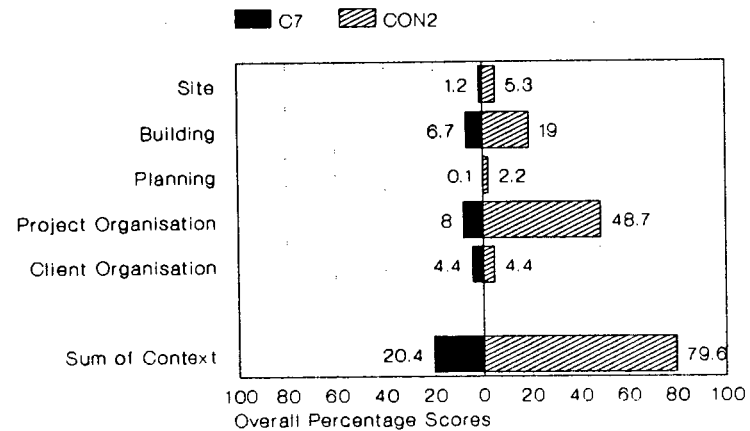
Figure A5.7

Sentence Context Profiles - Case Study (7)

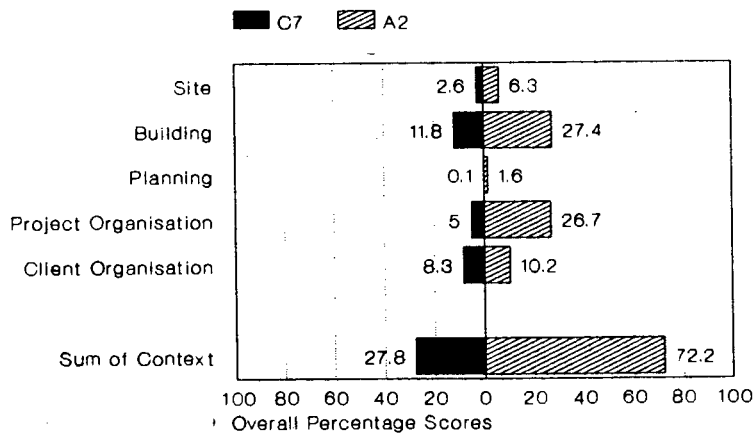
Context Codes - Interview 25 (C7-CE2)



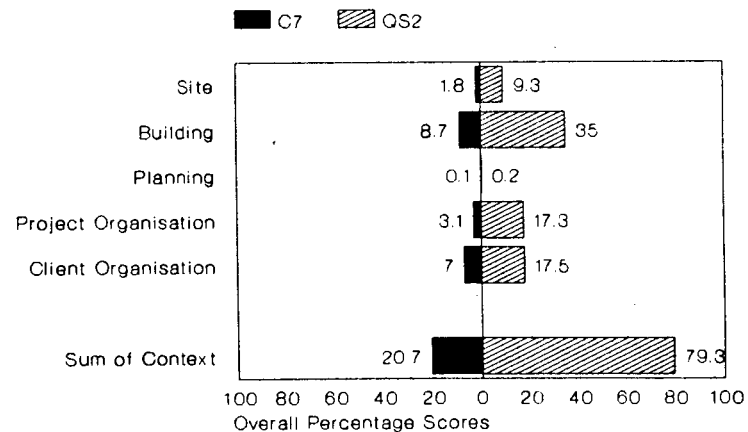
Context Codes - Interview 30 (C7-CON2)



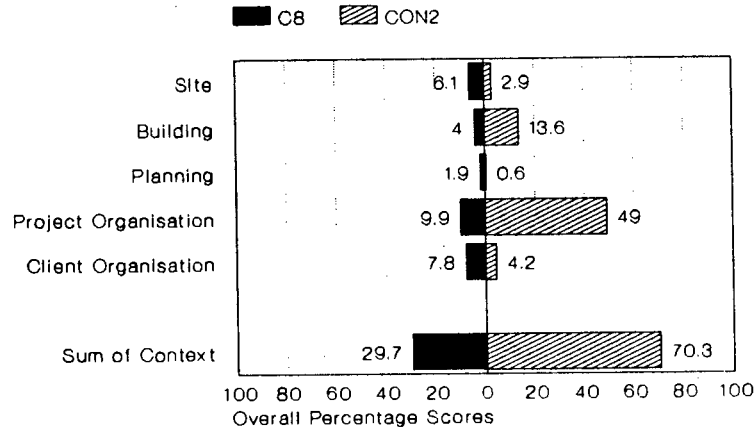
Context Codes - Interview 19 (C7-A2)



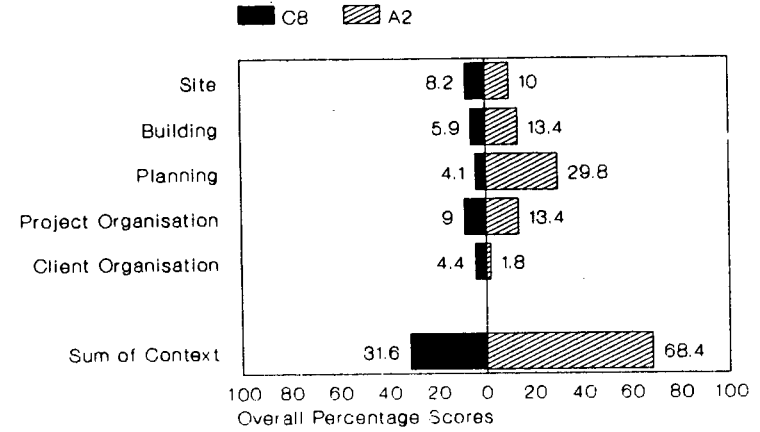
Context Codes - Interview 24 (C7-QS2)



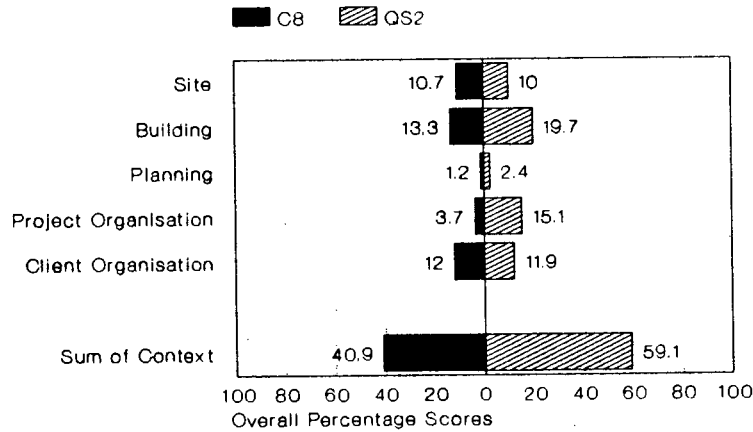
Context Codes - Interview 29 (C8-CON2)



