THE ROLE OF CUE INTERCORRELATIONS IN THE JUDGEMENT OF STUDENT INTEREST

ELKANAH OLUMIDE AIYEWALEHINMI

BSc. Construction, Dip. Product Res & Dev., MSc. Eng. Structures, PhD

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Education, University of Technology, Sydney 2004.

Faculty of Education University of Technology, Sydney 2004

CONTENTS

TABLES

FIGURES

ABSTRACT

This thesis seeks to broaden our understanding of how students combine and use information to make a judgement about a subject in which they may be interested. A review and assessment of previous studies is presented, including a discussion of Brunswik's single lens model. A simple idiographic analysis focusing on a person's behaviour across a large number of situations is presented. The emphasis is on the repeated sampling of a person across many situations. The situations in this study contain profiles or collections of information that involve educational descriptions. The profile is in the form of some ratings (or a set of cues) that describe a subject. The findings support earlier studies, which reported individual variation in perceptions of interest and differences in the ability to make accurate judgement of interest.

The purpose of this study was to (1) investigate how students use available information to make a judgement in a matter of educational interest; (2) how they perceive the world when it is organised in a particular way; and (3) how students construct their own reality and combine information to judge their own reality.

The research question was:

Does increasing the correlation between the items of information impact upon the nature of judgements made by people in terms of: (a) the correlation between each item of information and judgement or (b) the multiple correlation between all items and judgement?

In the past, interest was regarded as an undifferentiated motivational factor to learning and achievement, thus limiting the scope of the study of interest. This study, however, focuses on how students take into account the relationship between different factors when determining their level of interest in a subject they may be interested in studying. In this context, the ability of students to handle information effectively may positively affect the quality of their judgements in regard to their interest in the subject they are considering studying.

The research comprised four separate studies. Participants were university students from three different universities, the University of Technology Sydney, the University of Lagos and Obafemi Awolowo University Ile-Ife. Six different cues were used. Participants were given a booklet comprising 75 judgement profiles.

These profiles contained six different cues or informational details. Participants were asked, " How interested would you be in taking a subject that has been described in this way?"

Participants were also asked to study the cues in the profile and judge their own interest on a scale of 0 (no interest) to 9 (high interest) based on the information described in the profile. Profiles (N=15) were repeated to determine the reliability or consistency of judgement for each participant. Both multiple correlations and cue utilities based on Brunswik's single lens model were computed. In each study, the four most reliable students based on test-retest reliability, were chosen for further analysis. The cues varied in intercorrelation from 0.0, 0.2, 0.5 and 0.8.

Generally the results showed that participants were different in terms of their judgments and also varied in their perceptions of the situation. There was a plethora of idiosyncratic responses to the various profiles and cues. This individual variation was consistent even across the four content areas.

Overall, the results of the four studies were not substantially different from each other. It shows that policy capturing involves not only attaining some useful measure of cue importance through the procedure of multiple regression but also gaining some knowledge of how cue values are functionally related to judgements. The primary interest is on nonlinear relationships which are additive in nature and addressed the issue of the cue-judgement relationships.

The overall depiction showed that multiple correlation and multicollinearity varied from one case study to another. However, the overall results tended to confirm the importance of individual variation in perceptions relating to judgement of interest in a subject as earlier and widely reported in the interest literature. More importantly this study continues to highlight the large individual difference in human judgement and perception of the world in determining whether educational interest or some other factor that may influence the ways in which components of the educational world are intercorrelated.

These findings tended to support earlier reports that individuals differ in their ways of making a judgement (Parkin 1993, Armelius & Armelius 1976). Indeed, the result of the study confirmed previous reports on the significant differences that exist in individual perceptions of interest.

Taken together, the results of this study support the view that judgement analysis may function as a very important aid to individual student learning and performance on the judgment task. Significantly, the outcome of these four studies, show how students have combined and used information to make a judgement in a subject including how they have constructed their own world of reality.

CHAPTER 1

INTRODUCTION

This thesis concerns the study of cue intercorrelations in a person's judgements of interest. It has not been clear how people combine different forms of related or unrelated information to make a judgement or decision about their interest. The fundamental problem has been whether a person's judgement is derived from the nature of the given information, the structure of that information or some interaction of both these factors.

The purpose of this program of research is to show how people make use of available information to make a judgement in the context of educational interest. It seeks to understand how students use, consciously or unconsciously, information to make a judgement or decision about a subject. The following section provides some background and introduces the concept of interest, which is the key context for the research.

Background to the study

At least from the time of the nineteenth century educator Herbart (reprinted 1965) - and especially since the work of Dewey - there has been attention on interest as a key factor in learning. Dewey (1913) argued that interest should be seen as an interactive process between an individual and the environment. Interest was viewed as a major motivating force for those who look at students' behaviours in an attempt to determine whether they will achieve their goals or not. Of course, interest has been described in many different ways: as a habitual tendency, a motivation, a belief, as a trait, as a component of personality or in terms of text characteristics (Renninger & Wozniak, 1985).

In the educational context, interest has been theorised as a useful concept, especially with respect to a person's motivation for learning (Renninger, Hidi, & Krapp, 1992) and for one's personal relevance for participating in education (Schank, 1979). For example, Alexander (2003) reported that one's knowledge of a field; one's interest and the cognitive strategies used were all related to learning within a particular domain.

General reviews of the literature (Krapp & Prenzel, 1992) indicated that educational achievement and satisfaction could be seen as largely the results of the student's ability to make judgements of his or her interest and right decisions about those interests. The development and realisation of interest was perceived as an ongoing interaction of persons and their environments.

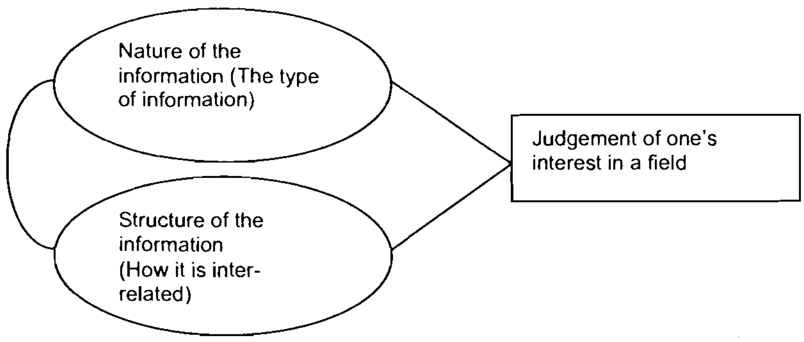
Renninger, Hidi and Krapp (1992) described two components of interests as individual and situational. In addition, they indicated that there are two ways of investigating interests. One is to concentrate on interestingness in a situation and how that influences learning performance. The other is to consider longstanding personal preferences and look at their contribution to learning. They demonstrated that individual interest involves stored knowledge and values, which lead to attitudes that the individual might or might not be consciously aware of having. Although interest has been hypothesised as playing a powerful role in learning and development, a key question is how to determine what makes something interesting.

This thesis concentrates largely but not exclusively on the interestingness in a situation. Understanding how students combine and use information to react to a subject may prove to be one of the more effective ways to improve instruction. This study investigates how students use the relationship or correlation between available information to make a judgement in a subject they are studying. The field of human educational interest was chosen because it is relevant to education and learning but also because it is a non-threatening domain in which to conduct such judgements.

A framework for the study of a person's judgement of interest

Figure 1.1 describes a tentative and content-free framework for the judgement of one's interest. It links judgement with information characteristics and factors inherent in the information. It focuses on whether a person's judgement is derived from: (a) the characteristic way that the given information is presented; or (b) the structure of the information (how it is inter-related); or, (c) any interaction effect.

Figure 1.1 A framework for the study of a person's judgement of interest



The model shows how people might perceive interest, construct their own reality and interpret information after it has been presented in a particular way. As can be seen from the figure, the model is concerned with the application of judgement analysis specifically focusing on the issue relating to how people use information to make a judgement of their interest in an educational context.

The program of research outlined in this thesis follows this model. It will focus on the structure of the information. Specifically, it considers how people take into account the relationship between different factors when determining their level of interest in a domain. The study will adopt a statistical analysis of judgements by looking at the effects of varying levels of intercorrelations between information. It will then determine whether the extent of intercorrelation between information has any effect on how people make judgements about their educational interest in an academic subject area.

The available information for deciding about a subject can vary in many ways. Indeed, there will be interplay between a range of both individual and situational factors. Some of these factors are summarised briefly in Table 1.1 and will be used to provide the content for this program of research.

Table 1.1 Some potential factors influencing educational interest

Investigators	Individual, situational and trait factors
Athanasou & Aiyewalehinmi (2001)	• The challenge in the subject • The fascination or stimulation of the subject • The quality of teaching in the subject • The usefulness of the text • The learning facilities for the subject • The extent to which theory and practice are related
Athanasou (1994, 1999)	• The easiness of the subject • The importance of the subject • The quality of teaching in the subject • The ability in the subject • The time spent studying the subject • The time spent on projects and assignments
Holland (1973)	• Realistic interest • Investigative interest • Artistic interest • Social interest • Enterprising interest • Conventional interest

Statement of the problem

Researchers working in the area of interests have noted that the environment can stimulate curiosity and eventually lead to long-term interest in a domain but they have not yet sought to explain how people use the facts, ideas and information available to them (Ainley, 1998). Most explanations have focused on explaining choice and Restle (1961), for example, thought that a decision-maker matched each case with his/her ideal view, while Tversky (1972) focused on the elimination of particular aspects. In most cases, it appears that each individual will be different in the way he or she uses the presented information to make their judgement or decision about their personal interest in a domain.

This research focuses not so much on the contents of the choice but on how people use available information to make a judgement of interest. The study will highlight the dynamic of interests when the intercorrelation between information is systematically varied. At this present time, we do not know how people combine information to make a judgement of interest in a subject. The study will examine just how does a person take into account the relationship between different factors when determining his or her level of interest. It focuses upon the following question:

- Does increasing the correlation between the items of information impact upon the nature of judgements made by people in terms of: (a) the correlation between each item of information and the judgement; or (b) the multiple correlation between all items and the judgement?

The study will attempt specifically to investigate and analyse individual judgements when six information factors involved have the same artificially varied cue intercorrelations from 0.0 through to 0.8. It will seek to determine how increasing the multicollinearity will affect the multiple correlation between the six information cues and a resulting judgement. This study will build upon the results of previous studies in the area of social judgement analysis (especially lens model analysis and multiple-cue probability) learning to further explore and examine the above research questions. These aspects are described in some detail in the following chapter. Underlying the research in this thesis is the lens model approach of

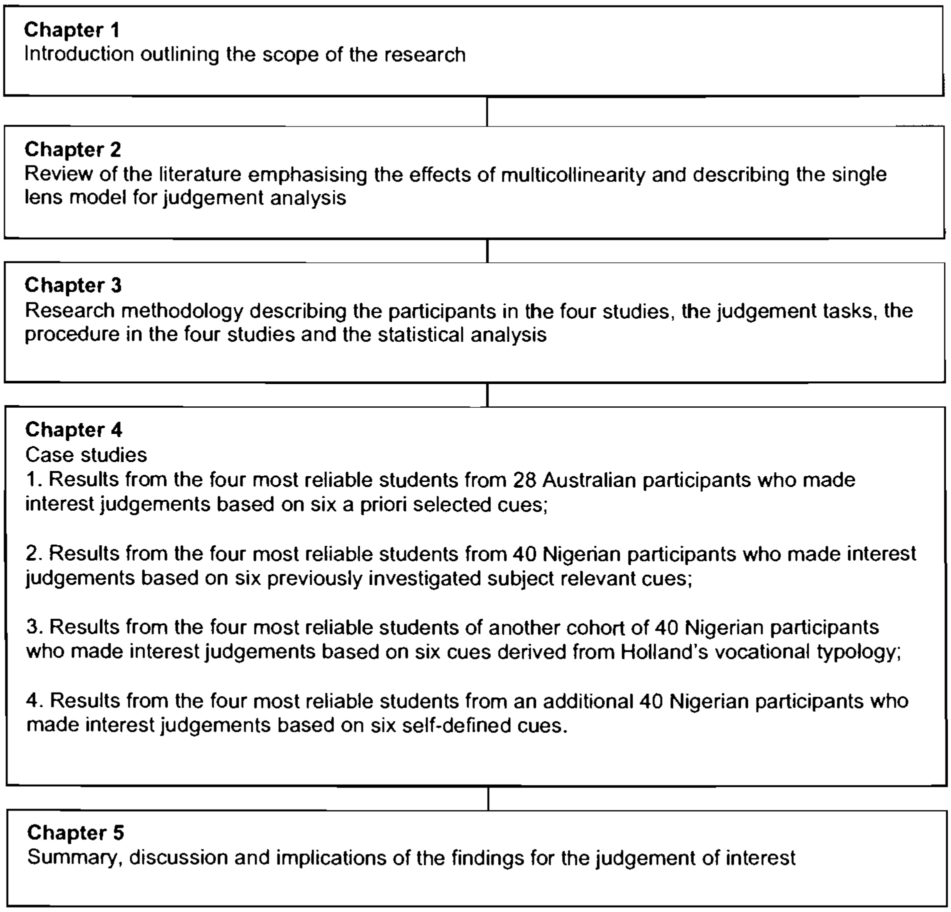
Brunswik (1952, 1955) who advocated studying individual behaviour across situations and focusing on behaviour that was situated in the natural task environment in order to better understand the nature of a person's adaptation to the environment.

Hammond (cited in E. A. Weaver, personal communication, 10th April 2000) thought the "study was directed toward a very important point". The results are relevant for the ways in which we perceive the world around us. This is especially the case when there is no readily available criterion for one's judgement. It may be the case that we react differently when cues or factors are unrelated or moderately related or highly related. Although the focus of this thesis is on the topic of interest, the results have implications for the ways in which people perceive and learn under varying conditions of complexity.

Thesis outline

Figure 1.2 describes the structure of the thesis. Chapter 2 reviews appropriate literature relevant to the study and especially the single lens model that provides the conceptual framework for the investigation. Chapter 3 outlines the methodology adopted and describes various approaches used in the four separate studies that make up the research program. In these four separate studies, the information or cues were varied in order to see whether the increase in correlation had an effect across differing content. Chapter 4 presents the research results and focuses mainly on the presentation of results from the four most reliable participants. Each section of the chapter contains four case studies selected from 28-40 different participants in each study. The focus is on an analysis of the effects of correlations between information on multiple correlations. Chapter 5 draws together the conclusions from the study and indicates that the results have implications for the ways in which human judgements are made.

Figure 1.2 An outline of the thesis and its structure



CHAPTER 2

LITERATURE REVIEW

The previous chapter sought to introduce the topic of how people might consciously or unconsciously use information to make a judgement or decision about their interest in a subject. The literature reviewed in this chapter discusses the problems associated with how people combine and use information to make a judgement in a subject.

Several special issues are explored with respect to people using available information to make a judgement in a subject they may be interested in studying. The chapter also introduces policy capturing and the Brunswik lens model. Of particular interest is the single lens model, which is used to investigate students' judgements of interests in this study.

Judgement analysis

Judgement analysis as used in this research is concerned with those forms of decision-making that are involved in processing information to make a decision. It includes the manner in which information is processed and acquired; why information is sometimes taken as an object of inquiry; and the basic distinction between various process-tracing approaches used by people to describe the intellectual process to enable them to make judgements and decisions.

Parkin (1993) described judgement as a reasoned cognitive evaluation that precedes a decision. He saw it as a prior act of reasoning that contributes to complete knowledge of an actuality. He went further to say that individuals differ in their ways of making a judgement and that this, to some extent, may depend upon the relationship between the cues and a factor in a situation.

In the context of this study, it can be stated that judgement and decision-making are not treated in a paradigmatic fashion because there is no single, universally endorsed, overarching theoretical framework that researchers use to organise and guide their efforts. Rather, there are a number of schools of thought that identify different issues such as interest.

A historical survey of the judgement and decision-making literature shows that different groups of researchers have been motivated by different questions and different models of the decision making process. In short, one group of investigators took notice of the efforts of economists and statisticians into account when advising people about their decision-making (see Goldstein & Hogarth, 1997). The type of questions these groups were interested in, were, 'How do people decide on a course of action?' 'How do people choose what to do next especially in the face of uncertainty?'

'Do people make decisions rationally? 'If not, by what psychological process do people make decisions and can decision-making be improved?' Other groups of researchers (see Goldstein & Hogarth, 1997) were motivated by other decision approaches in terms of perspective, advantages and limitation, for example how the visual system relies on fallible cues about or around the external environment to determine distance.

In *Clinical versus Statistical Prediction,* Meehl (1954) focused on judgement and decision-making. This book contributed to understanding the way people combine information from multiple sources to produce numerical judgements (e.g., diagnoses). Hammond (1955) demonstrated that Brunswikian principles of perceptions are applicable to the study of clinical judgement. Meehl (1954) and Hammond (1955) highlighted the importance of clinical judgement in the domain of judgement analysis but the integration of complete judgment analysis really lay in the work of Egon Brunswik. Some features of Brunswik's ideas are summarised below.

Brunswik, (1952, 1956; Hammond, 1966a, 1966b) posited that an object in the environment (i.e., a distal stimulus) stimulated a person's sensory organs to produce multiple cues (i.e., a proximal stimulus) to the object's identity and properties.

Researchers like Brunswik acknowledged perceptions to be a construction from an incomplete and unreliable collection of sensory cues. In the Brunswikian tradition, researchers tend to emphasise the accuracy of judgements as a function of learning in a task environment. In short, our ecology often demands the use of cues in order to adapt adequately to the environment.

Brunswik, among others, stressed that most people function in situations that are both uncertain and involve a multiplicity of cues. He stressed that judgement must in everyday circumstances be based on a wide range of indicants, which no single judge can control. In the study of preferential choice, researchers might examine people's responses to complex and uncertain sets of information.

This study emphasises matters of personal preference that have direct consequences for educators. Judgement analysis is a technique that can be used to identify and describe a person's judgement policies and in this study it will be used to capture policies from a student. This study focuses on using Brunswik's single lens model. It is the study of the judgements of a person in the absence of any ecological criterion. This concept of the Brunswikian single lens model is explored in some detail because as mentioned earlier, the single lens model in social judgement analysis theory constitutes a fundamental methodology for studying human judgement.

Single lens model

The single lens model of judgement analysis that is described in this section provides a basic methodology for studying human judgement. Beal, Gillis and Stewart (1978) described the single lens model and its applications in this fashion:

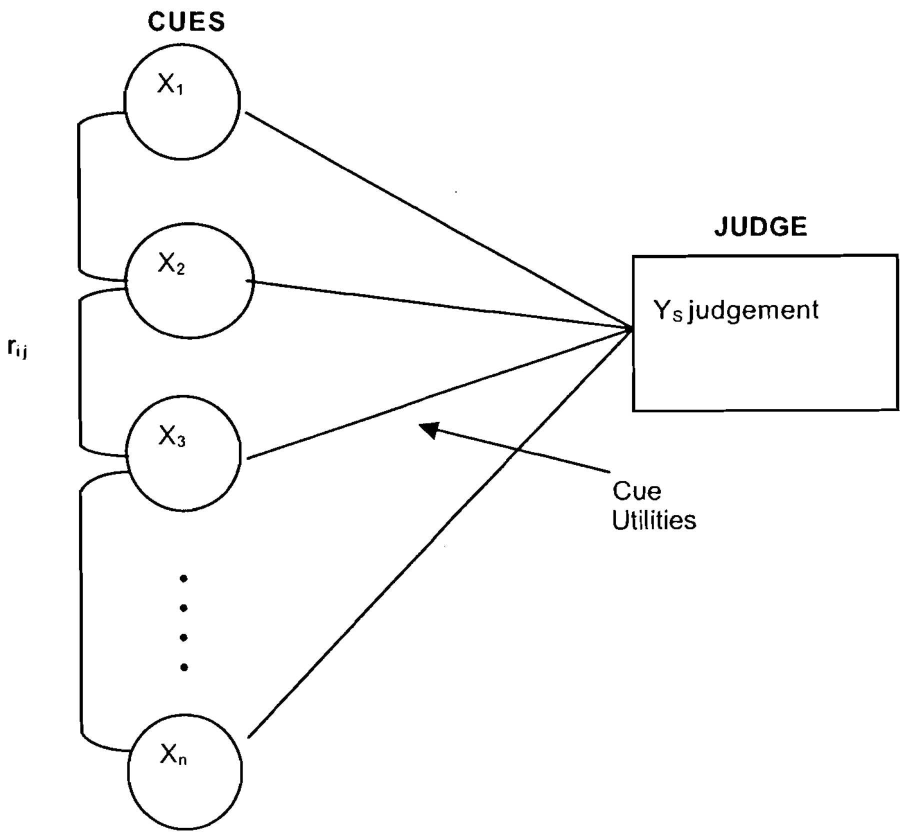
> The lens model as applied to the single system case involves making public the subtle inferential activities of the judge (the environmental system being largely unknown or unknowable). The focus of the paradigm here is on "capturing" the cognitive policy of the individual, that is, identifying the cues, functions and forms, and the weighting scheme that is being utilised by the judge (p.26).