Context Codes - Interview 18 (C8-A2)



Context Codes - Interview 23 (C8-QS2)



Context Codes - Interview 28 (C8-CE2)

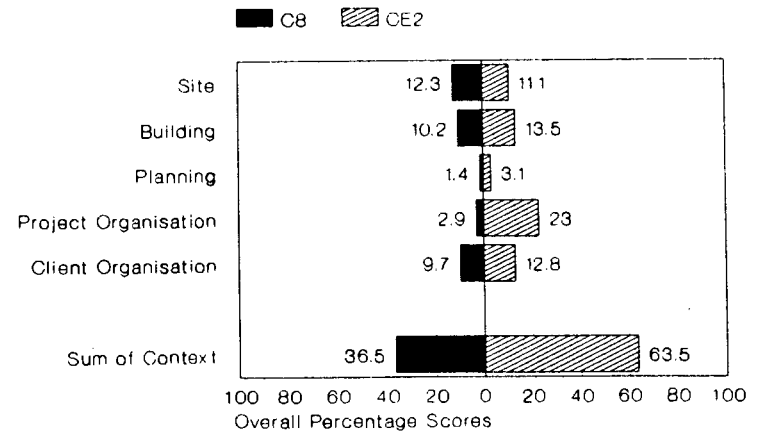
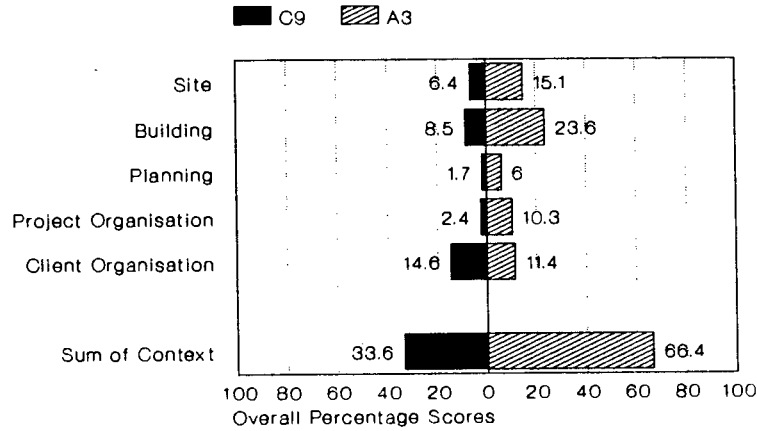


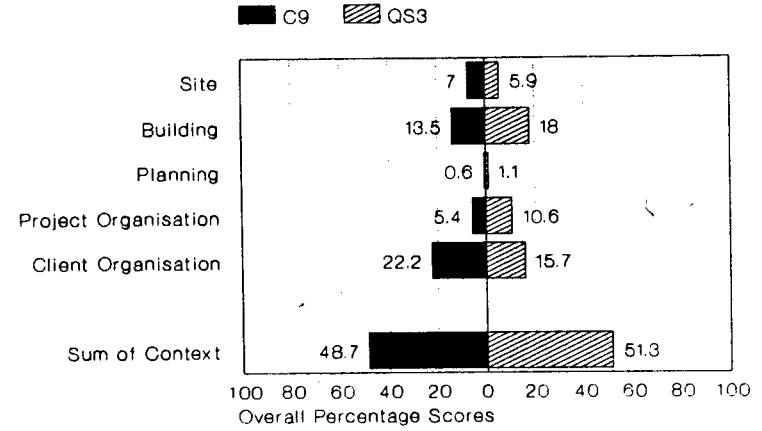
Figure A5.9

Sentence Context Profiles - Case Study (9)

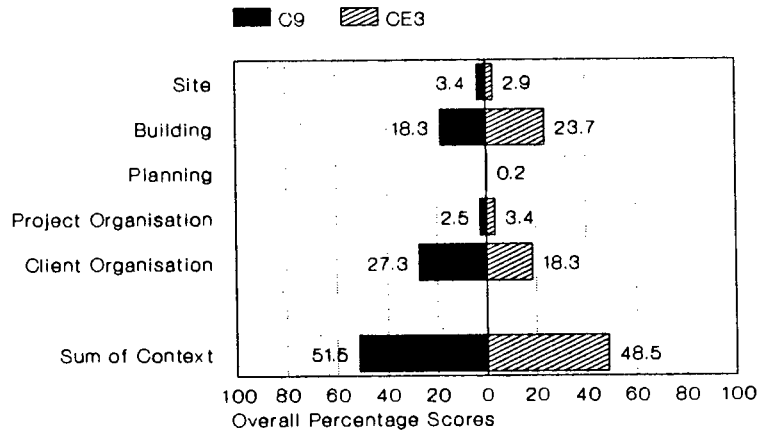
Context Codes - Interview 33 (C9-A3)



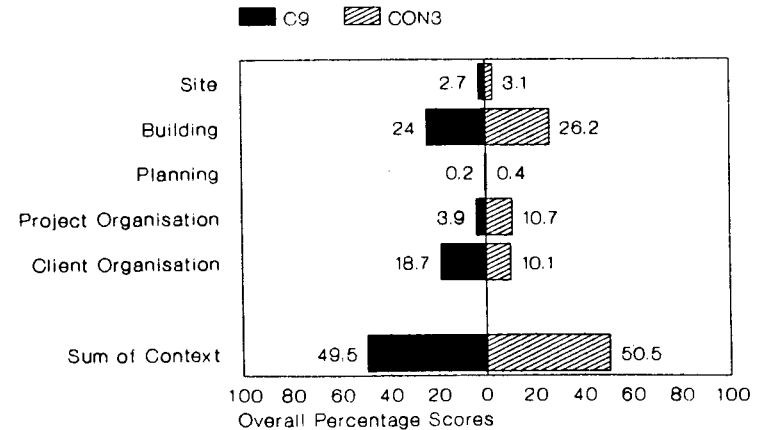
Context Codes - Interview 34 (C9-QS3)



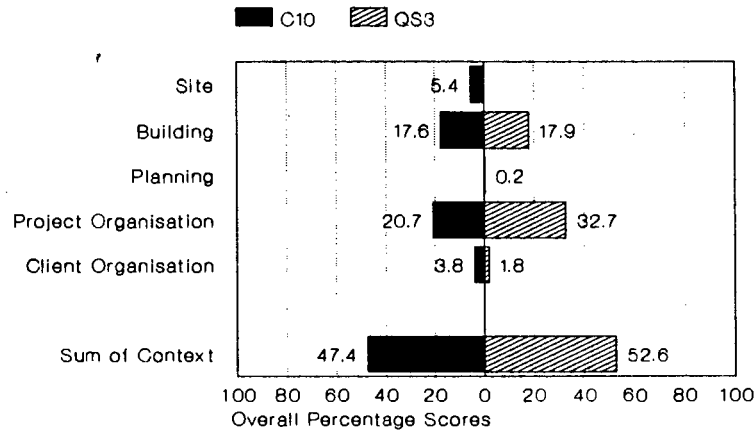
Context Codes - Interview 35 (C9-CE3)



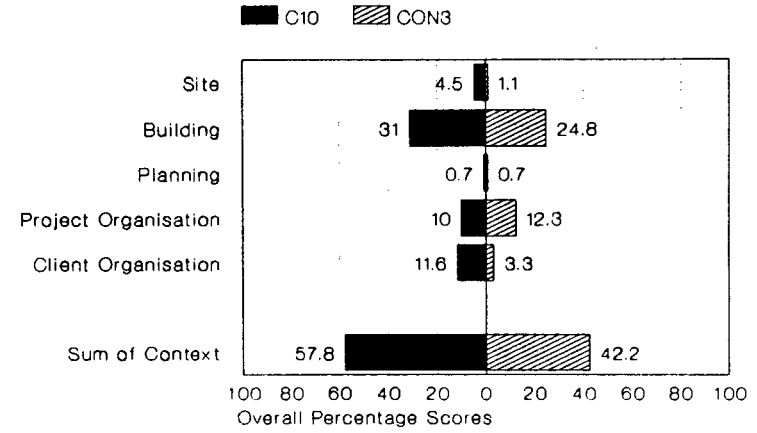
Context Codes - Interview 36 (C9-CON3)



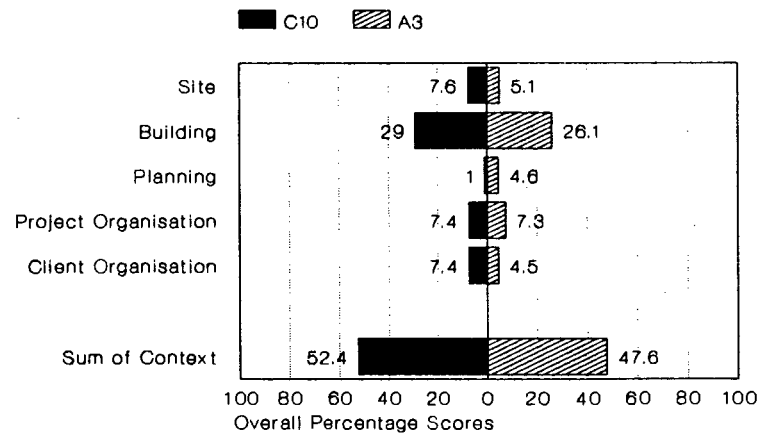
Context Codes - Interview 37 (C10-QS3)



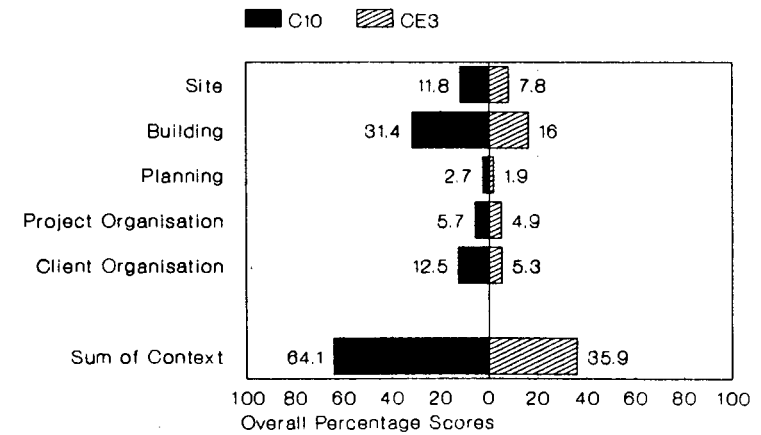
Context Codes - Interview 38 (C10-CON3)



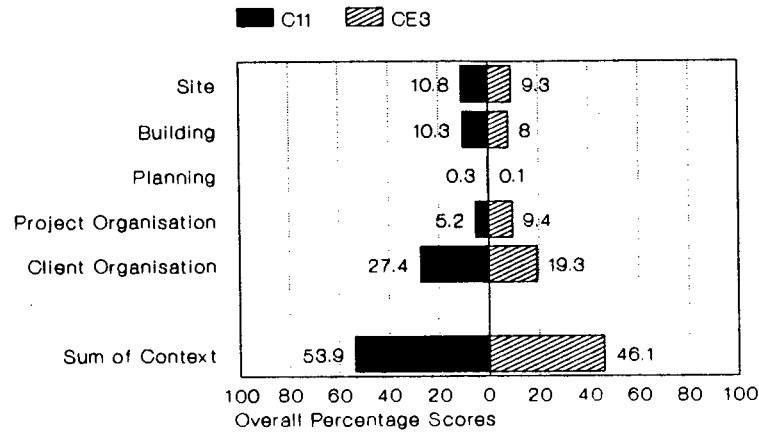
Context Codes - Interview 39 (C10-A3)



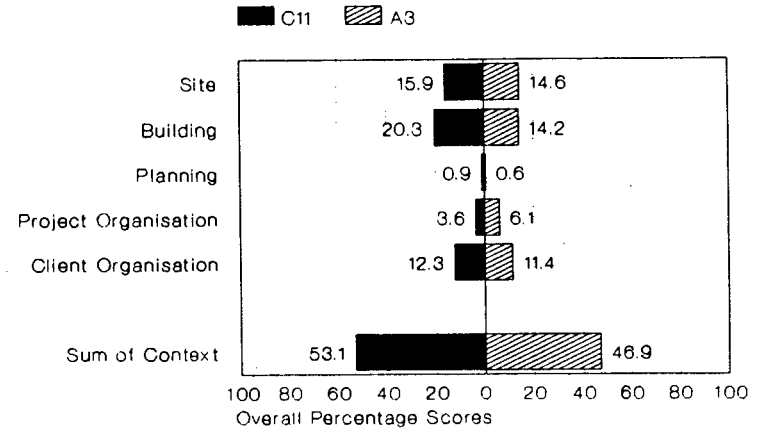
Context Codes - Interview 40 (C10-CE3)



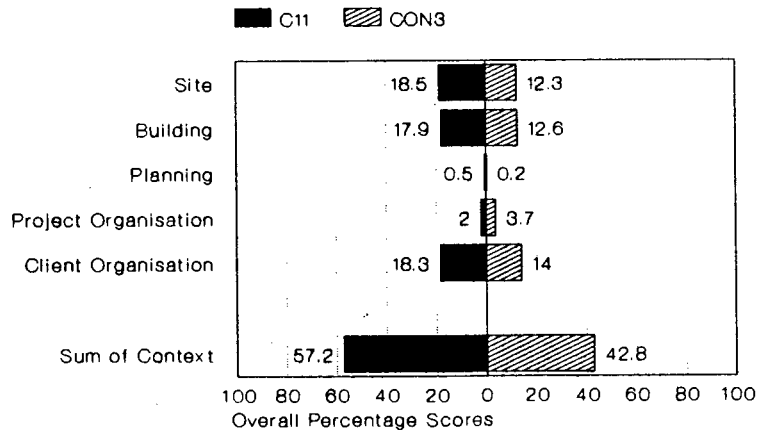
Context Codes - Interview 41 (C11-CE3)