Most studies have considered the double lens model in which there is some consideration of the criterion for judgement whereas the single lens model considers only the judgement process and makes no reference to information about the criteria for judgement.

Cooksey (1996) viewed the double lens model as depicting the complexities of the relationship between two interacting sub-systems, the environment or ecology and the cognitive processes of the judge. He indicated further that the double lens model is a robust representation for studying human judgement, that can be varied and extended in several ways without losing or distorting its essential concepts. In this context, it can be argued that through the use of the lens model, the scope of studying human judgement was greatly expanded.

Figure 2.1, shows the Brunswik single lens model depicting the complexities of the relationship between interacting sub-systems, the environment or ecology and the cognitive processes of the judge. The lens model as shown in Figure 2.1 can be seen as a robust representation for studying human judgement. It can be varied and extended in several ways without losing or distorting its essential concepts.

Figure 2.1 Single lens model for studying judgements



The single lens model design in Figure 2.1 is identical with the classical policy-capturing model, which is frequently used in applied judgement in the absence of any ecological criterion. Ecology in this sense is reflected only in the configuration of cues that confront the judge but there is no comparison to actual environmental outcomes. In other words, the cue intercorrelations are a subtle part of the task information presented to a decision maker.

In Figure 2.1 Y_S represents the predicted judgement, X_1 -X_n represent the value of cues. Y_s is the value predicted from the cues by means of a multiple-regression equation fitted to the cues. The intercorrelations among the various cues (intra-ecological correlations) are denoted as $r_{ij.}$ The single lens compares judgement with values for ecological measures and sets the stage for researchers to see how judges or subjects learn about the use of cues in the ecology.

According to the literature (see Cooksey, 1996) the researcher needs to have available a sample of profiles representing situations or cases for human judges to process. In this respect, the judgement to be rendered in each situation may be obtained using a variety of response modes and scales. Furthermore, in a single lens model there is no available objective or defensive distal criterion from within the task ecology by which a researcher can validate or verify the judgement made. That is, in the single lens model, task outcomes remain unknown. This can be regarded as a limitation of the single lens model as a research tool.

Brunswik (1952) argued that with respect to ecology, researchers should be able to examine the intercorrelations among various cues and the distributional characteristics of each cue (e.g., mean, standard deviation, range, skewness, kurtosis) and so on. Brunswik indicated that with the single lens model the researcher should gain information at the idiographic level. Brunswik's view was that it was the weight of each cue when forming a judgement that defined the judge's policy.

Policy capturing

The term 'policy' in the context of judgement and decision-making is used to describe the guide to action or the general rule for making decisions in some special occasions or cases. Occasionally, if the relationships between the research data and inferred policy are not reliable, the inferred policy may be described as probabilistic policy.

Research involving capturing of judgement policies has always been associated with the statistical process of multiple regression. Brunswik (1940) argued that statistical methodology provides a valuable understanding of both person and task system in the context of human perceptions. In fact this statement forms the fundamental basis of Brunswik's notion of the idiographic-statistical approach to psychology.

Cooksey (1996) demonstrated that social judgement theory methods maintain close contact with ecological circumstances by employing the principle of representative design (which focuses on how a researcher obtains the stimuli for judgement) and avoidable unwarranted over-generalisations from aggregation (e.g., averaging across judgements) through the use of idiographic statistical analysis. He outlined a basis for making comparisons between a person's judgement and perceptions. He went further to say that these methods have proved valuable in the analysis of individual judgement as well as group judgements.

The importance of Brunswik's idea of probabilistic functionalism (including this methodology of representative design) was its ability to provide a way to understand how a person should approach the analysis of data from within that person's perspective. When Brunswik proposed an idiographic–statistical approach, he was concerned about an experimental design, which required the use of statistical approaches or methods in order to accomplish the analysis of data arising from the design. He was also concerned with the uniqueness of each organism as they engaged in functional behaviour within the context of a particular ecology. Brunswik argued that for a representative sample of data in a situation within a particular ecology, each organism's behaviour should be individually examined and statistically tested before generalising behaviour trends.

Hammond, McClelland and Mumpower (1980) saw this idea of Brunswik's somewhat differently by demonstrating that the thrust of the idiographic–statistical approach is to force researchers to focus on establishing estimates for statistical parameters describing individual behaviour in a variety of situations. Hoffman (1960) in his study of paramorphic representation of clinical judgement, focused on the idiographic use of the linear and configural regression model to represent human judgement processes. These authors are not far from each other because they all have direct or common link with Brunswik's probability functionalism and Hammond's (1955) application of probability functionalism to the problem of clinical judgement.

Cooksey, Freebody, and Davidson (1986) found that models of human judgement could be viewed in terms of heuristic representations even if other models show a stronger empirical relationship to actual behaviour. Historically, Bottenberg and Christal (1961) applied policy capturing by using multiple regression equations to idiographically analyse judgement and also used policy clustering to analyse judgements having similar predictive policies.

Christal (1963) went further to employ the term judgement analysis to portray the collective use of policy capturing and policy clustering method. The use of policy capturing in the judgement domain in terms of education has increased through the work of Christal (1963), Cooksey (1988), Doherty, and Ullman (1980), Houston (1974), Wherry, Naylor, Wherry and Fallis (1965) and other researchers. According to these researchers, policy capturing and single system design (single lens models) employ the same methodology. Actually, Brunswik's concept of studying human judgement integrates these two divergent branches of judgement research.

Many studies of human judgement are basically designed as policy capturing or single system studies because of the methodological constraints that centre on the unavailability of an ecological criterion measure. The goal of policy capturing using multiple regression procedures is to produce a linear equation, which optimally weights each cue in terms of its predictive contribution to the judgement. The following equation represents the linear equation derived from the statistical indices, which arise out of this lens model conceptualisation and which gives rise to the lens model.

$$Y_S = b_0+b_1X_1+b_2X_2+b_3X_3+\ldots b_nX_n + e$$

Where all b are scaled in the original units of the judgement measurement scale.

Each b is defined *a partial regression slope* and the change in value of b indicates how much the judgment prediction will change. This can occur, for example if one unit increases the value of b in the equation under consideration and all values of other variables are held constant. The *e* in the equation represents an error or residual. That is, it represents the extent to which the model of the judge misses the actual value (Y_S). In this context, Brunswik constructed the real world outside the organism by focusing on a person's decisive principal constraints. This view found expression or representation in the single lens model.

Cue intercorrelations

Brunswik's (1955) notion of probabilistic functionalism has been used in multiple cue probability learning (see Hursch, Hammond and Hursch, 1964). Probability learning refers to a situation where a subject or learner has to predict events, which are correlated to stimuli. As noted earlier, cue intercorrelations are the relationships between items of information in a situation. They can be an important aspect of multiple-cue probability learning.

Smedslund (1955) and Summers (1962) pointed out that people tended to learn to use cues or information in a manner appropriate to their ecological situation. Hursch, Hammond and Hursch (1964) indicated how we utilise information from several cue variables in predicting the state or value of some criterion. They found that learning strategies were a function of cue characteristics. Schench and Naylor (1965) and Naylor and Clark (1968) also showed that achievement was more directly related to positively correlated cues than to negatively correlated cues of equal validity. These authors based their studies on an experiment with nine groups of ten subjects in which each participated in a 200 trial of multiple – cue-learning situation. They found that some subjects were able to achieve at an optimal level whereas others were unable to reach the optimal level.

Brehmer (1974) studied the effect of cue intercorrelations on interpersonal learning of probabilistic inference tasks. He reported on inference tasks that require a person to learn to make use of a set of cues to make judgements about the state of a criterion variable. Brehmer concentrated on the correlation between a set of cue values and criterion values rather than the social context of human learning. He conceded however that, human learning extends beyond feedback. He indicated, further, that human learning often takes place in a social context, where people obtain information about a task not from direct experience but from other persons who had that experience. This problem was identified in his experimental studies when participants were asked to learn the relationship between a set of cues and criterion variables from repeated observation of cue value and criterion values.

Armelius and Armelius (1974, 1975, 1976) carried out a program of research on the effect of cue-criterion correlations, cue intercorrelations and the sign of the cue intercorrelations on performance in suppressor variable tasks. They found that consistency was directly related to cue-criterion correlation and that the cue judgement beta weights were directly related to the magnitude of the cue intercorrelations. Armelius and Armelius (1974) attempted to separate the effects of cue-criterion correlations and the cue intercorrelations. They found that subject's performance was positively related to cue-criterion correlations and not cue intercorrelations. Nonetheless these authors agreed that it was not possible to make the general conclusion that cue intercorrelations had no effect on performance.

Armelius and Armelius (1975) also examined individual level of expected performance in a subject (an academic discipline). Their purpose was to find out what would be the expected level of performance if cue intercorrelations had no effect on performance and they used only cue-criterion correlations to determine cue validity. They found that some participants were able to reach an optimal level of performance whereas others were not. On average, the level of performance was higher than expected. There was no sign of a cue intercorrelation effect on performance and also the participants had utilised only cue- criterion correlations.

Dudycha, Dudycha and Schmitt (1974) went further to study the effect of cue redundancy in multiple cue probability learning. In this study these authors used three tasks with different levels of R^2 (multiple correlation squared) where the cue intercorrelations were varied while both cue-criterion correlations and total task predicability was constant. They discovered that task achievement was impaired by the cue intercorrelations at the highest level of R^2 but not at the other levels.

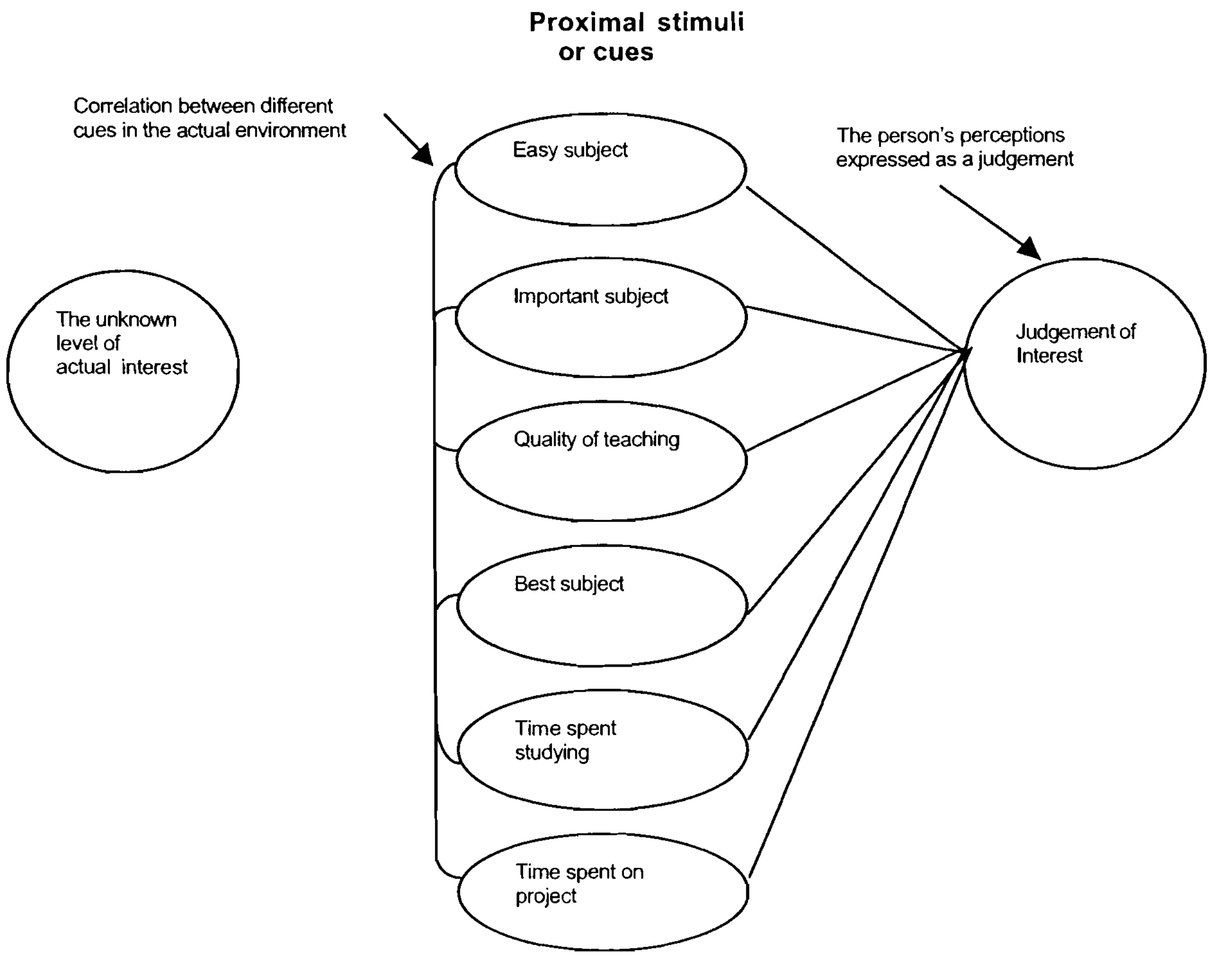
The significance of these studies is that they are all centred on cue intercorrelations and multiple cue probabilistic learning in the double lens model. However, these studies do not really tell us whether high or low cue intercorrelations will affect people in their judgements of interest in the context of a single lens model. Further research is needed to identify how people combine and use information including the effect that cue intercorrelations have on a judgement.

Proposed study

Figure 2.2, shows how the Brunswik single lens model might be employed in this study. In Figure 2.2 the cues are hypothesised *a priori* to form a tentative model of student interest in a hypothetical subject.

In Figure 2.2, six cues are depicted. For the sake of this example the cues are the extent to which a subject is easy to study, the extent to which a subject is important, the quality of teaching in a subject, the extent to which a subject is described as one's best subject, the amount of time spent studying and the time spent on projects. These six cues could then be presented to individual students who will then decide how interested they would be in a hypothetical subject that had been described in this way. In judgement analyses of the single lens model multiple scenarios of the six cues are presented.

Figure 2.2 Single lens model designs for use in this study



The figure depicts the potential complexities of the relationship between interacting sub-systems, the environment or ecology and the cognitive processes of the judge. The single lens model can be seen as a robust representation for studying human judgement. The process can be varied and extended in several ways without losing or distorting its essential concept. The judgement of interest may be predicted from the cues by means of a multiple regression equation. The purpose of using this figure is to depict how one might examine the effect on judgement when r_{ij} is systematically altered. As noted in Chapter 1 the study explores and examines the following question:

- Does increasing the correlation between the items of information impact upon the nature of judgements made by people in terms of: (a) the correlation between each item of information and the judgement; or (b) the multiple correlation between all items and the judgement?

In the following sections, the potential effects of cue intercorrelations in multiple regression are discussed.

In making judgements of interest, we know that the judgement will depend upon (a) the relationship between each factor and a person's actual level of interest but also (b) the extent to which the factors in a situation are themselves related. The first aspect cannot be determined *a priori*. It depends upon the emphasis, which the person gives to each factor in a situation and its relationship to the overall level of interest, in other words, the correlation between each factor and the level of interest.

The second aspect is the object of this research. It is the intercorrelation between the factors or the extent of multicollinearity. It will affect the overall relationship in a well-determined manner because it is linked to the value of a multiple correlation based on the correlation between predictors.

In this study the predictors are the cues in a situation. The value of any multiple correlation between all the cues in a situation and the level of interest (the judgement) is related to the intercorrelation of the independent variables as well as to their correlation with the dependent variable. For three variables, the multiple correlation $R_{a.bc}$ is given by:

$R_{a.bc}$ = Square root $[(r^2_{ab} + r^2_{ac} - 2r_{ab}\, r_{ac}\, r_{bc})/(1 - r^2_{bc})]$

Where

a = the judgement (dependent variable *a*)

b = the first cue in a situation (independent variable *b*)

c = the second cue in a situation (independent variable *c*)

$R_{a.bc}$ = multiple correlation coefficient between dependent variable (*a*) and a combination of independent variables (*b* and *c*)

r_{ab} = correlation between dependent variable *a* and the independent variable *b*

r_{ac} = correlation between dependent variable *a* and the independent variable *c*

r_{bc} = intercorrelation between the independent variables *b* and *c*.

From this equation, it may be noted that:

1. The multiple correlation increases as the size of the correlations of the dependent variable and the independent variable increases; and
2. The multiple correlation cannot be less than the highest correlation of any independent variable with the dependent variable.

As the correlation between the variables (r_{bc}) increases then they become measures of the same factor and for the purposes of prediction, one normally aims for the situation where the cues are more independent of each other (i.e., the smaller the intercorrelation r_{bc}) so that there will be little overlap or redundancy and the greater will be their value in jointly determining the level of interest (i.e., the judgement).

In the case where variables are highly intercorrelated one might expect that the knowledge of the extra variable in a multiple regression would add no additional information about the judgement. While one might assume the multiple correlation to increase as the correlation between the cues becomes smaller, this is not always the situation. A simple example using only three cues is shown in Table 2.1.

In Table 2.1 the multiple correlation has been calculated for varying combinations of values when the independent variables are correlated 0.0, 0.2, 0.5 or 0.8 with the dependent variable (Columns 1 and 2) and also when the independent variables have different levels of intercorrelation or multicollinearity from 0.0 through 0.2 and 0.5 to 0.8 (Column 3). This process involves triangulation method. It replicates in a simpler form and will be undertaken later in this research study.

An example of where the multiple correlation decreases then increases is when r_{ab} = 0.2, r_{ac}=0.5 and r_{bc} = 0.0; then the multiple correlation ($R_{a.bc}$) decreases from 0.54 (see line 6 of the table) to 0.51 (line 16) when r_{bc} = 0.2 then to 0.50 when r_{bc} = 0.5 (line 26) and then increases to 0.60 when r_{bc} = 0.8 (line 36). An example of where it increases is when r_{ab} = 0.0, r_{ac}=0.5 and r_{bc} = 0.0; then the multiple correlation ($R_{a.bc}$) increases from 0.50 (see line 3 of the table) to 0.51 (line 13) when r_{bc} = 0.2 then to 0.58 when r_{bc} = 0.5 (line 23) and then increases still further to 0.83 when r_{bc} = 0.8 (line 33). In other cases it can decrease consistently, such as when there is a moderate to high correlation between the independent variables and the dependent variable – for example when r_{ab} = 0.5, r_{ac}=0.8 and r_{bc} = 0.0; then the multiple correlation ($R_{a.bc}$) decreases from 0.94 (see line 7 of the table) to 0.83 (line 37) when r_{bc} = 0.8.

Table 2.1 Samples of multiple correlation under varying levels of multicollinearity and variations in cue-judgement correlations

Correlation between first cue and the judgement r_{ab}	**Correlation between second cue and the judgement** r_{ac}	**Cue intercorrelations (Multicollinearity)** r_{bc}	**Multiple correlation** $R_{a.bc}$
0	0	0	0.00
0	0.2	0	0.20
0	0.5	0	0.50
0	0.8	0	0.80
0.2	0.2	0	0.28
0.2	0.5	0	0.54
0.2	0.8	0	0.82
0.5	0.5	0	0.71
0.5	0.8	0	0.94
0.8	0.8	0	1.00*
0	0	0.2	0.00
0	0.2	0.2	0.20
0	0.5	0.2	0.51
0	0.8	0.2	0.82
0.2	0.2	0.2	0.26
0.2	0.5	0.2	0.51
0.2	0.8	0.2	0.80
0.5	0.5	0.2	0.65
0.5	0.8	0.2	0.87
0.8	0.8	0.2	1.00*
0	0	0.5	0.00
0	0.2	0.5	0.23
0	0.5	0.5	0.58
0	0.8	0.5	0.92
0.2	0.2	0.5	0.23
0.2	0.5	0.5	0.50
0.2	0.8	0.5	0.83
0.5	0.5	0.5	0.58
0.5	0.8	0.5	0.81
0.8	0.8	0.5	0.92
0	0	0.8	0.00
0	0.2	0.8	0.33
0	0.5	0.8	0.83
0	0.8	0.8	1.00*
0.2	0.2	0.8	0.21
0.2	0.5	0.8	0.60
0.2	0.8	0.8	1.00*
0.5	0.5	0.8	0.53
0.5	0.8	0.8	0.83
0.8	0.8	0.8	0.84

Note that some of correlations (marked *) describe an impossible multivariate distribution (Wood, personal communication, 2004).

Predictions

In the single lens model, it is only possible to control the values in column 3 of Table 2.1. Indeed it is not possible to know in advance what value an individual will place upon a factor when determining his/her level of interest. Accordingly the effect of multicollinearity on the multiple correlation will be dependent upon the cue-judgement correlations, but as noted earlier the cue-judgement correlations cannot be known in advance. In some instances the multiple correlation will increase, in others it will decrease then increase and in other instances it will decrease. For any combination of variables related to interest, the multiple correlation produces results that would be hard to estimate in advance and this is even more the case when there are numerous independent variables and a mixture of positive and negative correlations.

As a starting point, however, and working from the pattern in Table 2.1:

1. there is no special *a priori* reason for there to be a relationship between the values of r_{ab} and r_{bc} or between r_{ac} and r_{bc}. That is, there is no basis to infer that the multicollinearity between variables is important for or even related in any way to the links between a predictor and a criterion (or between independent variables and the dependent variables);

2. it is likely that the higher the multiple correlation $R_{a.bc}$ then the higher will be the values of r_{ab} and r_{ac}. This is straightforward and follows from the multiple correlation formula; and
3. for all possible combinations of r_{ab}, r_{ac} and r_{bc} (in Table 2.1), it is unlikely that there will be a strong positive relationship between the level of multicollinearity and the multiple correlation. (Indeed from Table 2.1, it is only 0.04).

To summarise, it is predicted that multicollinearity will not effect the cue-judgement correlations in the single lens model and will not affect the level of multiple correlation between the cues and the judgements in the single lens model.

Conclusion

It is not yet known how students combine different forms of information to make a judgement of interest in a subject. Earlier studies showed that cue intercorrelation in multiple cue probability learning affected judgements. For instance, Armelius and Armelius (1976) noted that '...the subjects are able to learn a task where the cues are highly intercorrelated better than a task with orthogonal clues' (p. 249).

This study will attempt to examine and analyse cue intercorrelation and how students select and use information to make a judgement about how interested they are in a subject using the single lens model. In addition the study will investigate whether judgements are directly related to cue – criterion correlations, or whether the cue judgement beta weights are directly related to the magnitude of the cue intercorrelations. The initial prediction is that individuals perceive interest and use information differently. Chapter 3 provides details of the methodology to be used in the study.

CHAPTER 3

RESEARCH METHODOLOGY

The previous chapter concluded by considering the relevance of the Brunswik lens model with particular focus on the single lens aspect. The lens model was seen as a useful framework for representing and analysing the judgement processes of an individual.

The research program described in this chapter comprised four separate investigations each comprising four case studies (see Figure 3.1 for an overall description). This chapter sets out the methodology and includes the nature of the samples, the judgement profiles used to collect the data and the statistical techniques used to analyse the data. Each study comprised four different investigations with cue intercorrelations of increasing levels of multicollinearity.

The first investigation used adult and vocational education student teachers in Australia and sought to describe how they used information to make a judgement or decision about a field of study when it was described in terms of six factors relevant to learning. These factors were developed *a priori* rather than theoretically and were based on lay perceptions of what might make a subject interesting.

Then three investigations using Nigerian university students followed and tested the same ideas in another context and with different cues to determine if the results were stable across cue contents.

Figure 3.1 Schematic outline of the studies

CASE STUDY 1 A PRIORI SELECTED FACTORS

(N=4) Australian students exposed to cues of increasing multicollinearity. Cues related to a priori subject relevant factors (Athanasou & Aiyewalehinmi, 2001)
Six cues:

- The challenge in the subject
- The fascination or stimulation of the subject
- The quality of teaching in the subject
- The usefulness of the text
- The learning facilities for the subject
- The extent to which theory and practice are related

STUDY 2 SUBJECT RELEVANT FACTORS

(N=4) Nigerian students exposed to cues of the same increasing multicollinearity. Cues related to a priori subject relevant factors (Athanasou, 1994,1999)
Six cues:

- The easiness of the subject
- The importance of the subject
- The quality of teaching in the subject
- The ability in the subject
- The time spent studying the subject
- The time spent on projects and assignments

CASE STUDY 3 HOLLAND INTEREST TYPES

(N=4) Nigerian students exposed to cues of the same increasing multicollinearity. Cues related to content using Holland's interest types (Holland, 1973)
Six cues:

- Realistic interest
- Investigative interest
- Artistic interest
- Social interest
- Enterprising interest
- Conventional interest

CASE STUDY 4 SELF SELECTED TYPES
(N=4) Nigerian students exposed to cues of the same increasing multicollinearity. Cues were self-defined by the participants
Six cues:

- A
- B
- C
- D
- E
- F

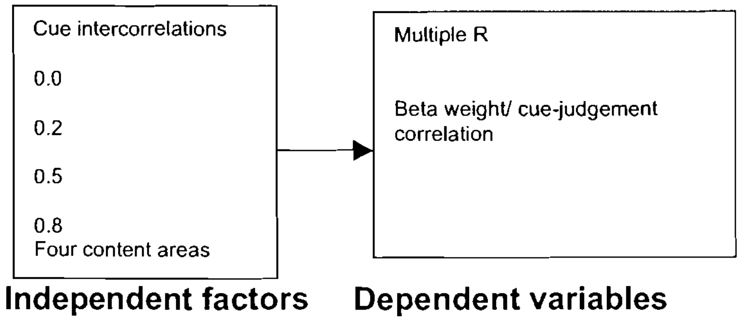
A pilot study that was relevant to this research methodology was conducted at the University of Technology, Sydney, Faculty of Business. The results of the pilot are not reported in this thesis. The pilot investigation helped in selecting the format that was suitable for the final study (Athanasou & Aiyewalehinmi, 2001, see Appendix H).

The purpose of the following sections is to explain the methodology used in carrying out the four separate studies. This will include the nature of the data samples, the profiles used to collect the data and statistical techniques used to analyse the data.

Dependent and independent variables/factors

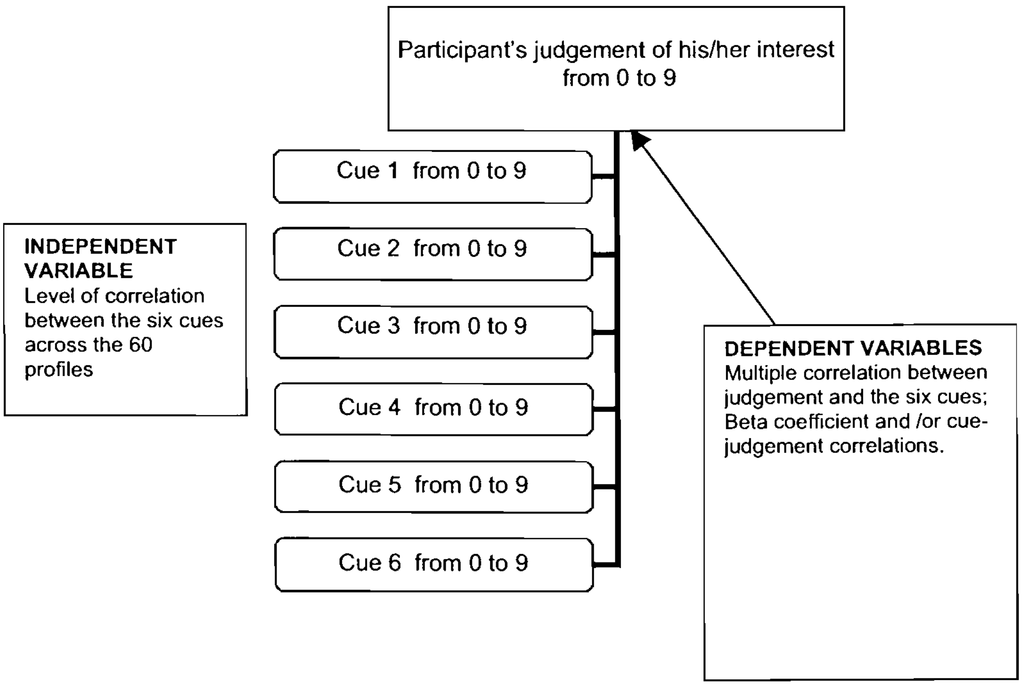
The general framework for the dependent and independent variables is depicted in Figure 3.2. The independent factor in all these four investigations was the increasing levels of multicollinearity from 0.0 through 0.2 to 0.5 and 0.8. This means that the factor that was varied was the relationship between judgement cues. The values of 0.0 to 0.8 reflect the average intercorrelation between the judgement cues. Thus participants were exposed to factors that differed substantially in their interrelationship.

Figure 3.2 Overall structure of the research



The dependent variables or outcomes of interest were some key aspects of the judgement process. If one refers to the single lens model which is depicted as Figure 3.3 then the key aspects are: the multiple correlation between the cues and the final judgement made by each participant. Next, one might look also at the beta weights of the cues and their relative emphasis in the multiple regression equation or alternatively the cue-judgement correlations.

Figure 3.3 The single lens structure used in this study



CASE STUDY 1- A PRIORI SELECTED FACTORS

Participants

Participants were mature age students (N=28) in the Faculty of Education at the University of Technology, Sydney who were completing a Graduate Diploma in Vocational Education or Bachelor of Education in Adult Education to qualify as technical and further education teachers. Participation was voluntary and not related to study requirements. Students were paid for their participation in the study. Human research ethics committee approval was obtained from the University of Technology, Sydney.

Instrument and procedure

Each participant was given a booklet comprising 75 judgement profiles. The profiles contained six cues or information details.

The six cues selected were:

- Challenging: How challenging is this subject?
- Fascinating: How fascinating or stimulating is this subject for you?
- Teaching: How good is the quality of teaching or lecturing in this subject?
- Text: How useful is the text in this subject?
- Facilities: How good are the learning facilities for this subject?
- Theory/Practice: How well are theory and practice related in this subject?

In this Study four sets of 60 cues were produced that had mean intercorrelations of 0.0, 0.2, 0.5 and 0.8. The values of the cues were produced using CUER a specially written program in Q-BASIC (provided by Professor Ray Cooksey, University of New England). Seven participants completed the booklet containing cues with mean intercorrelations of 0.0; seven completed cues with mean correlations of 0.2; seven participants completed the booklet containing cues with mean correlations of 0.5 and seven respondents completed the booklet containing cues with mean correlation of 0.8. A copy of one section of the booklet and the answer sheet is shown as Figure 3.4. A complete copy of the instrument is provided in Appendix A and a complete listing of the cues is provided in Appendix B.

Figure 3.4 Survey question booklet (part-only).

UTS FACULTY OF EDUCATION
SUBJECT INTEREST SURVEY

Thank you for taking part in this study.

Instructions

You have to answer questions about your interest in a subject that you are studying. Look at each profile of information. The profile contains answers to six questions.

It contains ratings from 0 (nil) to 9 (very high) on some questions about the subject.

Now you have to make a judgement from the information contained in each profile. You have to judge how interested you might be in the subject. Make all your judgements on the separate answer sheet.

This is the question you are being asked:

How interested would you be in taking a subject that has been described in this way?

How to record your judgement

You circle a number from 0 to 9 on the answer sheet.

You can use any number from 0 to 9.

EXAMPLE: Look at the student profile in judgement no. 1. You might decide that you would not be interested in taking this subject at all. You would then rate your interest as 0 or 1.

If your interest is very low you might rate it around 2 or 3.

If you were moderately interested you might rate it around 4 or 5.

If your interest was high you might rate it as 6 or 7

And if your interest was very high, you might circle 8 or 9

Feel free to ask any questions if you are not sure what to do.

STUDENT PROFILE No. 1 JUDGEMENT No. 1

How challenging is this subject for you?	[*9*]
How fascinating or stimulating is this subject for you?	[*3*]
How would rate the quality of teaching or lecturing in this subject?	[*4*]
How useful is your text in this subject?	[*9*]
How good are the learning facilities for this subject?	[*6*]
How well are theory and practice related in this subject?	[*2*]

PLEASE RATE YOUR INTEREST IN THIS SUBJECT

No interest **Very high interest**

0 1 2 3 4 5 6 7 8 9

Table 3.1 indicates the correlation matrices of cues used for 0.0, 0.2, 0.5, and 0.8 cases that formed the different parts of the first case study. The average intercorrelations were -0.05, 0.20, 0.54, 0.87 for the four groups respectively. These same values were used for all the case studies.

Table 3.1 Cue intercorrelations (N=60)

Intercorrelation 0.0 (average r =0.05)						
	Challenging	*Fascinating*	*Teaching*	*Text*	*Facilities*	*Theory/Pr*
Challenging	1					
Fascinating	-0.33	1.00				
Teaching	-0.04	-0.19	1.00			
Text	0.20	-0.24	-0.08	1.00		
Facilities	-0.26	0.00	-0.16	-0.06	1.00	
Theory/Pr	0.15	0.06	-0.14	0.15	0.13	1.00
Intercorrelation	0.2 (average	r= 0.2)				
	Challenging	*Fascinating*	*Teaching*	*Text*	*Facilities*	*Theory/Pr*
Challenging	1.00					
Fascinating	0.19	1.00				
Teaching	-0.05	0.28	1.00			
Text	0.22	0.29	0.24	1.00		
Facilities	0.05	0.25	-0.02	0.07	1.00	
Theory/Pr	0.33	0.44	0.26	0.24	0.27	1.00
Intercorrelation	0.2 (average	r=0.54)				
	Challenging	*Fascinating*	*Teaching*	*Text*	*Facilities*	*Theory/Pr*
Challenging	1.00					
Fascinating	0.49	1.00				
Teaching	0.60	0.57	1.00			
Text	0.43	0.56	0.63	1.00		
Facilities	0.60	0.61	0.57	0.51	1.00	
Theory/Pr	0.52	0.49	0.63	0.49	0.49	1.00
Intercorrelation	0.8 (average	r=0.87)				
	Challenging	*Fascinating*	*Teaching*	*Text*	*Facilities*	*Theory/Pr*
Challenging	1.00					
Fascinating	0.88	1.00				
Teaching	0.84	0.89	1.00			
Text	0.88	0.85	0.86	1.00		
Facilities	0.87	0.89	0.91	0.89	1.00	
Theory/Pr	0.89	0.88	0.83	0.91	0.90	1.00

Participants were instructed to look at a student profile and consider the information presented. Then each participant rated how interested he or she would be in taking a subject that had been described in this way. The rating of the cues ranged from 0 (very low) to (9 very high). Participants were provided with explanations of what each cue represented. They were asked to proceed with making their own judgement of interest at their own pace.

To control and determine how consistent participants were in their judgements 15 profiles (numbers 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, and 45) were selected and repeated at the end in order to determine the consistency of a participant's judgement of interest. The test-retest reliability of the judgement was determined using the product moment correlation between the original judgements and the 15 judgement profiles that were repeated.

For all four investigations a conservative and strict approach was taken to the quality of the data used. Only the results of the person with the highest test-retest reliability and an error-free response sheet was selected as a case study for each intercorrelation. For instance, it was noted that one student had a negative test-retest correlation and this person was immediately eliminated. Other students were eliminated if they missed some judgements or produced double judgements or there was evidence that they might have completed it carelessly such as deliberate patterns (e.g. 98765432101234567890... or 999888777666555444333222111000 etc).

This situation occurred to a far greater extent in the Nigerian case studies and it is also discussed below. It was considered more important to sacrifice sample size in order to obtain valid and accurate data because a key feature of the Brunswikian approach is that each person represents his or her own study. The amalgamation of results is not essential in Brunswikian analysis of individual responses because inferences are not made to other persons but rather to situations, that is to further situations within persons themselves.

Analysis

The analyses of the judgement of interest were undertaken for the participant using the single lens model as the framework. The results of the study were analysed using a single lens model analysis. The six cues (Challenging, Fascinating, Teaching, Text, Facilities and Theory/Practice) were correlated with the 60 judgements. (If one were to include all 75 judgements then it would have changed the pattern of correlations.)

Descriptive statistics for each case were reported and a multiple regression analysis was undertaken using SPSS-X. The following basic statistics were determined from the multiple regression analysis

(i) The multiple correlation between the six cues and judgements were determined together with the correlation of each cue (cue utilities) with the judgements;

(ii) The F-statistic from the regression ANOVA was used as a guide to how important the cues were in explaining the judgement. The adequacy of each cue was tested with a *t*-test. In addition, a number of key aspects of the multiple regression analysis were considered in the interpretation of each case study. These involved an analysis of the residuals, autocorrelation and the effects of collinearity.

Residual analysis

A regression model rarely estimates the value of the dependent variable exactly and one would normally expect a difference between the predicted judgements and their actual value. This difference is a residual. The residuals are examined, as they are helpful in identifying outliers that were different from the bulk of the judgements.

The first residual plot examined is the plot of residuals versus predicted values. Normally, the plot of the residuals versus predicted values will exhibit a shape of constant width independent of the fitted value. In addition, if the model is appropriate for the data there should not be a visible pattern in the plots of residual versus each variable. Any pattern would provide evidence of a possible effect in at least one explanatory variable.

Autocorrelation

Autocorrelaton was also examined in each case study. This focused on a pattern in the residuals. Autocorrelation is the level of correlation between each residual and the residual immediately preceding it. This is relevant because the data were collected sequentially and one residual may be related to the adjacent residuals. This will show whether the judgements were ordered in any meaningful way.

Autocorrelation was determined with the Durbin-Watson statistic (D). This measures the correlation between each residual and the residual immediately preceding it. If successive residuals are positively autocorrelated, then the value of D will approach 0. If the residuals are not correlated the value of D will be close to two (2). If there is a negative autocorrelation, D will be greater than two and could even approach the maximum value of four.

Collinearity

As mentioned previously, collinearity refers to the extent of the correlation between the cues. As the cues become more highly correlated then the collinear variables should not provide new information and it ought to become difficult to separate the effect of each cue on the judgements.

In this case the values of the regression coefficients may fluctuate. The variance inflationary factor (VIF) was used to determine collinearity. The VIF is equal to 1 with a set of variables that are uncorrelated then and may even exceed 10 for highly correlated cues. A criterion of 5 has been set for the VIF to indicate excessive correlation between factors. The VIF values for the four case studies are listed in Table 3.2. These values are consistent across all the four case studies because the same values were used.

Table 3.2 Values for the Variance Inflationary Factors (VIF)

Group	Cue 1	Cue 2	Cue 3	Cue 4	Cue 5	Cue 6
0.0	1.27	1.22	1.13	1.11	1.19	1.09
0.2	1.20	1.37	1.20	1.18	1.13	1.47
0.5	1.89	1.94	2.53	1.87	2.05	1.83
0.8	6.37	7.74	7.52	7.88	10.02	8.97

Standardised coefficients

Standardised regression coefficients were used in this study even though the variables were all on the same scale of 0 to 9. Standardised regression coefficients or beta weights are particularly helpful when the magnitude of variables may vary widely or when they are on a different scale and it is difficult to compare the relative importance of one regression coefficient with another. Standardised regression coefficients were used to indicate which cues were most important in predicting judgements.

The standardised coefficients are calculated as though all the cues had means of zero and a variance of one. The beta coefficients represent the change in the mean of the judgement per unit change in the cue while taking into account the effect of the other variables. They represent net regression effects.

CASE STUDIES 2-4

Participants for all the investigations (case studies 2-4)

For all three subsequent investigations, the participants were students from the University of Lagos and Obafemi Awolowo University Ile-Ife both in Nigeria. The Dean of Faculty of Arts, at Obafemi Awolowo University Ile-Ife and the Dean of Faculty of Arts at the University of Lagos were contacted to allow their students to participate in the research study. Lecturers and Heads of Departments were then contacted for their approval.

Participants were both male (N=58) and female (N=62) students who were studying for a Bachelor Arts in the Department of English. They were full time students and they were between 18 to 25 years of age at the time when these data were collected. They responded to an invitation to take part in the research. Participation was voluntary and not related to any course requirement.

General procedure for case studies 2-4

Arrangements were made to meet with their students who were willing to commit half an hour of their time to complete the research questionnaire booklet. Students were paid for their participation.

A covering letter and instructions were included in the student profile samples distributed to these participants to study in order to be familiar with the research task. Participants were provided with explanations of what each cue represented including a covering instruction to assure respondents of confidentiality of information. They were asked to proceed with making their own judgement of interest and at their own pace. Unfortunately the only time available was immediately following an examination.

To control and determine how consistent participants were in their judgements 15 profiles in each set of numbers (numbers 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, and 45) were again selected and repeated so that a total of 75 judgement profiles were produced.

In the case studies it was noted subsequently that substantial numbers of participants in Nigeria reported test-retest correlations that were negative whereas only one person in the Australian group reported a negative correlation. This was unusual and suggested that either (a) they did not understand the task completely due to its unfamiliarity; or

(b) they rushed the task immediately after the examination being interested only in the payment; or (c) they completed it carelessly since there were no right or wrong answers. In any event it was considered conservative to reject persons with low or negative test-retest correlations from the analysis in the interest of obtaining higher quality data rather than maximising sample size.

The selection of one participant from each group may at first sight appear to be a drastic measure in response to the negative test-retest correlation or low test-retest correlations. This strategy was selected after some consideration for obtaining the most accurate findings. Indeed it is a most conservative approach used to ensure quality and that only the most valid data were analysed. It was considered better to sacrifice data in order to obtain the most valid responses. It is also consistent with the idiographic research approach favoured by Brunswik (1956). Moreover, these investigations each sought to complement one another. Nevertheless, consistent with a transparent approach to research practice that makes available the original uncoded data, the entire cohort of judgements are listed in Appendix C for other interested researchers. In addition, analyses of the judgement results for the entire cohorts (that is for every person) are also listed in Appendix D to G.