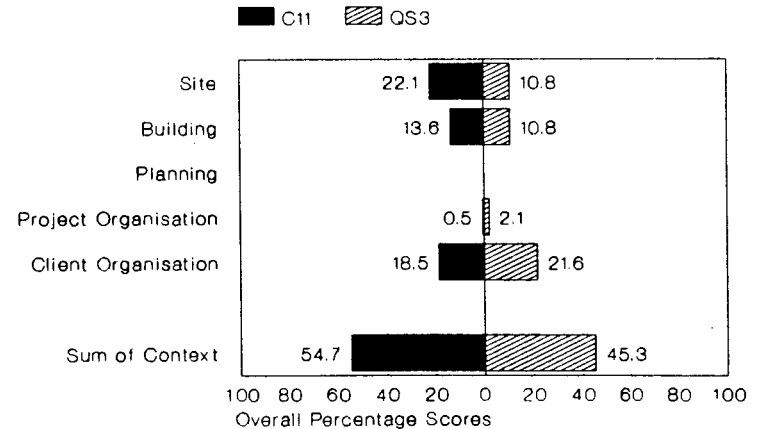
Context Codes - Interview 42 (C11-A3)



Context Codes - Interview 43 (C11-CON3)



Context Codes - Interview 44 (C11-QS3)



Average Context Codes - Case Study (1)

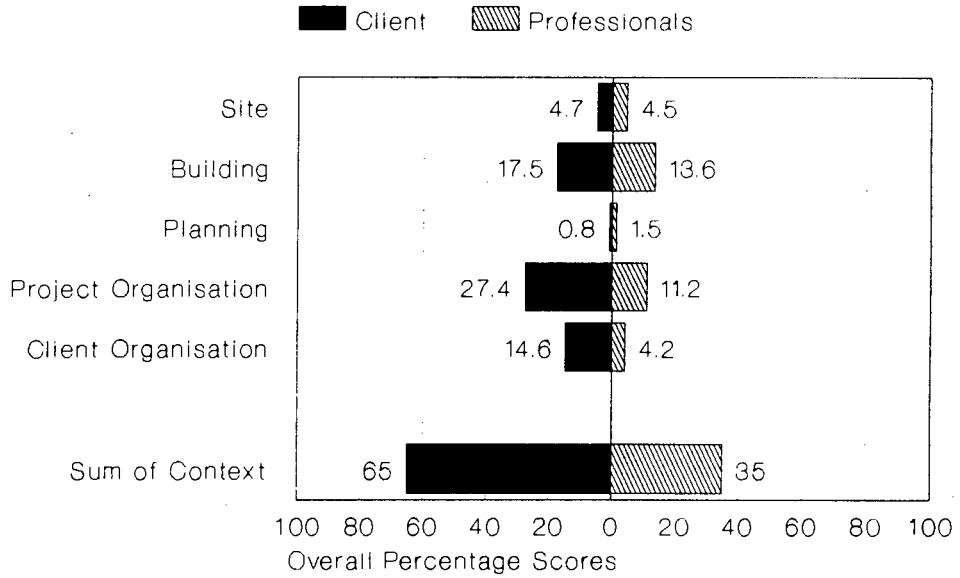


Figure A5.12 Sentence Context Average Profiles - Case Study (1)

Average Context Codes - Case Study (2)

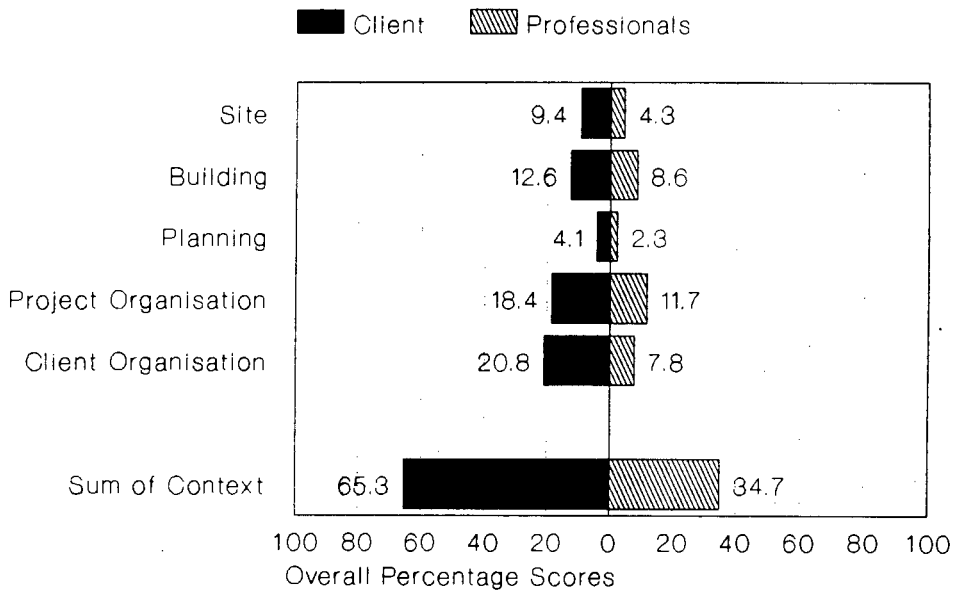


Figure A5.13 Sentence Context Average Profiles - Case Study (2)

Average Context Codes - Case Study (3)

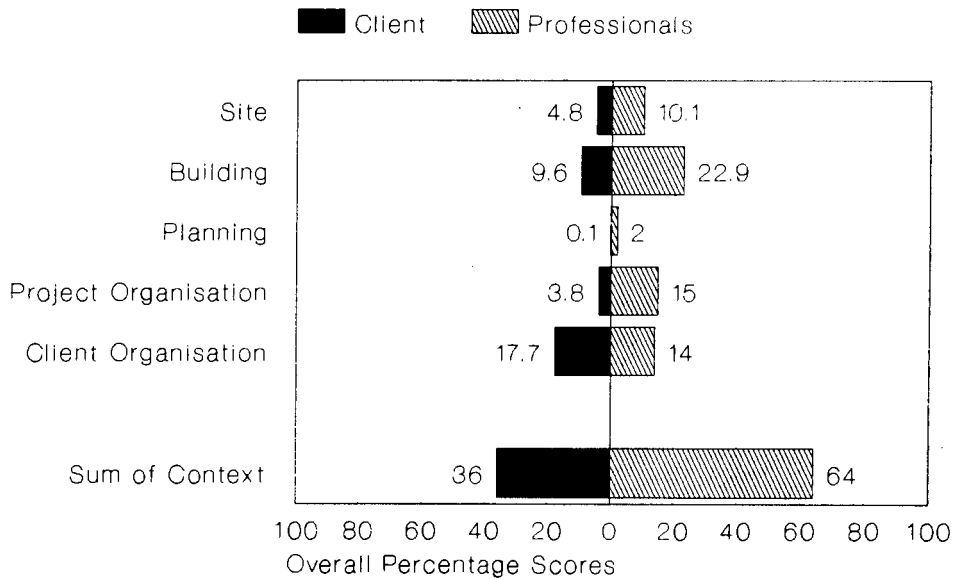


Figure A5.14 Sentence Context Average Profiles - Case Study (3)