Finally, as mentioned earlier, sample size is not essential for idiographic studies of judgement since these studies may be conducted even on one person, but the combination of results from the four investigations are important for comparisons of the effects of multicollinearity.

Procedure and analysis

The procedure and analysis for all case studies 2-4 were identical with that of the first study and will not be repeated. The following sections describe the participants in each of the case studies in a little more detail.

CASE STUDY 2 – SUBJECT RELEVANT FACTORS

Participants

Participants were 24 female and 16 male volunteer students age between (18 and 25). The participant formed the case study with the most reliable judgement from each of the 0.0, 0.2, 0.5 and 0.8 groups. Thus four participants were selected ultimately for this case study.

Instrument

The instrument used in this study was a pre-printed booklet containing 75 judgement profiles including the 15 repeated profiles. Each profile contained six cues. The six cues were rated from 0 (no interest) to 9 (very high).

They are described in greater detail below. In case study 2 these included:

- Easy subject: How easy this subject is for you?
- Important subject: How important this subject is for you?
- Quality teaching: How the quality of teaching in this subject is rated?
- Best subject: How much is this rated as your best subject?
- Studying Time: How much time have you spent studying this subject?
- Project time: How much time has been spent on a subject project?

CASE STUDY 3 –INTEREST TYPES

Participants

Participants were 13 female and 17 male volunteer students aged between (18 and 25). The participant formed the case study with the most reliable judgement from the 0.0, 0.2, 0.5 and 0.8 groups. Thus four participants were also selected ultimately for this case study.

Instrument

The instrument used in this study was a pre-printed booklet containing judgement profiles which contained six cues defined as (Realistic interest, Investigative interest, Artistic interest, Social interest, Investigative interest and Conventional interest).

These included:

- Realistic interest: Realistic interest is defined as a systematic of manipulation of objects, tools, machines and preferred activities.
- Investigative interests: Investigative interest is defined as activities that apprehend observation, symbol systematic, physical investigation, biological and cultural phenomena in order to understand and control.
- Artistic interest: Artistic interest is defined as ambiguous, free, unsystematic activities that embody manipulation of physical, verbal or human materials to create art products.
- Social interest: Social interest is defined as operation of manipulation of others inform of training, developing caring and enlightening.
- Enterprising interest: Enterprising interest is defined as activities that entail manipulation of others to attain organisational goals or economic gain.
- Conventional interest is defined as activities that involve absolute order, systematic manipulation of data to attain organisational goal or economic goal.

CASE STUDY 4 – SELF-SELECTED INTERESTS

Participants

Forty (19 males and 21 females) university undergraduate students served as judges in the study. The participant formed the case study with the most reliable judgement from the 0.0, 0.2, 0.5 and 0.8 groups. Thus four participants were selected ultimately for this case study.

Instrument

In this case each profile contained six cues that were self-defined as (A, B, C, D, E and F) rated from 0 (no interest) to 9 (very high interest). A B C D E or F could vary in content. They could be anything of interest or preferred activities dependent upon the individual.

CONCLUSION

The purpose of this chapter has been to outline the research methodology employed and the statistical techniques that will be applied to analyse the research data. The research design incorporated a pilot study plus an initial case study conducted in Australia. This was supported by three further case studies with four persons in each and which used students in Nigeria. The emphasis in the research design has been on investigating the role of varying levels of multicollinearity in individual judgements using a variety of dependent measures. The next chapter reports the findings of the case studies.

CHAPTER 4

RESULTS

Chapter 2 and 3 were concerned with reviewing the relevant literature and setting out methodology used in collecting and analysing the data for the study. The purpose of this chapter is to present the results derived from the four investigations (see Figure 3.1 for an overall description of the research design). The results are presented as four case studies. Each case study provides the descriptive statistics of the judgements as well as the multiple correlations for the four judges. The format for presentation is consistent and uniform across the four case studies.

CASE STUDY 1 - A PRIORI SELECTED FACTORS

This section sets out the findings for four Australian students who were exposed to six cues of increasing multicollinearity. The cues were related to a priori subject relevant factors and included:

- the challenge in the subject;
- the fascination or stimulation of the subject;
- the quality of teaching in the subject;
- the usefulness of the text;
- the learning facilities for the subject; and
- the extent to which theory and practice are related.

The results of this investigation relate to the influence of multicollinearity on (a) the absolute value of the judgements; (b) the multiple correlation between cues and the judgement; and (c) the standardised beta weights. The results for the entire cohort of 28 students are listed for the information of the reader in Appendix D.

The four most reliable participants were selected from the entire cohort of 28 student participants. The four most reliable participants selected were based on test-retest reliability results (Judge B from group 0.0, Judge N from group 0.2, Judge Q from the 0.5 group and Judge V from the 0.8 group).

The absolute value of the judgements

The distribution of judgements for all four judges (B, N, Q and V) across the 60 profiles is listed in Table 4.1(a) and also shown in Figure 4.1(a), while the mean level of judgement of interest is shown in Table 4.1(b). The mean level for Judge B was 5.0 (SD = 2.0), 4.5 (SD = 2.3) for Judge N, 3.8 (SD = 1.5) for Judge Q and 4.6 (SD = 2.0) for Judge V. The overall analysis of variance of the differences between these mean judgements was statistically significant ($F(3,236) = 3.55$, $p<0.015$) but the largest differences were in the comparison of Judges B and Q. The mean differences are illustrated in the box plot in Figure 4.1(b). All variables included in the study were tested for normality and showed approximately normal distribution.

Table 4.1 Frequency distribution, mean and standard deviation of judgements

(a) Frequency distribution

Interest Judgements	Judge B	Judge N	Judge Q	Judge V
0	0	2	1	1
1	3	4	1	1
2	1	5	9	6
3	11	8	12	10
4	8	13	20	9
5	13	10	10	12
6	10	4	4	13
7	8	6	2	3
8	4	5	0	1
9	2	3	1	4
Total	60	60	60	60

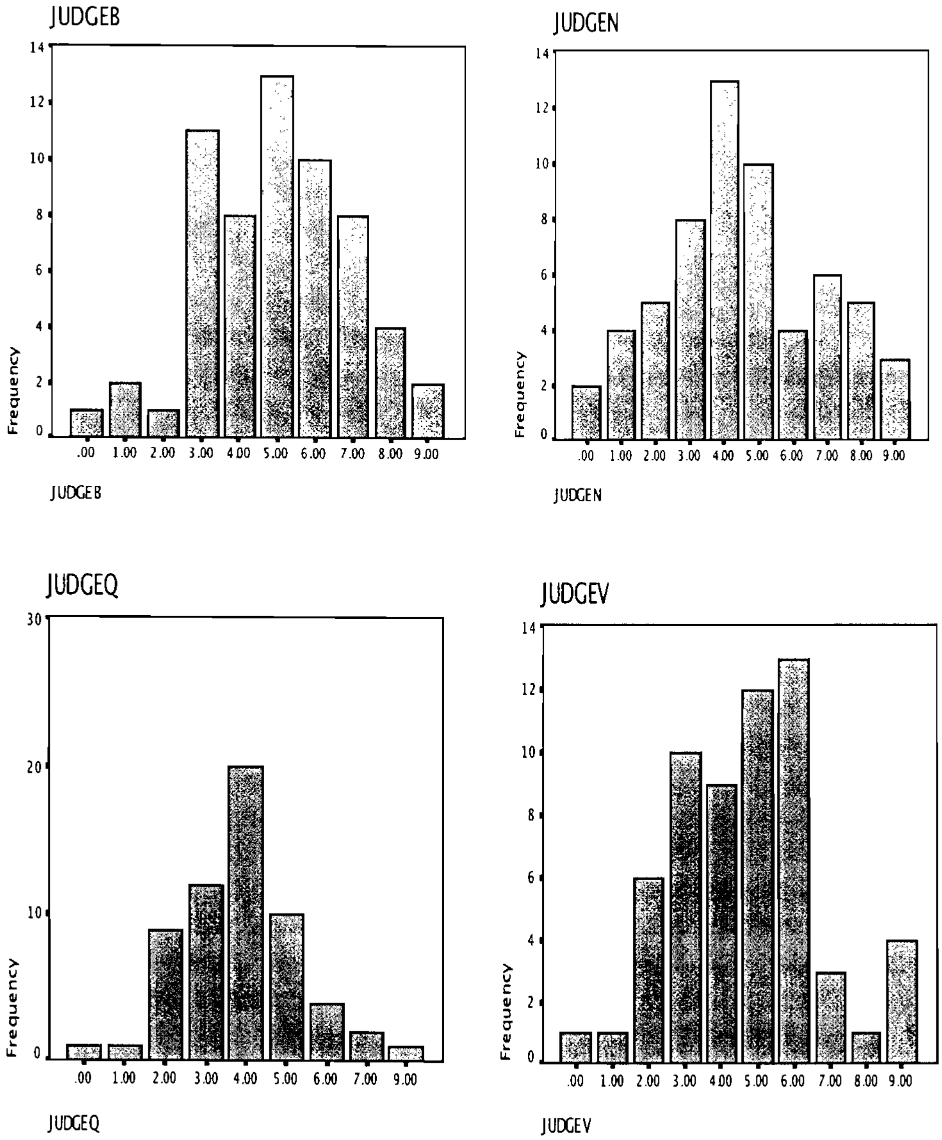
(b) Overall means and standard deviations

Judge	Judgement of interest Mean (SD)	Different from[1]
0.0groupJudge B	5.0(2.0)	Judge Q
0.2groupJudge N	4.5(2.3)	
0.5groupJudge Q	3.8(1.5)	Judge B
0.8groupJudge V	4.6(2.0)	

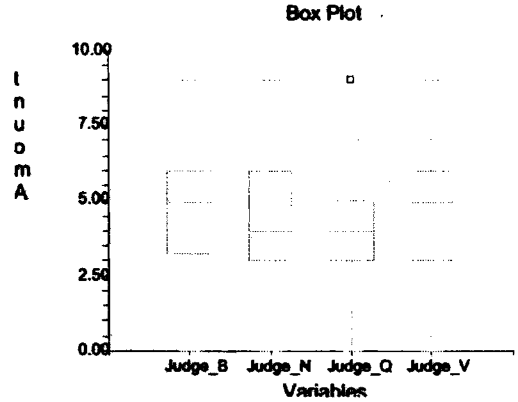
[1]Bonferroni all pairwise multiple comparison test, alpha=0.05 critical value=2.6383

Figure 4.1 Distribution of interest judgements

(a) Individual frequency charts of interest judgements



(b) Box plot for interest judgements



The multiple correlation between cues and the judgement

For Judge B, the multiple correlation was 0.934; 0.824 for Judge N; 0.929 for Judge Q; and 0.974 for Judge V. With the exception of Judge B, there appeared to be an increase in the multiple correlation from groups 0.2 to group 0.8 with increasing multicollinearity. The multiple correlation between the six cues and the judgement of interest is indicated in Table 4.2. In each case the multiple correlation was substantial and statistically significant. The multiple correlation would be unity if the person had judged consistently, that is, if he/she gave the same weight to the cues throughout the 60 judgements.

Table 4.2 Model summary

Judge	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	F(6,53)
0.0 group Judge B	.934	.873	.859	.739	2.074	60.8***
0.2 group Judge N	.824	.680	.643	1.375	2.274	18.7***
0.5 group Judge Q	.929	.862	.847	.605	1.878	55.2***
0.8 group Judge V	.974	.949	.943	.480	1.723	156.1***

***$p<0.0001$

The degree of autocorrelation as determined by the Durbin-Watson statistic was 2.074 for Judge B, 2.274 for Judge N, 1.878 for Judge Q and 1.723 for Judge V, showing that the residuals were not correlated.

Figure 4.2 indicates the analysis of residuals, starting with the distribution of residuals in Figure 4.2(a), the probability plot of residuals in Figure 4.2(b) and the plot of each residual against the predicted value in Figure 4.2(c). The distribution of residuals is reasonably distributed (see Figure 4.2(a)).

Figure 4.2 (b) below shows normal probability plots for the values of cues obtained from the groups. Most of the points are clustered around a straight line, indicating normal distribution, however, the normal probability plot for Judge B was considered to deviate from the expected values (see Figure 4.2(b)).

Figure 4.2(c) shows the scattergram plot of residuals versus the predicted Y values for judges B, N, Q and V. The graph shows the relationship between the judges and cues. The dots represent the observed data points and there was indication of differences observed between the selected judges. As can be seen the dots do not lie exactly on the same area of the charts, however, there was indication of positive relationships for Judges B, Q and V.

Figure 4.2 Analysis of residuals

(a) Residual analysis – histograms

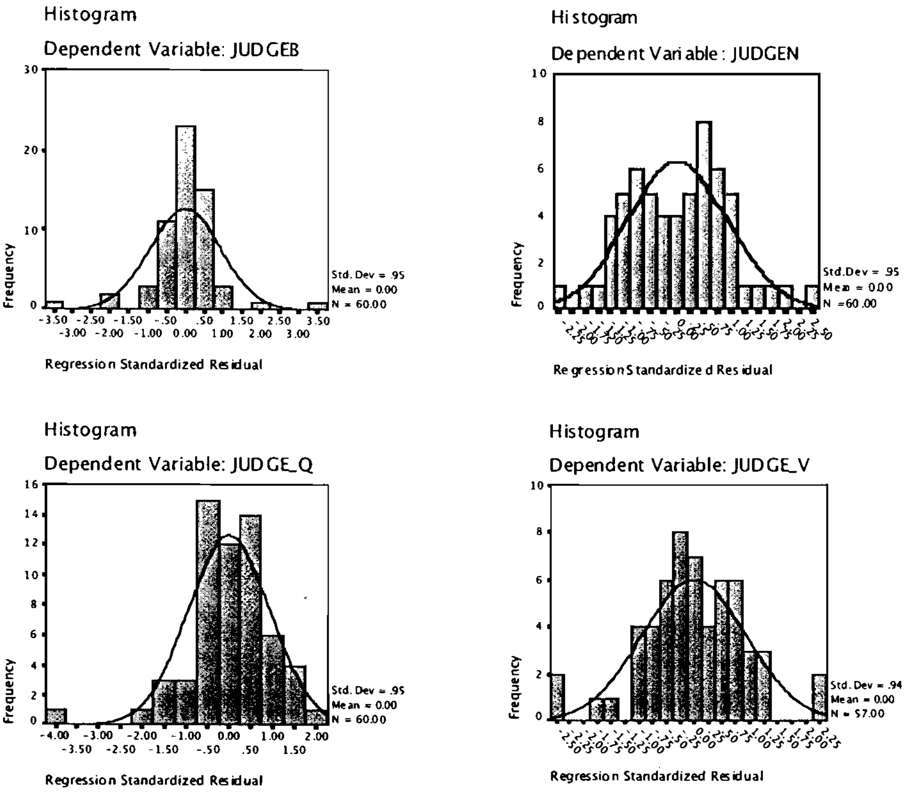


Figure 4.2 Analysis of residuals (continued)

(b) Residual analysis – normal probability plot

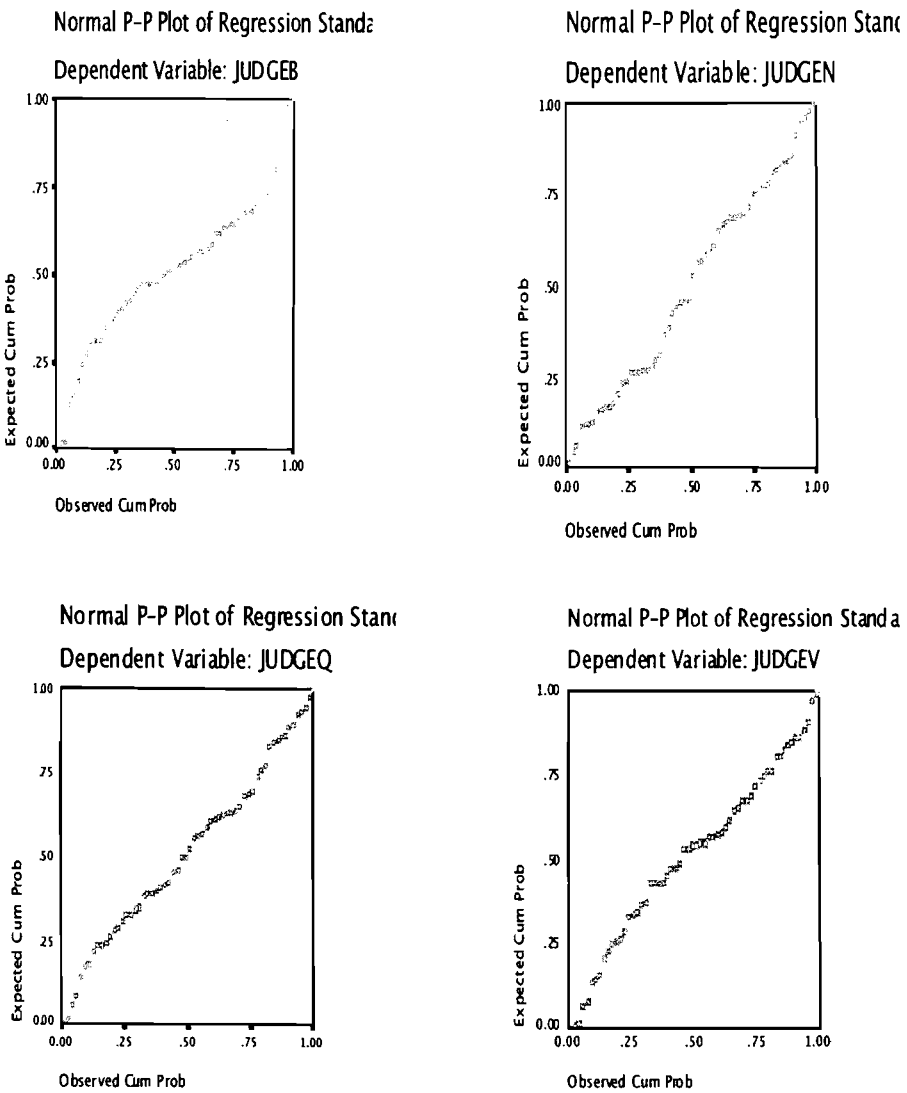
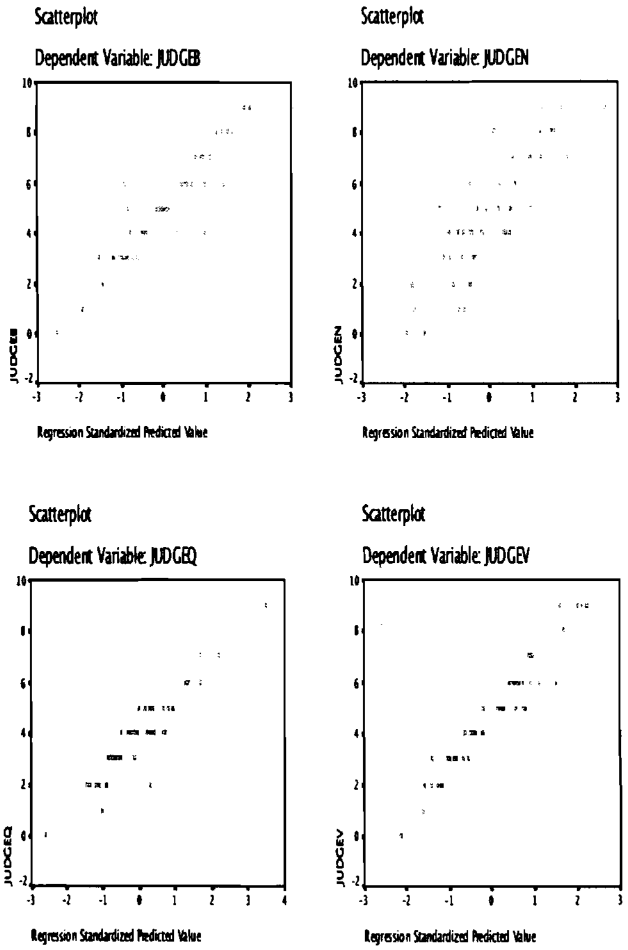


Figure 4.2 Analysis of residuals (continued)

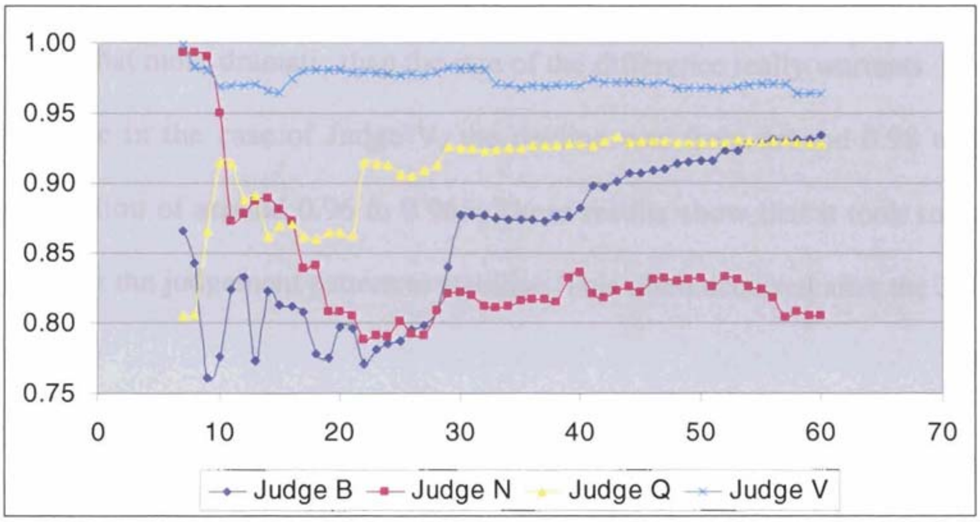
(c) Residual analysis–predicted judgement plot



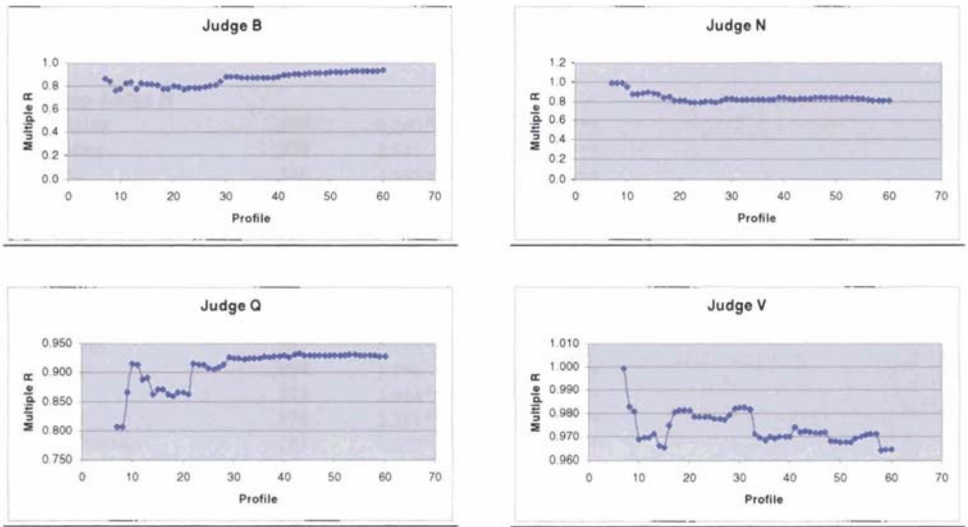
Before progressing to the analysis of the standardised beta weights, an additional analysis was performed for each judge. The multiple correlation was calculated after each judgement from the seventh to the 60th profile. The aim was to investigate any changes in judgements over time and whether these were affected by the level of multicollinearity. The results are illustrated in Figure 4.3.