Average Context Codes - Case Study (4)

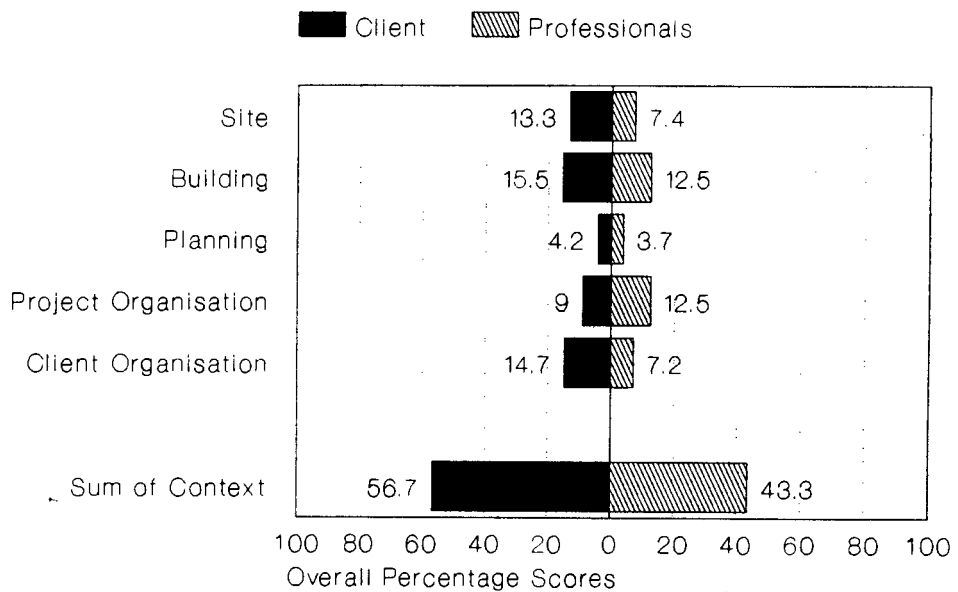


Figure A5.15 Sentence Context Average Profiles - Case Study (4)

Average Context Codes - Case Study (5)

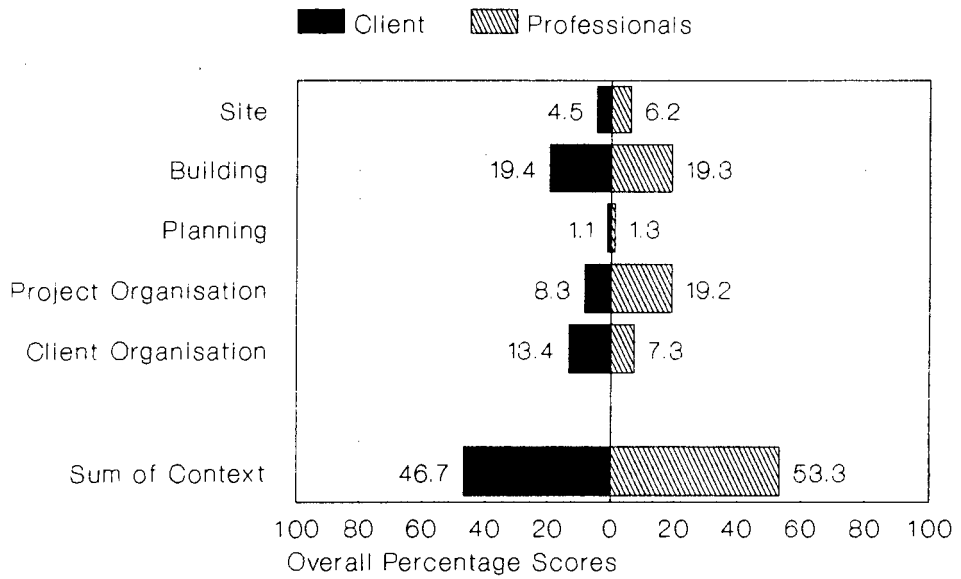


Figure A5.16 Sentence Context Average Profiles - Case Study (5)

Average Context Codes - Case Study (6)

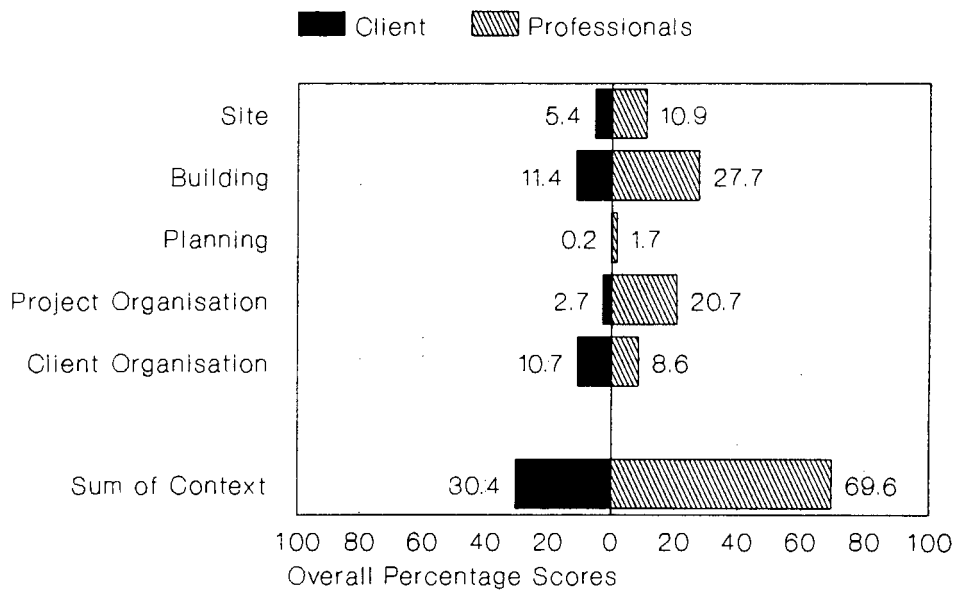


Figure A5.17 Sentence Context Average Profiles - Case Study (6)

Average Context Codes - Case Study (7)

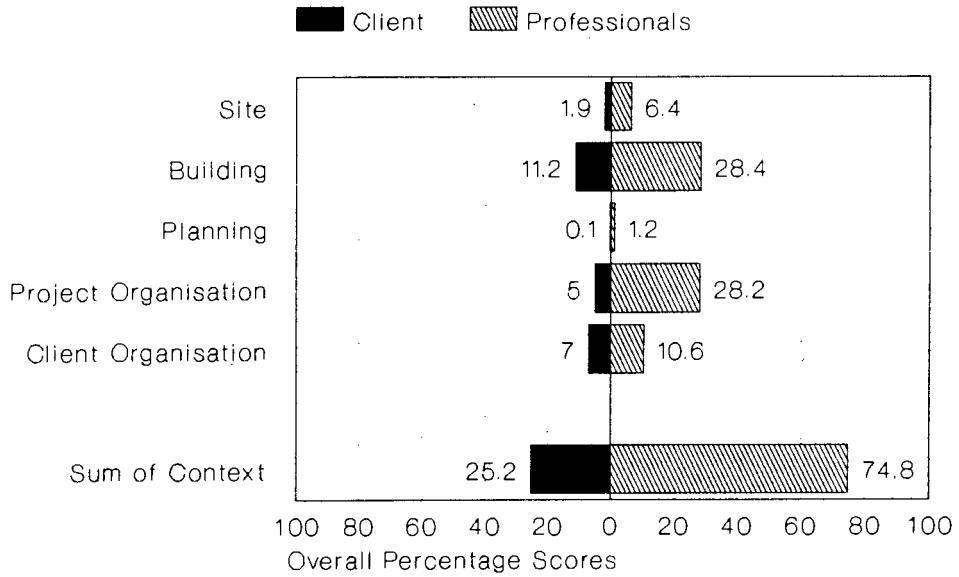


Figure A5.18 Sentence Context Average Profiles - Case Study (7)

Average Context Codes - Case Study (8)



Figure A5.19 Sentence Context Average Profiles - Case Study (8)

Average Context Codes - Case Study (9)

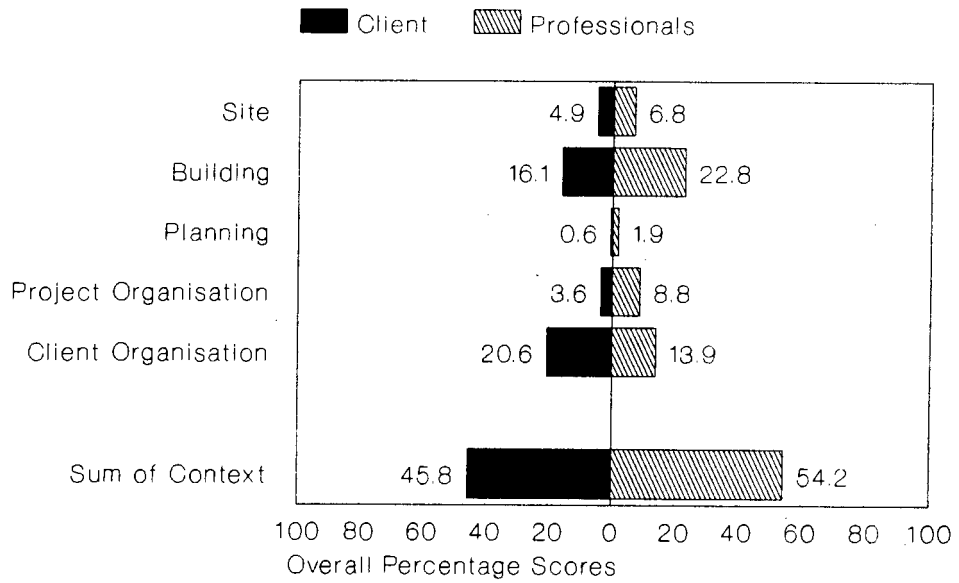


Figure A5.20 Sentence Context Average Profiles - Case Study (9)

Average Context Codes - Case Study (10)

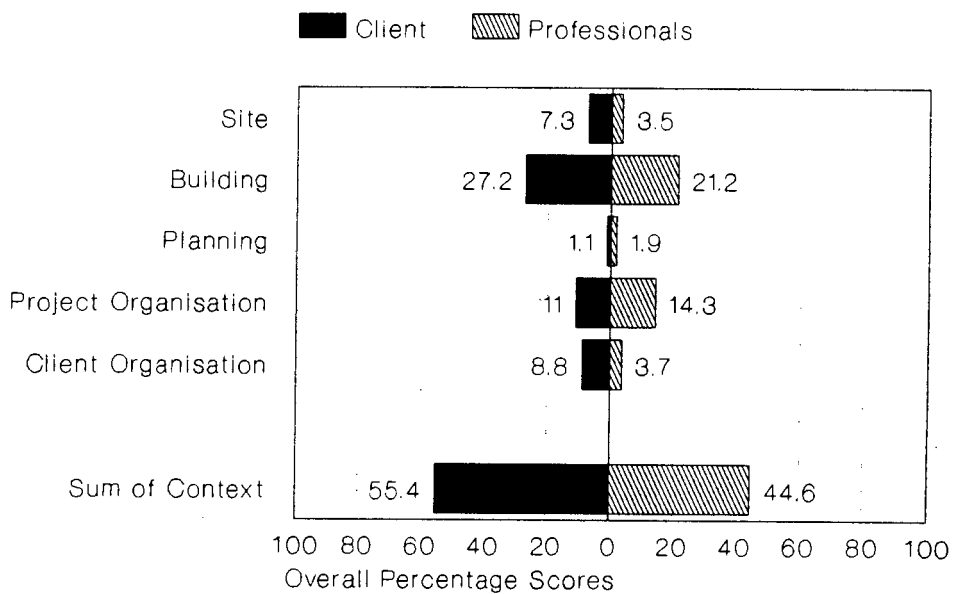


Figure A5.21 Sentence Context Average Profiles - Case Study (10)

Average Context Codes - Case Study (11)