Figure 4.3 Analysis of multiple correlations between cues and judgements after each profile

(a) Overall



(b) Individual judges



Judge B showed a slight increase in the level of multiple correlation from the first 30 judgements to the last 30. Judge N showed a decrease from a higher to a slightly lower level of multiple correlations, again becoming relatively constant after the 30th judgement. Judge Q showed a marked increase from lower levels of multiple correlations to a higher and constant level, again after the 30th profile. Judge V showed a marked and visible decline in multiple correlations from just after the 30th profile. While the charts portray these changes, the scale tends to make the alterations somewhat more dramatic than the size of the difference really warrants. For instance in the case of Judge V, the decline was from around 0.98 to a correlation of around 0.96 to 0.965. These results show that it took some time for the judgement pattern to stabilise. This often occurred after the 30th profile.

Table 4.3 Standardised coefficients

	Standardised Coefficients Beta	t	Correlation of judgements and cues
0.0 group Judge B			
Challenging	.014	. 250	-.221
Fascinating	.922	16.965	.930***
Teaching	-.050	-.956	-.239
Text	.007	.137	-.198
Facilities	.027	.513	.042
Theory/Practice	.054	1.046	.123
0.2 group Judge N			
Challenging	.309	3.243**	.382***
Fascinating	.294	2.881	.559***
Teaching	.380	3.985***	.457***
Text	-.020	-.215	.267*
Facilities	.285	3.085**	.388***
Theory/Practice	.082	.778	.486***
0.5 group Judge Q			
Challenging	.157	2.233*	.675***
Fascinating	.297	4.185***	.776***
Teaching	.094	1.156	.744***
Text	.273	3.914***	.744***
Facilities	.174	2.381*	.728***
Theory/Practice	.183	2.645*	.689***
0.8 group Judge V			
Challenging	.122	1.514	.903***
Fascinating	.033	.378	.883***
Teaching	.029	.336	.878***
Text	.477	5.334***	.956***
Facilities	.205	2.032*	.927***
Theory/Practice	.149	1.564	.928***

*p<0.05; **p<0.01; ***p<0.001

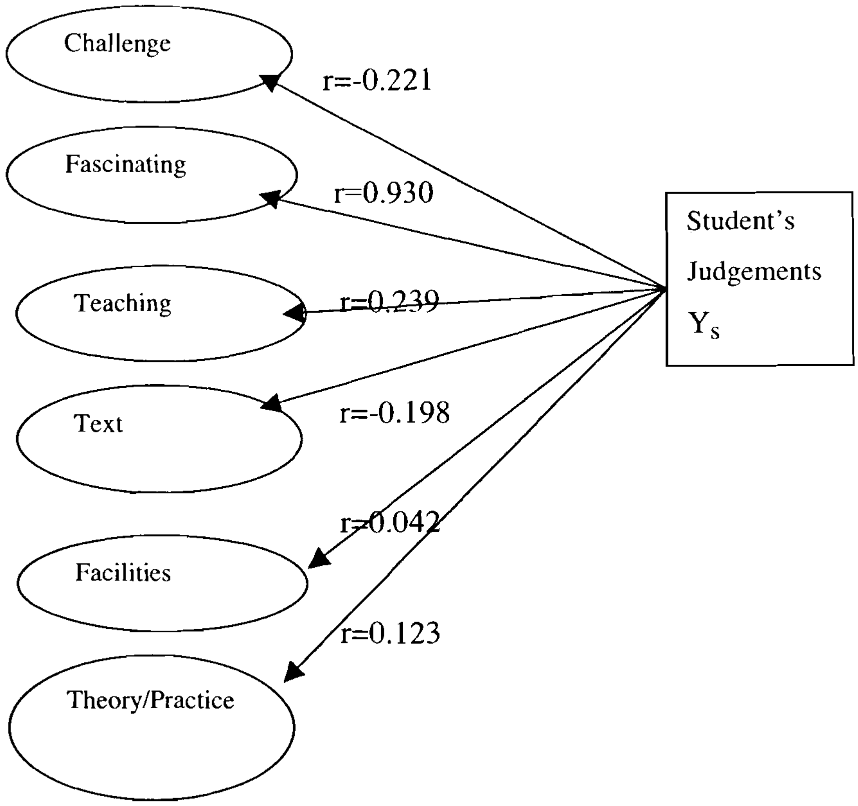
The standardised beta weights

For Judge B, the cue 'a fascinating subject' was used mainly for the judgement of interest (see Table 4.3, Column 2) and the beta coefficient was statistically significant for predicting his/her level of interest ($t=16.96$, $p<0.0001$ - see Column 2). This variable also correlated 0.930 with the level of interest (see Column 4). The other cues had low negative or zero correlations. By way of contrast, each of the six cues for all three other judges were statistically significantly related, even if the beta weights were not significant. It may be the case that judgements are qualitatively different with completely unrelated cues.

In addition, Figure 4.4 shows the six different cue judgement values for each judge. They represent the results of Table 4.3 (column 4) graphically. The values (shown as r) represent the simple correlation between each cue and student's judgement of interest. For Judge B, as mentioned above the largest value was 0.93 for 'fascinating' while all other cues had much lower values. For Judge N the correlations increased and increased still further for judge Q and finally for Judge V the correlations ranged from 0.87 to 0.95.

Figure 4. 4 Correlations of judgements and cues

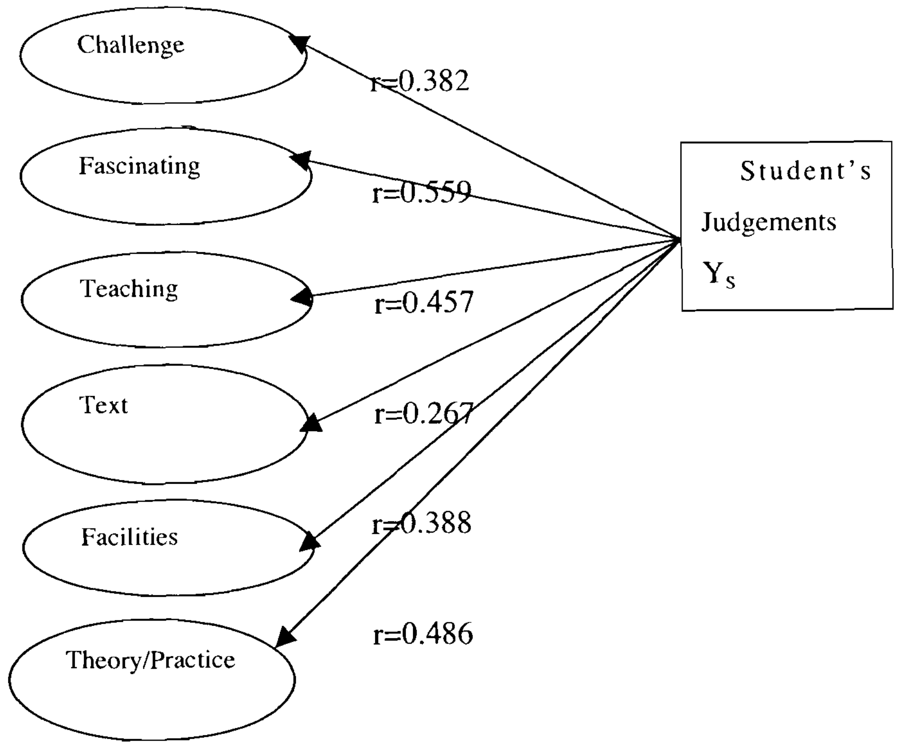
(a) Correlations of judgement and cues 0.0 (Judge B)



For Judge N, the individual correlations between each cue and the judgement were all statistically significant,(see also Figure 4.4 (b)) even though the intercorrelation between cues was only 0.2. The significant factors in the regression for Judge N were fascinating subject, a challenging subject, the quality of teaching, the facilities and theory/practice. Nonetheless, for Judge N the largest r has a value of 0.559.

Figure 4. 4 Correlations of judgements and cues (continued)

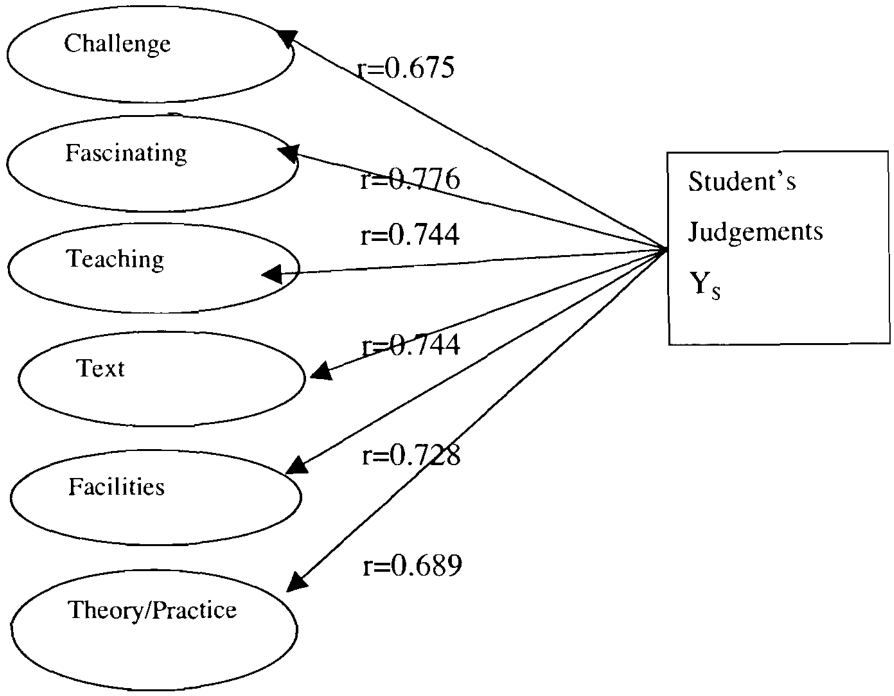
(b) Correlations of judgements and cues 0.2 (Judge N)



For Judge Q, there was a different pattern of emphasis in using more if not most of the six cues, especially 'challenging', 'fascinating', 'text', 'facilities' and 'theory/practice'. For this judge, all the cues correlated significantly with the judgement in the range 0.675-0.776 (see also Figure 4.4(c)). For Judge Q the largest r has a value of 0.776. This value represents the simple correlation between the cue 'fascinating' and the student's interest in a subject.

Figure 4. 4 Correlations of judgements and cues (continued)

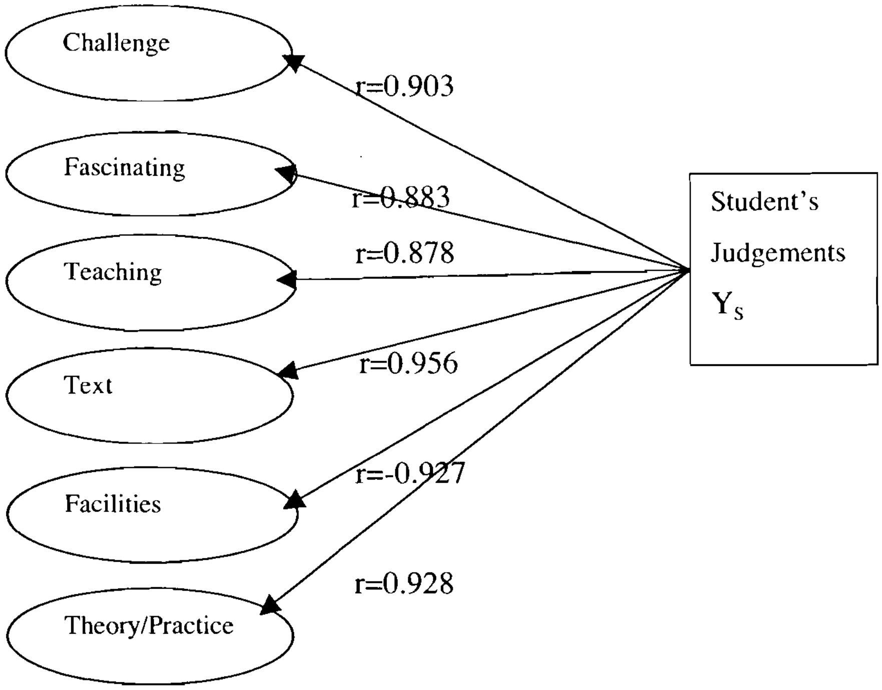
(c) Correlations of judgements and cues 0.5 (Judge Q)



For the final judge, Judge V, it is not really appropriate to interpret the beta coefficients due to the excessive collinearity. The individual correlations showed excessively high and positive correlations between each cue and the judgement of interest. As noted previously they were in the range of 0.87 to 0.95 (see Figure 4.4(d)).

Figure 4. 4 Correlations of judgements and cues (continued)

(d) Correlations of judgements and cues 0.8 (Judge V)



Summary

The pattern of judgements across the range of four cue intercorrelations of 0.0, 0.2, 0.5 and 0.8 revealed varying patterns of judgements with some expected outcomes. Firstly, the judgements were quite idiosyncratic. The mean levels of judgement across the four individuals were heterogeneous and increasing slightly across the four groups but it was not a monotonic increase. The individual correlations between cues and the level of judgement increased substantially as collinearity increased until with the 0.8 group the median cue-judgement correlation was 0.92 compared with around 0.1 for the 0.0 cue intercorrelations.

The multiple correlation increased somewhat as the cue intercorrelations increased but again it was not a uniform increase. The beta weights confirmed the idiosyncrasy of individual judgements. Overall, there was some support for the view that increased cue intercorrelations affected the perception of interest. Generally it was the case that the higher levels of multicollinearity resulted in higher levels of multiple correlations.

CASE STUDY 2 - SUBJECT RELEVANT FACTORS

In this section the results from the four most reliable Nigerian students who were exposed to six cues of varying intercorrelation are reported. These cues were:

- the extent to which a subject is easy to study;
- the extent to which a subject is important;
- the quality of teaching in a subject;
- the extent to which a subject is described as best subject;
- the usefulness of time studying a subject; and
- the relevance of time spent on a project.

The four most reliable participants selected were based on test-retest reliability results and the most complete answer sheets (Judge I from group 0.0, Judge S from group 0.2, Judge V from group 0.5 and Judge AN from group 0.8). The overall results of the group from which the four participants were selected are shown in Appendix E.

The absolute value of the judgements

Table 4.4 and Figure 4.5 (a) present the distribution of judgements for all four judges (I, S, V and AN) across the 60 profiles. The table also presents the mean scores and standard deviation for the judgements of interest.

This table shows significant differences between the mean scores of the selected participants. Judge S in the 0.2 group scored the highest mean (M= 6.6, SD=1.7) while judge AN in group 0.8 scored the lowest (M=4.0, SD=2.2).

The overall analysis of variance of difference between these mean judgements was statistically significant F (3,268) =42.56 07 p>0.0001). The mean differences are illustrated in the box plot in Figure 4.5 (b). All variables included in the study were tested for skewness and kurtosis and showed approximately normal distribution.

Table 4.4 Frequency distribution, mean and standard deviation of judgements

(a) Frequency distribution

Interest judgement	Judge I	Judge S	Judge V	Judge AN
0	5	0	0	3
1	4	0	1	5
2	5	2	4	9
3	9	2	13	7
4	5	3	13	9
5	10	6	16	13
6	4	11	8	6
7	8	18	4	5
8	5	9	1	0
9	5	9	0	3
Total	60	60	60	60

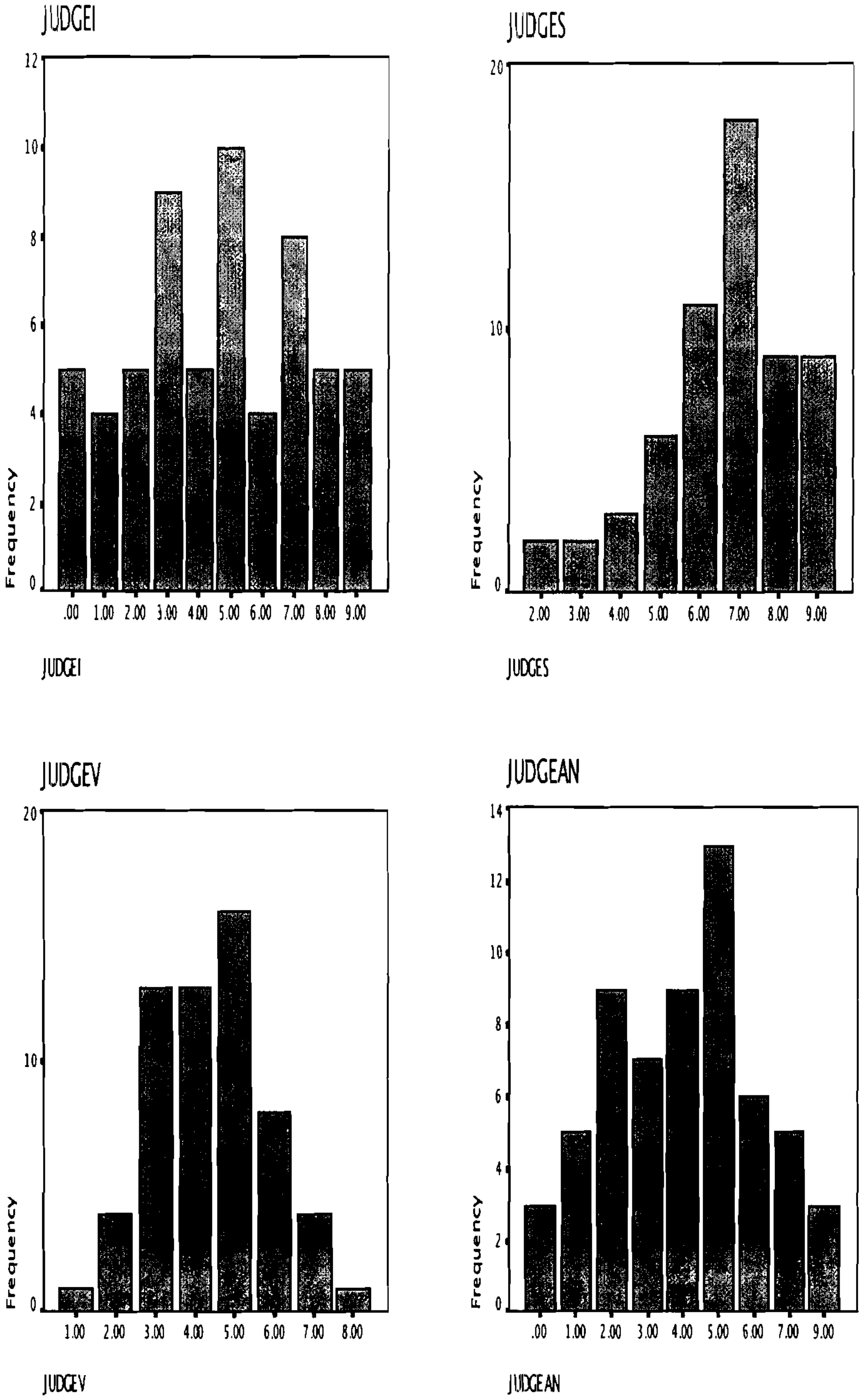
(b) Overall mean and standard deviation

Judge	Judgement of interest Mean (SD)	Different from[1]
0.0group Judge I	4.6 (2.7)	Judge AN, Judge V
0.2group Judge S	6.6 (1.7)	Judge AN, Judge V
0.5group Judge V	4.4 (1.5)	Judge S, Judge I
0.8group Judge AN	4.0 (2.2)	Judge S, Judge I

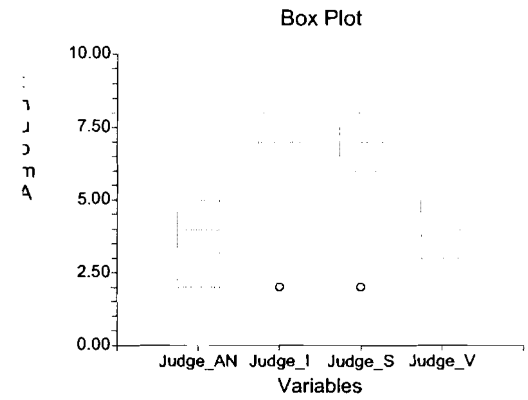
[1]Bonferroni all pairwise multiple comparison test, alpha=0.05 critical value=2.6383

Figure 4.5 Distribution of interest judgements

(a) Individual frequency charts of interest judgements



(**b**) Box plot for interest judgments



The multiple correlation between cues and the judgement

Table 4.5 shows the multiple correlation between the six cues and judgements. The multiple correlation was statistically significant and increased with the level of multicollinearity except for Judge V. The table also shows substantial differences between the judges. Judge AN in group 0.8 had the highest multiple correlation (0.991) followed by Judge S in group 0.2 (0.638) while judge I in group 0.0 scored the lowest multiple correlation (0.386).

Table 4.5 Model summary

Judge	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	F(6,53)
0.0 group Judge I	.386	.149	.052	.2.617	2.338	1.543**
0.2 group Judge S	.638	.407	.340	1.419	1.781	6.075***
0.5 group Judge V	.587	.344	.270	1.260	1.309	4.634***
0.8 group Judge AN	.991	.983	.981	0.306	1.778	512.1***

* p<0.05; **p<0.01; ***p<0.0001

The degree of autocorrelation as determined by the Durbin-Watson statistic is shown in column 6 of the Table 4.5. The Durbin-Watson statistic values are also reasonably close to 2 showing that there is no evidence of autocorrelation among the residuals.

Figure 4.6 shows the analysis of residuals – histograms and normality probability plots as well as the scattergram plot of residual vs. predicted values. As can be seen from each, the distribution of residuals is reasonably normally distributed but skewed in the case of Judge AN (see Figure 4.6(a))

.

Figure 4 6(b) shows the normal probability plots. These show that the points are clustered around a straight line indicating a normal distribution with exception of Judge AN.

The pattern of the scattergram of residuals plots versus the predicted Y values for each judge is shown in figure 4.6(c). The dots in the figures represent the observed data points and show that there are some differences between the four most reliable judges. As can be seen the dots for Judge AN show a strong linear relationship between the level of judgement interest and the residual value.

Figure 4.6 Analysis of residuals

(a) Residual analysis - histogram

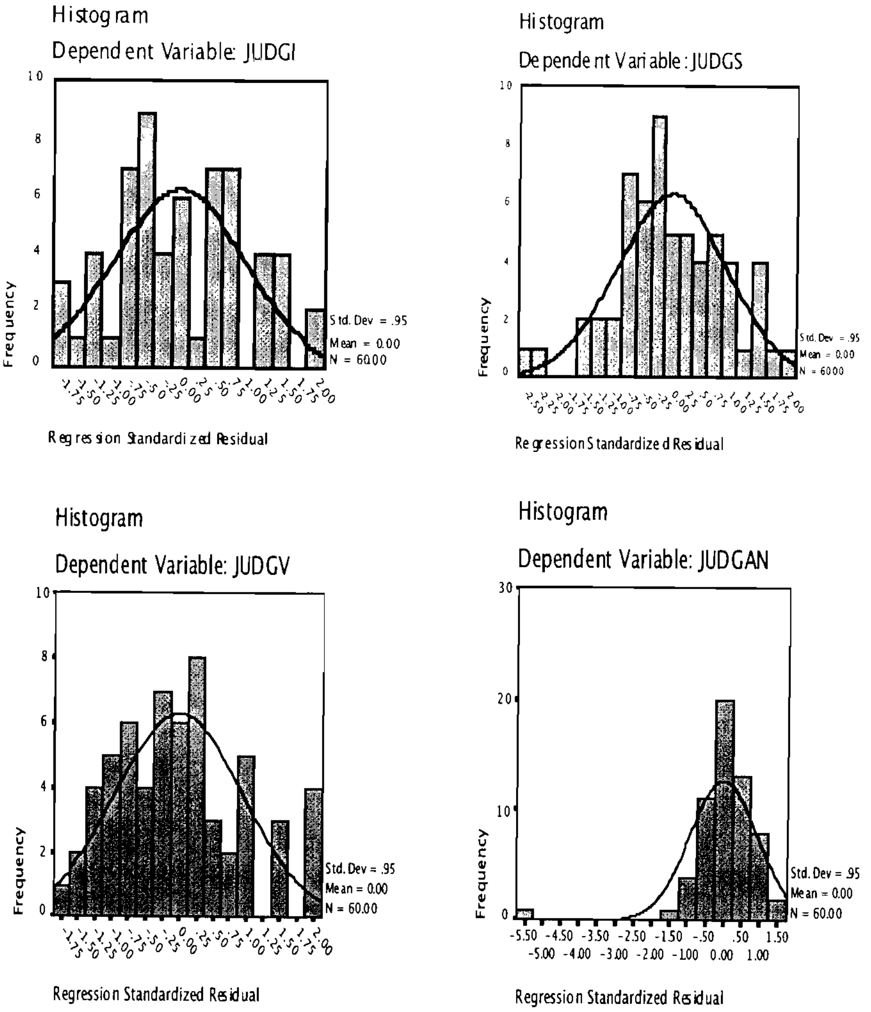


Figure 4.6 Analysis of residuals (continued)

(b) Residual analysis– normal probability plot

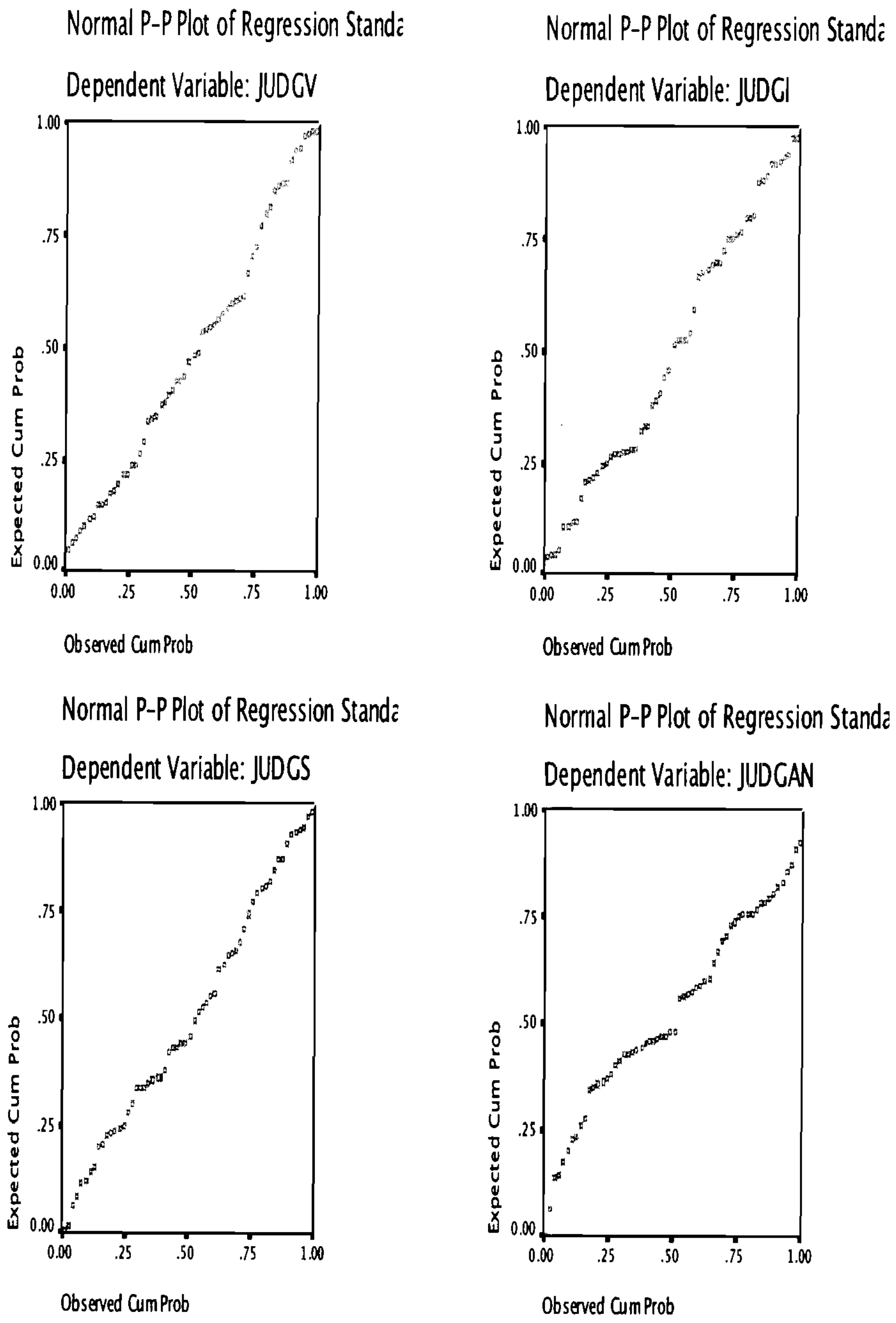
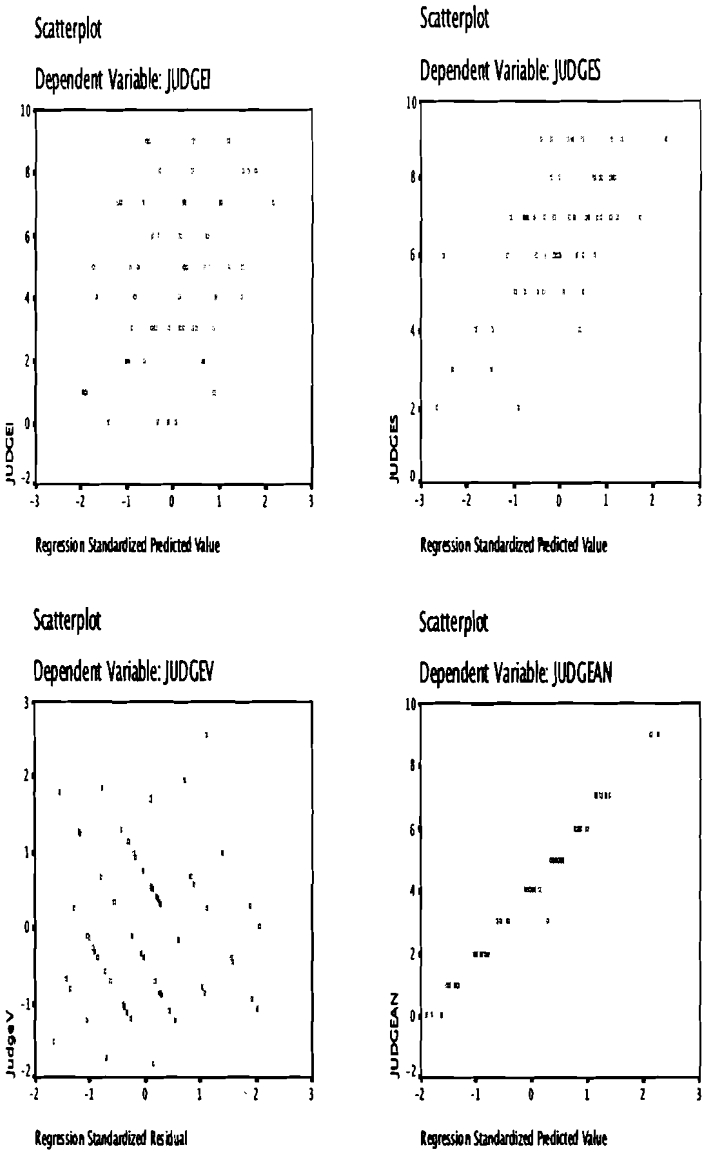


Figure 4.6 Analysis of residuals (continued)

(c) Residual analysis - predicted judgement plot

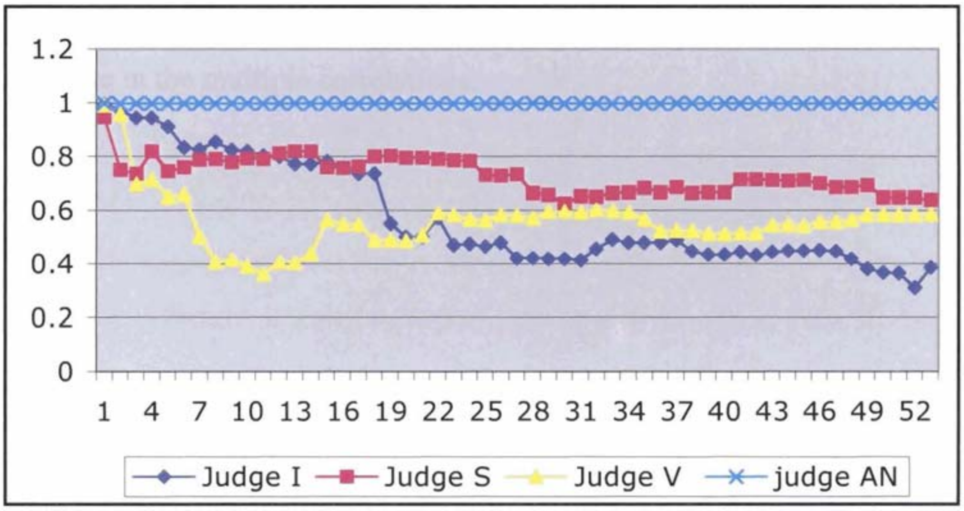


Before analysing standard beta weights, an additional analysis was performed on each judge. The multiple correlation was calculated for each judgement from the 7th to the 60th profile.

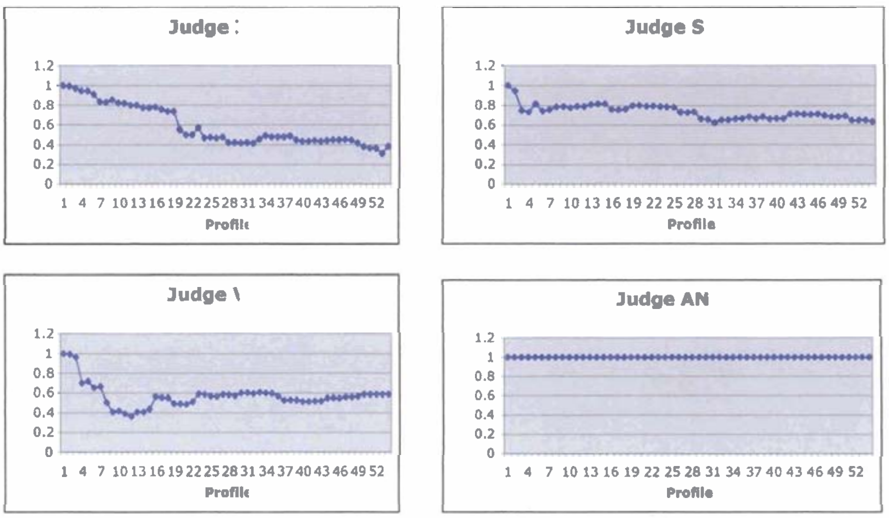
The aim was to investigate if there were any changes in judgement from the first to the last profile over time. The results are shown in Figure 4.7. The reader should note the different scale of vertical axes when interpreting the charts, especially the case of Judge AN.

Figure 4.7 Analysis of multiple correlation between cues and judgement after each profile.

(a) Overall



(b) Individual judges



Judge I varied in his or her judgement. The level of multiple correlation decreased before the first 30 judgments and then stabilised. Judge S also showed a decrease from a higher level of multiple correlation equal to 1 to a lower lever of multiple correlation equal to around 0.6 and became relatively constant between level of 0.6 and 0.7. Judge V similarly showed a decrease in the level of multiple correlation before the first 30 judgements then became relatively stable after the 24^{th} judgement. Judge AN showed a constant multiple correlation from 7^{th} to the 60^{th} profile but this is not adequately represented in the chart. In three cases there was evidence of an initial decline in the multiple correlations.

Table 4.6 Standardised coefficients

	Standardised Coefficients Beta	t	Correlation of Judgement and cues
0.0 group judge I			
Easy subject	.232	1.624*	.160
Important subject	.282	2.005*	.194
Quality of Teaching	.109	0.804	.079
Best subject	.010	-0.073	-.068
Time studying	.119	-0.856	-.222
Time assignment	.155	-1.169	-.137
0.2 group judge S			
Easy subject	.403	2.467	.403*
Important subject	.027	0.216	.257
Quality of Teaching	-.066	-0.572	.033
Best subject	.412	3.599**	.492*
Time studying	.250	2.224	.312
Time assignment	.029	0.226	.275
0.5 group judge V			
Easy subject	.407	2.627**	.467*
Important subject	.020	0.124	.305
Quality of Teaching	-.084	-.490	.342
Best subject	.305	2.011*	.414*
Time studying	-.280	-1.747	.206
Time assignment	.248	1.649	.437*
0.8 group judge AN			
Easy subject	.082	1.836	.894***
Important subject	.027	0.550	.872***
Quality of Teaching	-.181	-4.128***	.814***
Best subject	.076	1.527	.916***
Time studying	.186	3.609***	.905***
Time assignment	.808	16.461***	.985***

*p<0.05, **p<0.01, ***p<0.001

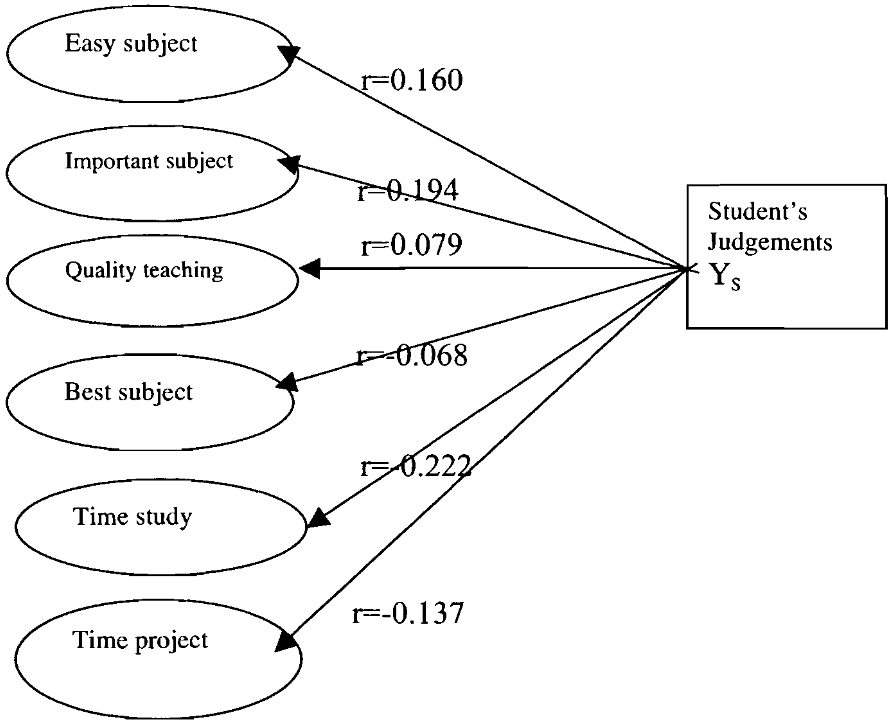
The standardised beta weights

For Judge I (group 0.0) the most significant cue was that relating to the important subject (see Table 4.6 Column 2). This variable was correlated 0.194 with the level of interest (see Column 4) and the beta coefficient was statistically significant for predicting the level of interest (t=2.005; p<0.05) (see Column 3).