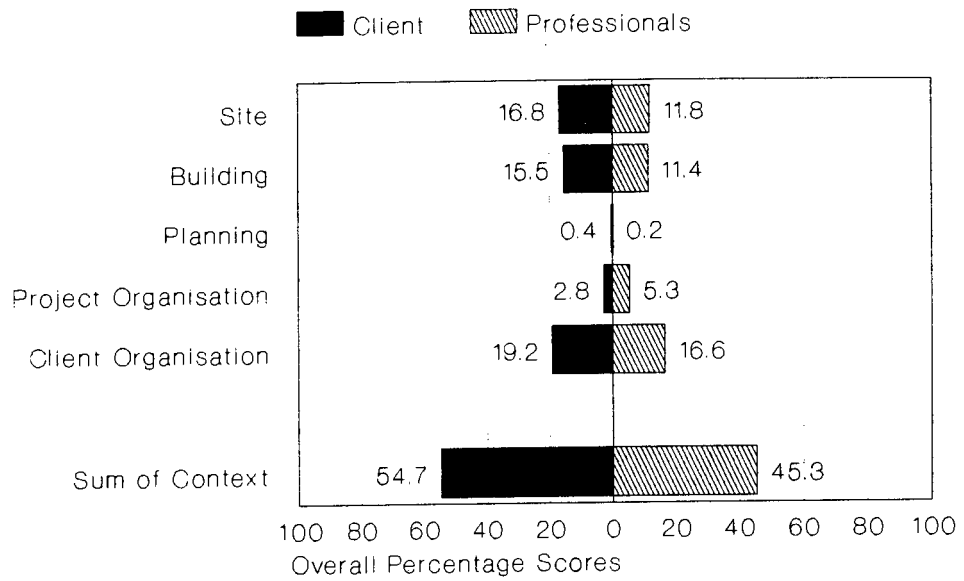
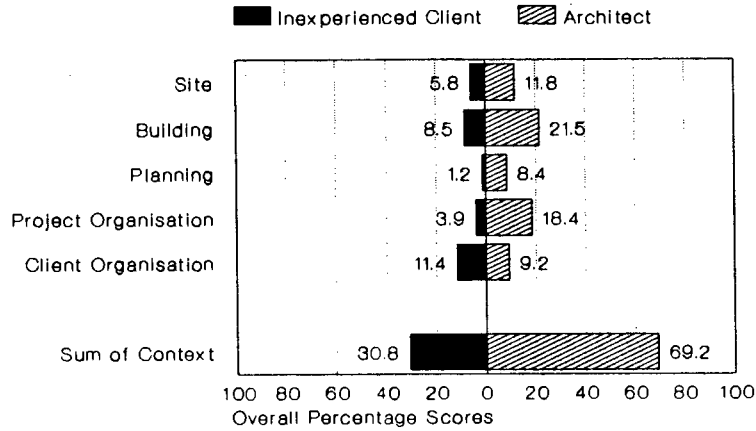
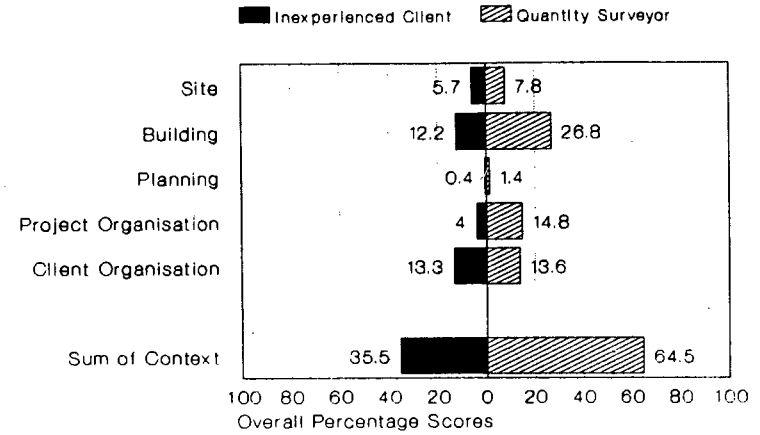


Figure A5.22 Sentence Context Average Profiles - Case Study (11)

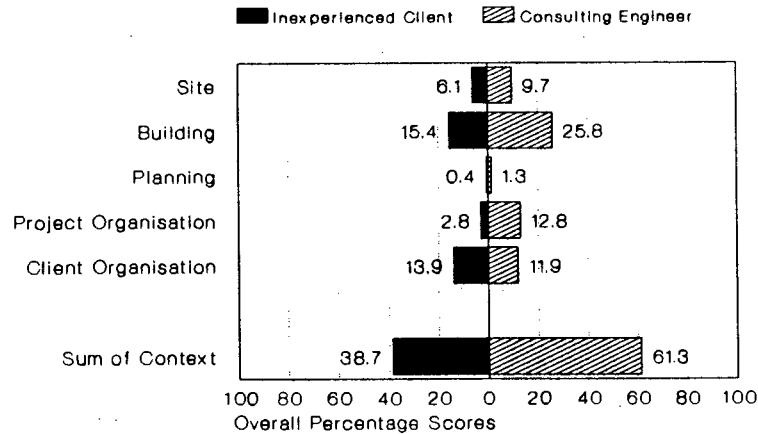
Average Context Codes (Inexp C-A)



Average Context Codes (Inexp C-QS)



Average Context Codes (Inexp C-CE)



Average Context Codes (Inexp C-CON)

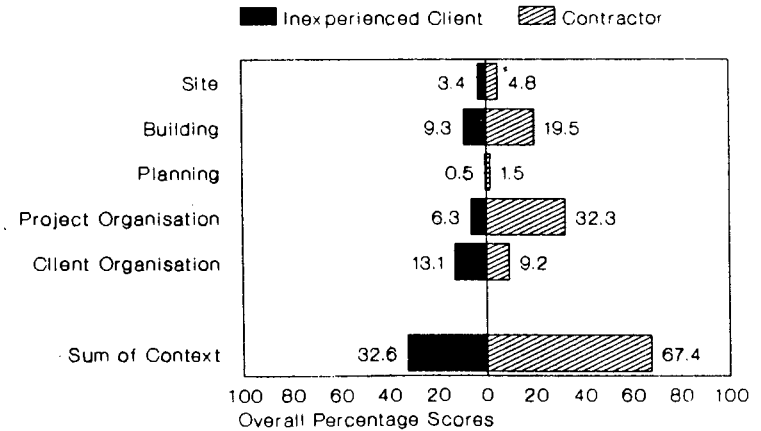
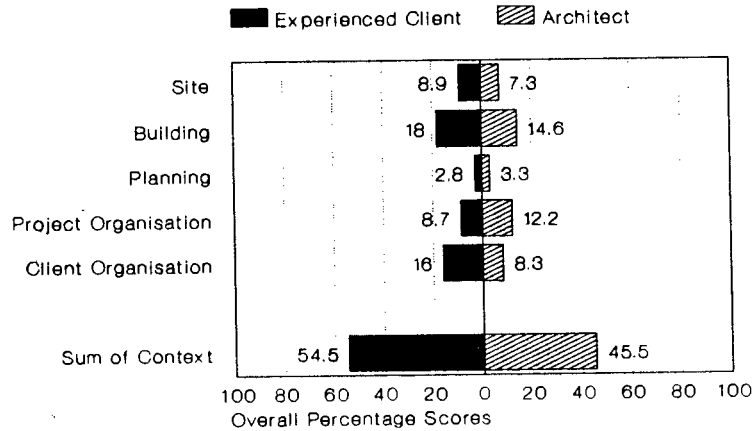