Figures 4.8 (a-d) show the judgement-cue correlations. These are indicated as r. The largest positive r for Judge I (Figure 4.8 (a)) was 0.194. This value represents the correlation between the cue (important subject) and the student's judgement of interest in a subject he/she might be interested in studying.

Figure 4.8 Correlations of judgements and cues

(a) Correlations of judgements and cues 0.0 (Judge I)

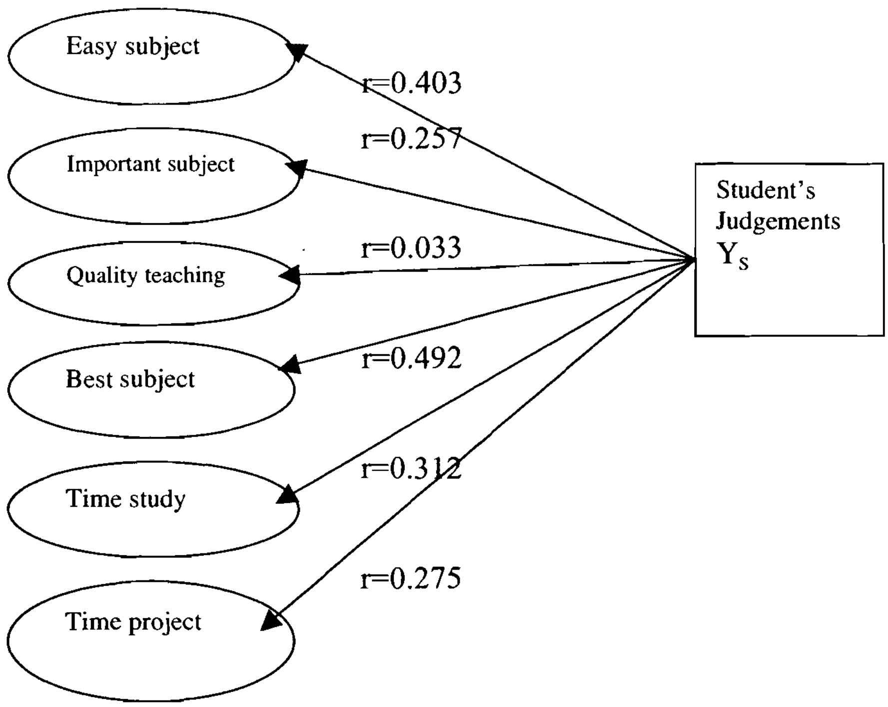


For Judge S (group 0.2) the most important cue was the best subject. This was correlated (0.492) with the judgement of interest. The beta weight coefficient was statistically significant for predicting his or her level of interest ($t=3.599$; $p< 0.001$) (see Table 4.6 Column 3).

The Figure 4.8(b) shows the six different r-values for the six predictors and they represent the correlation between the cues and the student judgement interest in a subject.

Figure 4.8 Correlations of judgements and cues (continued)

(b) Correlations of judgements and cues 0.2 (Judge S)

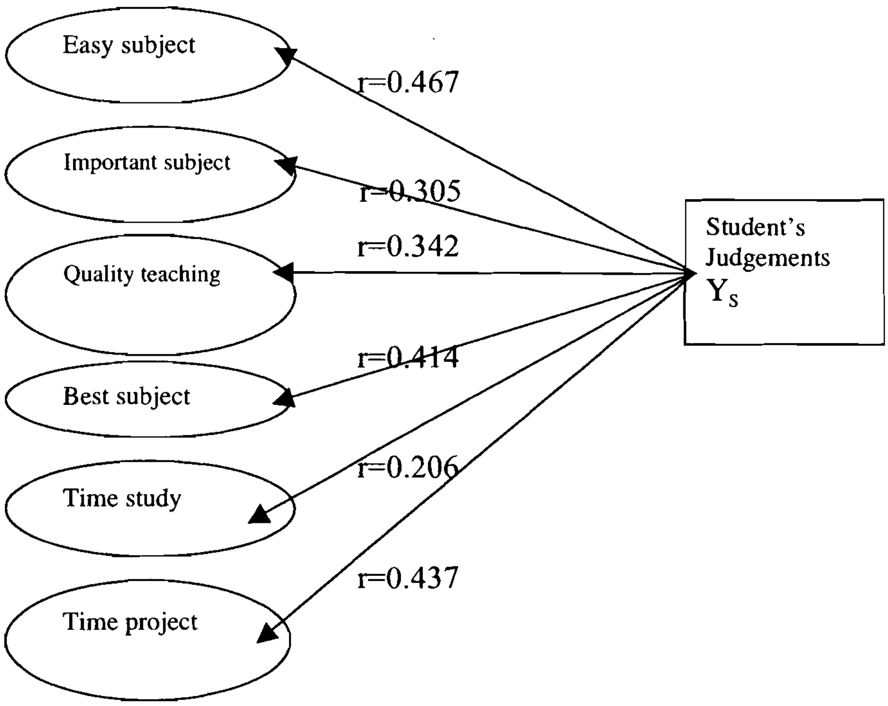


For Judge V (group 0.5) the most important cue was the easy subject. This cue was mainly used to determine his or her judgement of interest in a subject.

The easy subject was correlated (.467) with the level of interest (see Table 4.6 column 4 and Figure 4.8 (c)) and the beta coefficient was statistically significant for predicting his or her level of interest ($t=2.627$; $p<0.01$) (see Table 4.6 Column 3).

Figure 4.8 Correlations of judgements and cues (continued)

(c) Correlations of judgements and cues 0.5 (Judge V)

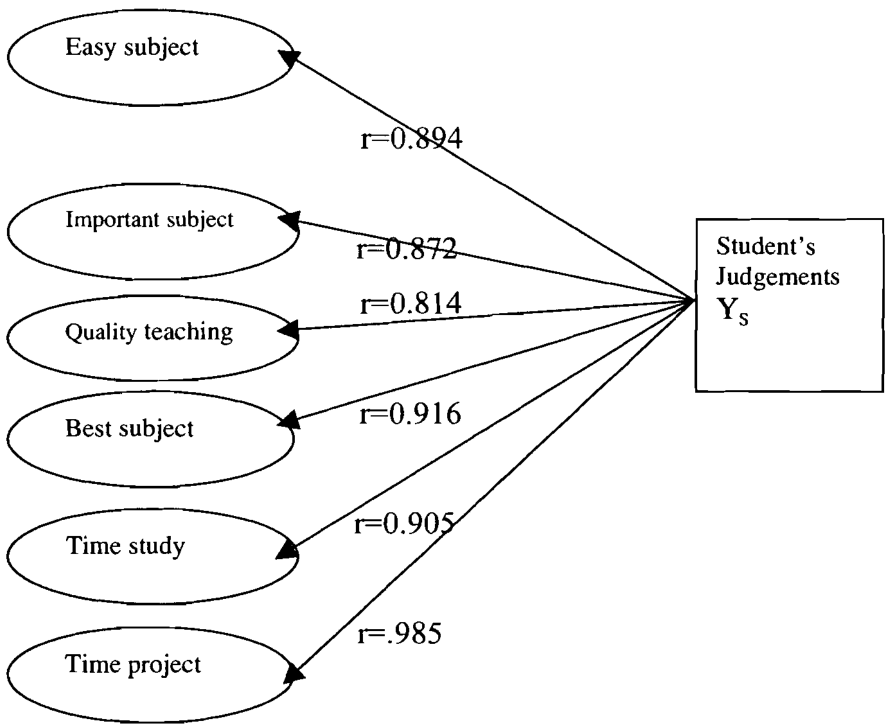


For the final Judge AN (group 0.8), the time spent on assignment/project was most important, although this must be interpreted with caution. This cue was used mainly for the judgement of interest. The individual cue judgement correlations were all very high.

The time spent on assignment/project was highly correlated (.985) with the judgement of interest. The beta weight coefficient (0.82) was statistically significant for predicting his or her level of interest ($t=16.461$; $p< 0.000$) (see Column 3). In this last case it may not be wise to analyse the beta coefficients due to the problem of collinearity.

Figure 4.8 Correlations of judgements and cues (continued)

(d) Correlation of judgement and cues 0.8 (Judge AN)



Summary

In this cohort, the level of multicollinearity seemed to lead to an increase in the use of cues. For the Judge AN there was a high cue–judgement correlation of 0.814 to 0.985. The multiple R increased between the 0.0 judge to the 0.8 judge. The beta weights confirmed the idiosyncrasy of individual judgements. Overall, there was some support for the view that increased cue intercorrelations affected the perception of interest. Generally it was the case of that the higher levels of multicollinearity resulted in higher levels of multiple correlation and certainly increased correlation of the cues with judgement.

CASE STUDY 3 – HOLLAND INTEREST TYPES

This section presents the results of the findings for the four most reliable Nigerian students who were exposed to six cues of increasing multicollinearity based on a description of the Holland interest types namely:

- Realistic interest;
- Investigative interest;
- Artistic interest;
- Social interest;
- Enterprising interest; and
- Conventional interest.

The results for the entire group of 40 students are shown in Appendix F.

The absolute value of the judgements

The four most reliable participants selected for the study were based on test-retest reliability results and the most complete answer sheets (Judge C from group 0.0, Judge L from group 0.2, Judge AC from group 0.5 and Judge AK from Group 0.8). The means and standard deviations for the judgements of interest are shown in Table 4.7 (see also Figure 4.9(a) for a distribution of judgements). The mean level for Judge C was 4.7 (SD = 2.1), 6.3 (SD = 1.2) for Judge L, 3.4 (SD = 1.9), for Judge AC and 5.1 (SD = 1.5) for Judge AK.

As can be seen there were differences between the mean scores of the reliable participants but no increasing level of judgements with increasing multicollinearity. The overall analyses of variance of the differences between these mean judgements were statistically significant (F= 3,236) = 3.98, p< 0.008) but the largest differences were in the comparison of Judges L and AC. The mean differences are illustrated in the box plot in Figure 4.7(b). All variables included in the study were tested for skewness and kurtosis and appeared to approximate a normal distribution.

Table 4.7 Frequency distribution, mean and standard deviation of judgements

(a) Frequency distribution

Interest Judgement	Judge C	Judge L	Judge AC	Judge AK
0	1	0	3	0
1	6	0	7	2
2	1	0	9	1
3	8	2	12	4
4	13	3	11	9
5	5	9	10	16
6	15	16	6	17
7	8	22	1	9
8	1	8	0	2
9	2	0	1	0
Total	60	60	60	60

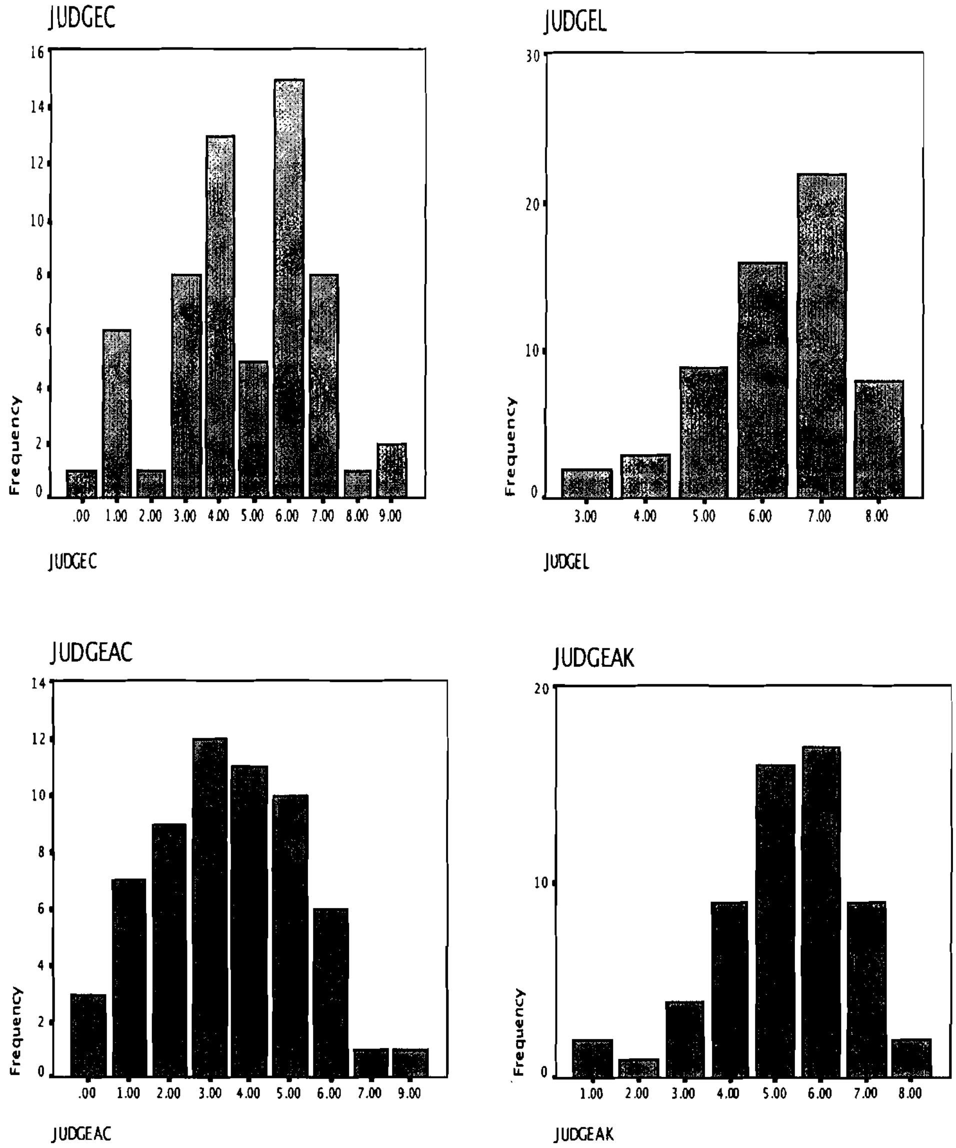
(b) Mean and standard deviation of judgements

Judge	Judgement of interest Mean (SD)	Different from[1]
0.0groupJudge C	4.7 (2.1)	Judge AC, Judge L.
0.2groupJudge L	6.3 (1.5)	Judge AC, judge C, Judge AK
0.5groupJudge AC	3.4 (1.9)	Judge C, Judge AK, Judge L
0.8groupJudge AK	5.1 (1.5)	Judge AC Judge L

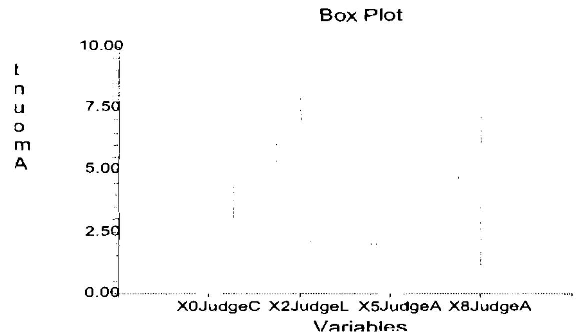
[1]Bonferroni all pairwise multiple comparison test, alpha=0.05 critical value=2.6383

Figure 4.9 Distribution of interest judgements

(a) Individual frequency charts of interest judgements



(b) Box plot for interest judgments



The multiple correlation between cues and the judgement

Table 4.8 shows the multiple correlation between the six cues and the judgements. The table also shows substantial differences between the judges. Judge AC in-group 0.5 had the highest multiple correlation (0.870) followed by Judge C in-group 0.0 (0.848) while Judge AK in-group 0.8 scored the lowest multiple correlation (0.105). This pattern was different from the earlier case studies.

Table 4.8 Model summary

Judge	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	F(6,53)
0.0 group Judge C	.848	720	.688	1.166	2.605	22.6**
0.2 group Judge L	.439	.193	.101	1.159	1.077	2.1*
0.5 group Judge AC	.870	.757	.729	.979	1.960	27.4**
0.8 group Judge AK	.105	.011	.101	1.582	0.616	0.09ns

***p<0.000, *p<0.07, ***p<0.000, ns p<0.358

The degree of autocorrelation as determined by the Durbin-Watson statistic is shown in column 6 of Table 4.8. For Judge AK the Durbin-Watson statistic value approaches zero and shows that there was evidence of autocorrelation among the residuals.

Figure 4.10 shows the analysis of residuals – histograms and normality probability plots as well as residuals vs. predicted Y. As can be seen from each the distribution of residuals is reasonably normally distributed but skewed in the case of Judge AK and extremely leptokurtic for Judge C. Figure 4 10(b) shows the normal probability plots. These show that the points are clustered around a straight line indicating a normal distribution with exception of Judges C and AK. The points may not be exactly clustered on the line due to the nature of the data. There is no special pattern in the scattergram of residuals versus the predicted Y for each judge (Figure 4.10 (c)), although there is evidence of a positive trend in the case of Judges C and AC

Figure 4.10 Analysis of residuals

(a) Residuals analysis - histograms

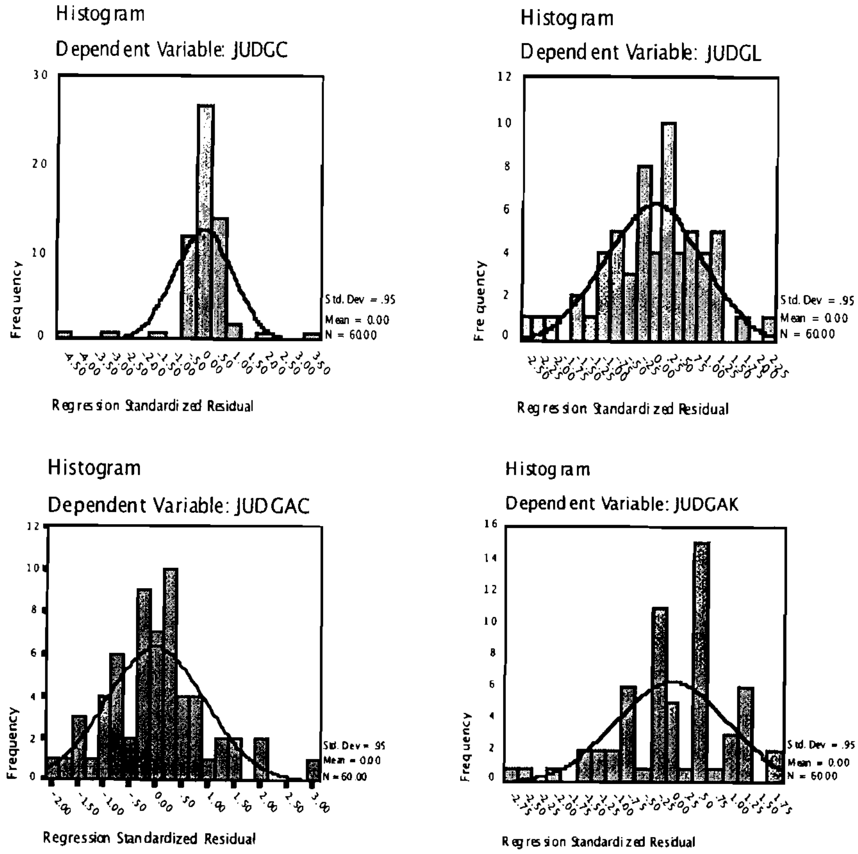


Figure 4.10 Analysis of residuals (continued)