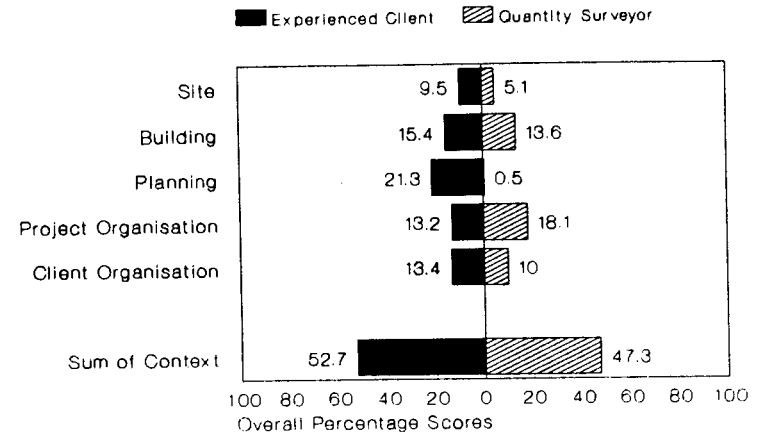
Figure A5.24

Sentence Context Average Profiles - Experienced Clients

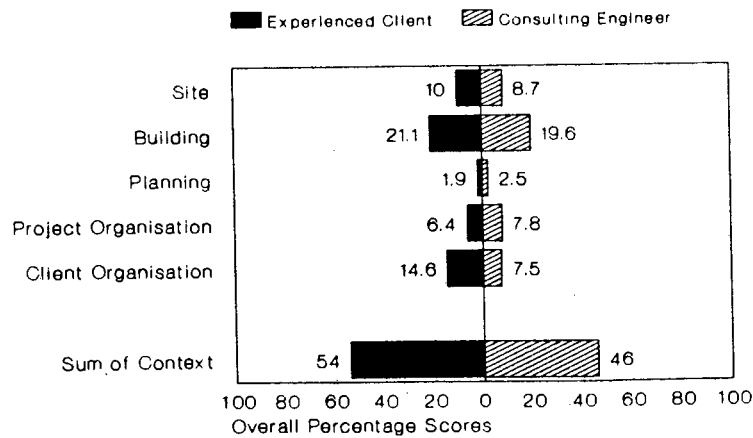
Average Context Codes (Exp C-A)



Average Context Codes (Exp C-QS)



Average Context Codes (Exp C-CE)



Average Context Codes (Exp C-CON)

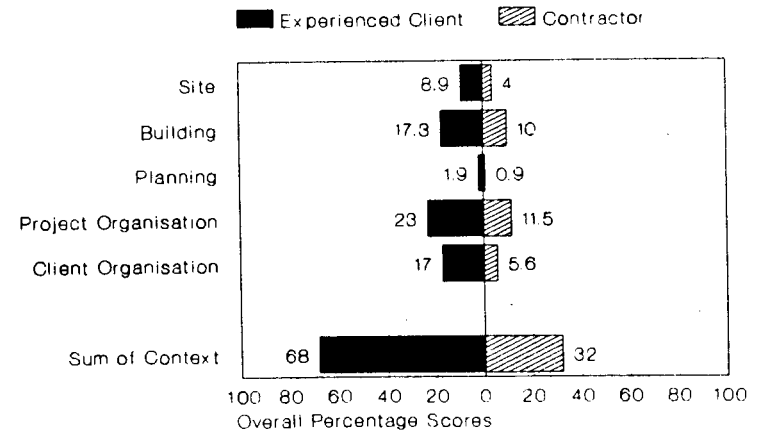
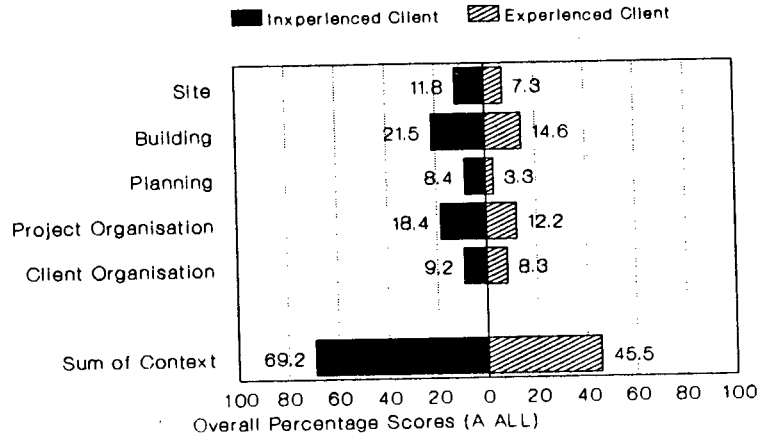
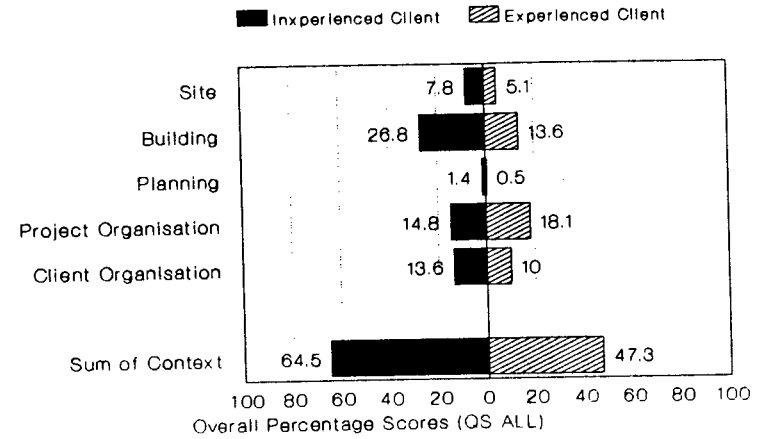


Figure A5.25

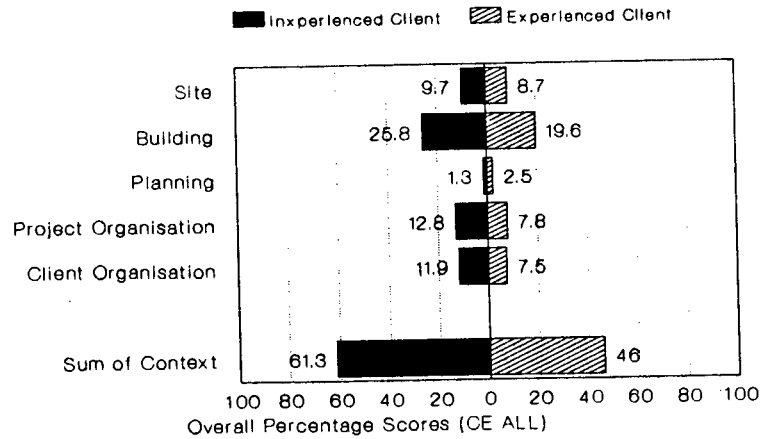
Average Context Codes (Architect)



Average Context Codes (Quant Surveyor)



Average Context Codes (Consult Engineer)



Average Context Codes (Contractor)