(b) Residual analysis – Normal probability plot

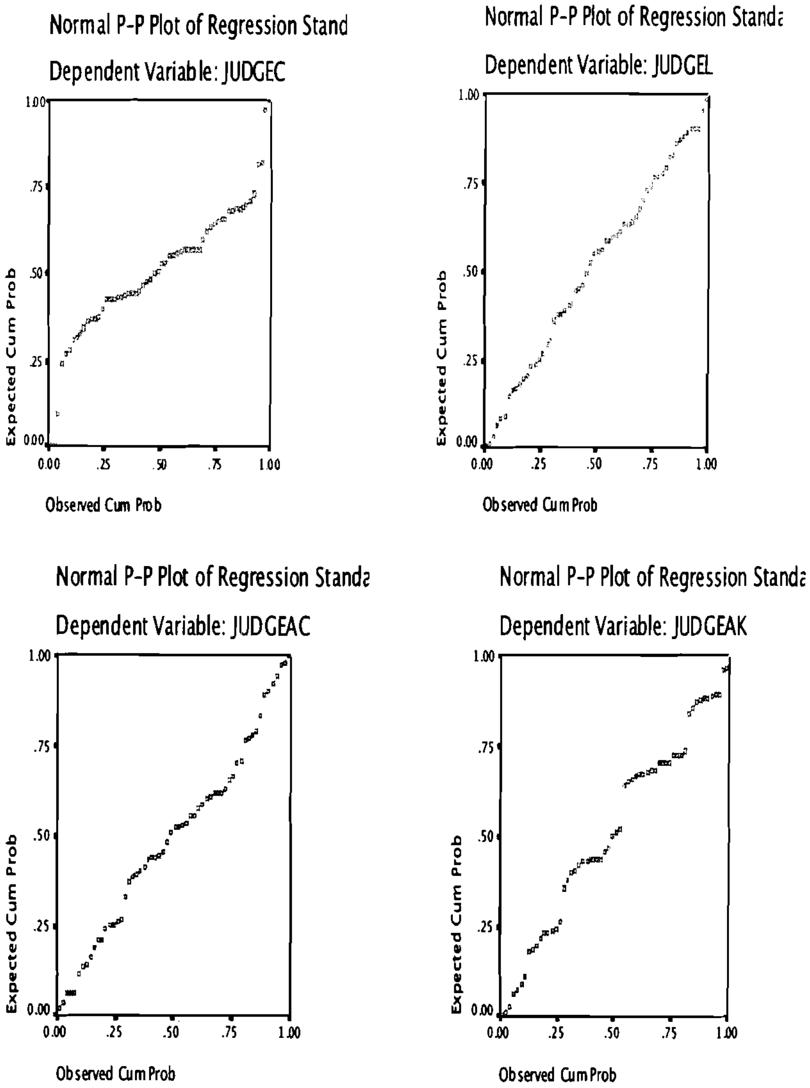
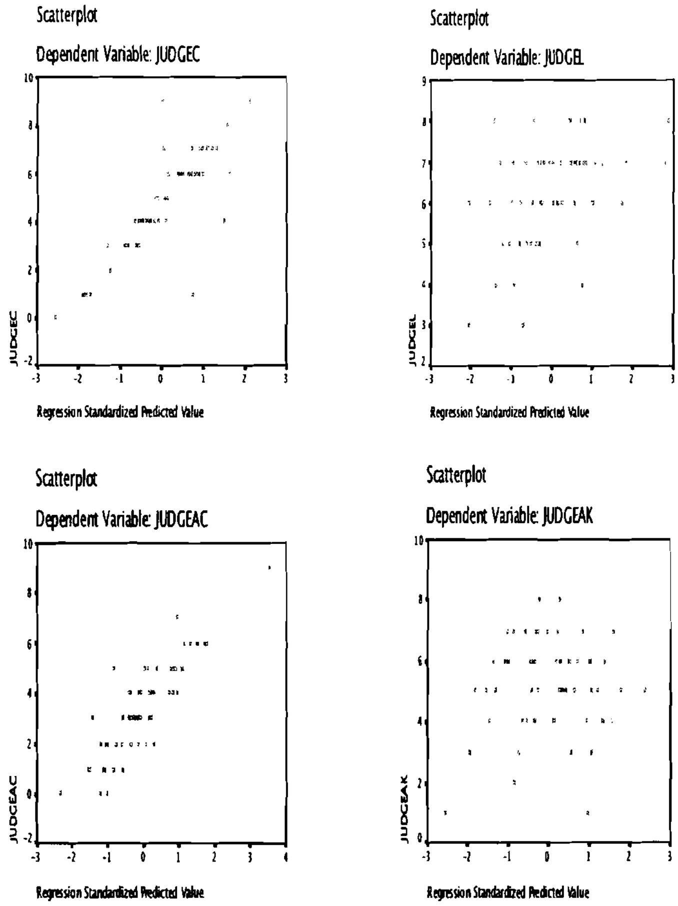


Figure 4.10 Analysis of residuals (continued)

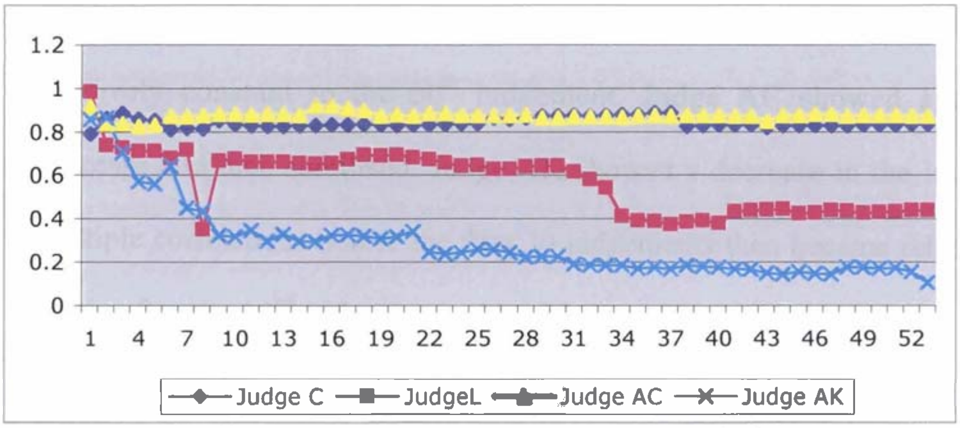
(c) Scattergram plot of residual vs. predicted value



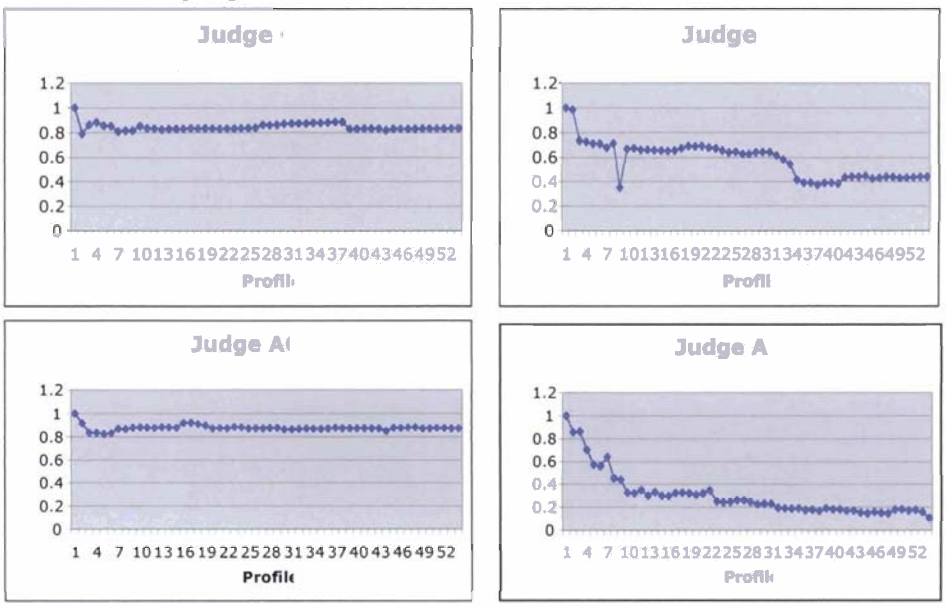
Before analysing standard beta weights, an additional analysis was performed on each judge. The multiple correlation was calculated for each judgement from the 7th to the 60th profile. The aim was to investigate if there were any changes in judgement from the first to the last profile over time. The results are illustrated in Figure 4.11. The reader should note the different scale of vertical axes when interpreting the charts.

Figure 4.11 Analysis of multiple correlation between cues and judgement after each profile

(a) Overall



(b) Individual judges



Judge C showed a decrease from a higher to a slightly lower level of multiple correlations, becoming relatively constant from the 10th judgement to the 60th judgement.

Judge L showed a decrease from the highest (1.0) to a much lower level of multiple correlation (0.36) again becoming relatively constant after 10th judgement and then a further decrease after the 34th judgement and then relatively constant to the 60th judgement. Judge AC showed a slight decrease and then stabilised. Judge AK showed a decrease in the level of multiple correlations before the first 30 judgements then became relatively stable after the 22nd judgement, although at a very low level. Again there was an initial decrease in the multiple correlation for all judges. It took quite some time for judgements to materialise, often well after the 30th judgement. There was no link between level of multicollinearity and pattern of judgements across profiles.

Table 4.9 Standardised coefficients

	Standardised Coefficients Beta	t	Correlation of judgements and cues
0.0 group Judge C			
Realistic interest	-.013	-0.161	-.272
Investigative interest	-.005	-0.064	-.014
Artistic interest	.156	2.005	.024
Social interest	-.050	-0.655	-.107
Enterprising interest	-.848	10.685	.832***
Conventional interest	.017	0.225	.094
0.2 group Judge L			
Realistic interest	-.332	-2.473	-.329*
Investigative interest	-.097	-0.667	-.038
Artistic interest	-.037	-0.274	-.038
Social interest	-.152	-1.140	-.230
Enterprising interest	-.203	-1.546	-.202
Conventional interest	.195	1.303	-.060
0.5 group Judge AC			
Realistic interest	.230	2.447	.664**
Investigative interest	-.059	-0.627	.521**
Artistic interest	.339	3.225	.770***
Social interest	.268	2.881	.681**
Enterprising interest	-.009	-0.097	.558**
Conventional interest	.280	3.147	.699**
0.8 group Judge AK			
Realistic interest	.167	0.478	.009
Investigative interest	.109	0.292	-.001
Artistic interest	-.133	-0.349	-.022
Social interest	.025	-0.066	-.017
Enterprising interest	.065	0.148	-.016
Conventional interest	-.248	-1.598	-.034

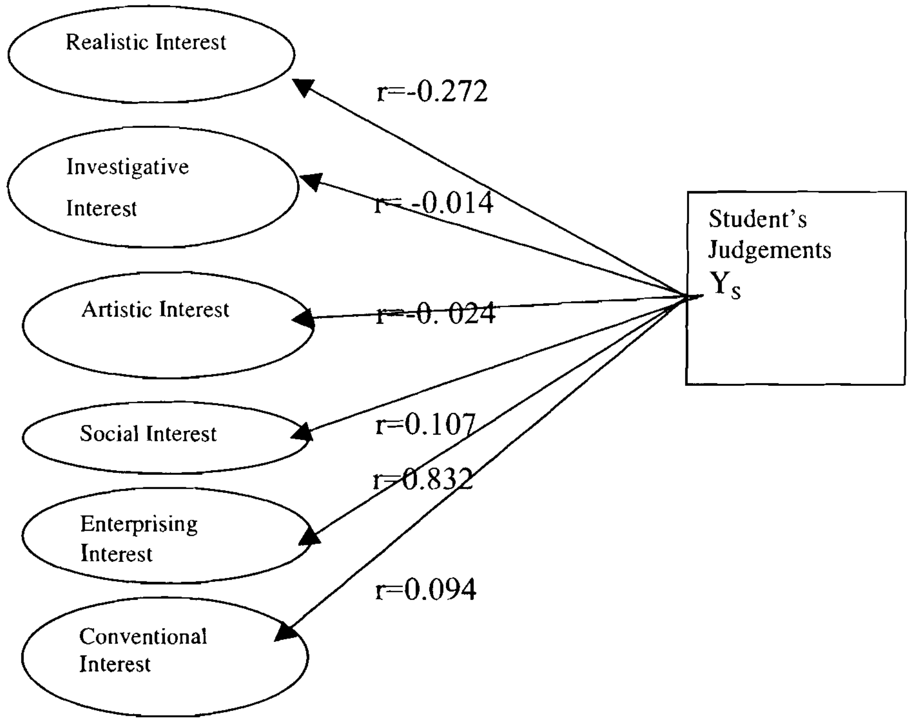
*p<0.05, **p<0.01, ***p<0.001

The standardised beta weights

An initial look at Table 4.9 identifies how individual judges determined their policies. For Judge C, (group 0.0) the cue 'Enterprising' was mainly used for the judgement of interest (see Table 4.9, Column 2). This variable was correlated 0.832 with the level of interest (see Table 4.9 Column 4 and Figure 4.12 (a)) and the beta coefficient was statistically significant for predicting the level of interest (t=10.6; p<0.001) (see Table 4.9 Column 3).

Figure 4.12 Correlations of judgements and cues

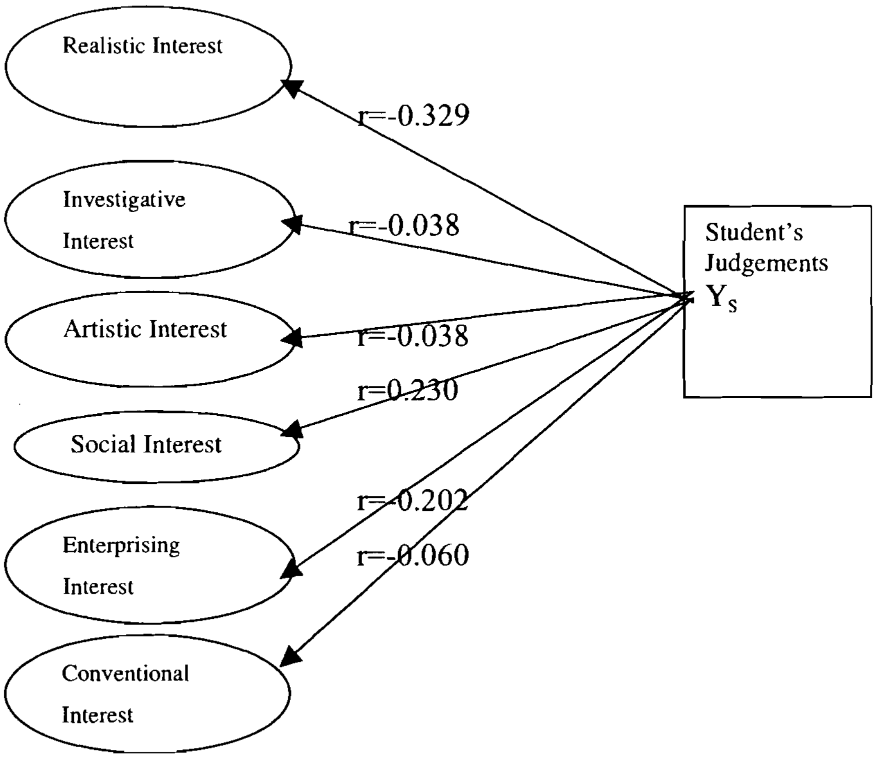
(a) Correlations of judgements and cues 0.0 (Judge C)



For Judge L (group 0.2) the significant cue was Realistic interest. Realistic interest was correlated –0.329 with the level of interest (see column 4 and also Figure 4.12(b)) and the beta coefficient was statistically significant (t=-2.5; p<0.017) (see Table 4.9 Column 3). Unusually, Realistic interest correlated negatively with the level of judgement. This is not readily explainable since Social interest (i.e., opposite to Realistic) was also negative.

Figure 4.12 Correlations of judgements and cues

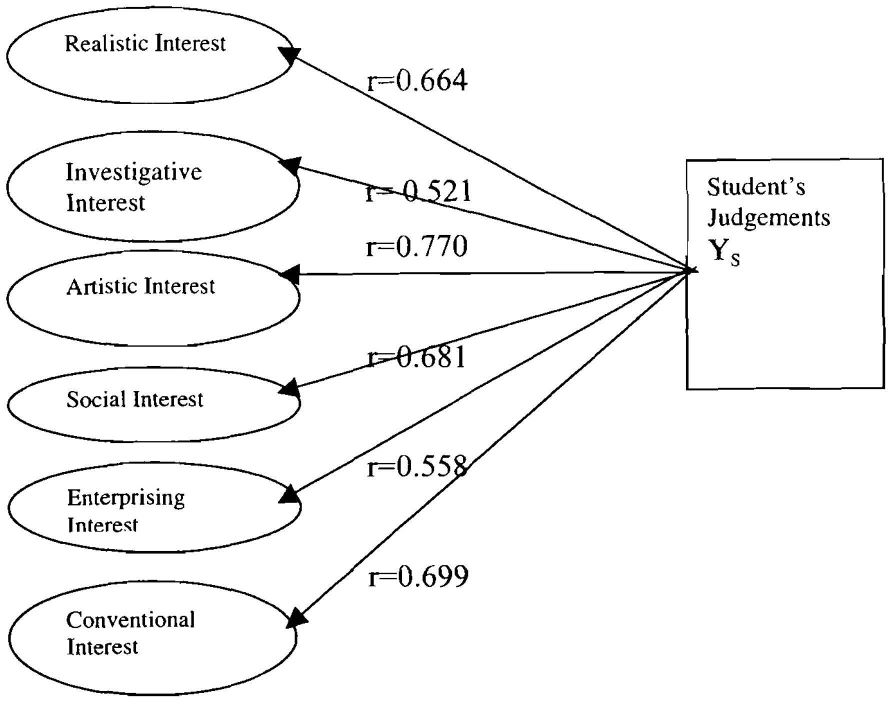
(b) Correlations of judgements and cues 0.2 (Judge L)



For Judge AC (group 0.5) the most important cue was Artistic interest. This cue was mainly used to determine the judgement of interest. Artistic interest was correlated 0.770 with the level of interest (see column 4 and Figure 4.12(c)) and the beta coefficient was statistically significant ($t=3.2$; $p<0.002$) (see Table 4.9 Column 3).

Figure 4.12 Correlations of judgements and cues

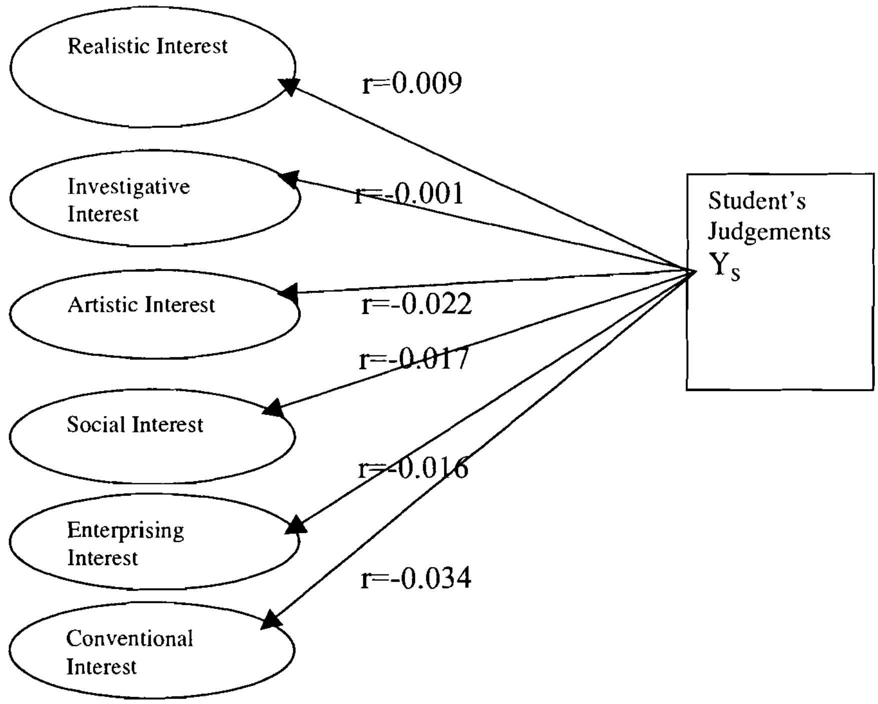
(c) Correlations of judgements and 0.5 (Judge AC)



For the final Judge AK (group 0.8) there was no special cue correlated with the judgement of interest. Cues had negative or low correlations. For this Judge the largest r was 0.009 (see table 4.9, column 4 and Figure 4.12 (d)). As can be seen for this judge with the highest multicollinearity, there were no relationships between the cues and the judgement of interests. This result is very unusual when compared with comparable persons in case studies 1 and 2.

Figure 4.12 Correlations of judgements and cues

(d) Correlations of judgements and cues 0.8 (Judge AK)



Summary

The pattern of judgements across the range of four inter-correlations of 0.0, 0.2, 0.5 and 0.8 showed varying and inconsistent patterns. The mean level of judgement across the four individuals was heterogeneous. It did not increase across the groups in conjunction with increased multicollinearity. The beta weights indicated marked idiosyncrasy of individual judgements. Overall, there was no support for the view that increased cue intercorrelations affected the perception of interest. Generally it was not the case that the higher levels of multicollinearity resulted in higher levels of multiple correlation. It is possible that the terms Realistic, Investigative Artistic, Social, Enterprising and Conventional were not culturally relevant for Nigerian students. Most importantly unlike the two previous case studies, the cue-judgement correlations (the last column in Table 4.9) failed to increase substantially.

CASE STUDY 4 –SELF SELECTED CUES

In this section the cues were self-selected and labelled as A, B, C, D, E and F. There was no special meaning given to these cues by the researcher. The four most reliable participants selected for the study were Judge G from group 0.0, Judge Q from group 0.2, Judge U from group 0.5 and Judge AG from group 0.8 based on test-retest reliability results and complete answer sheets. The overall results of the group from which the four participants were selected, are shown in Appendix G.

The absolute value of the judgements

The mean scores and standard deviation for the judgement of interest are presented in Table 4.10 (see also Figure 4.13). The mean level for Judge G was 5.3 (SD=1.9), 4.9 (SD=2.0) for Judge Q, 5.8 (SD=1.0) for Judge U and 4.6 (SD=2.2) for Judge AG. As can be seen in Table 4.10(b) there were significant differences between the mean scores of the most reliable participants but no increasing level of judgements with increasing multicollinearity. The overall analysis of variance of the differences between these means judgements was statistically significant (F=3,236) =3.98 p<0.008) with the largest difference between Judges U and AG (see Figure 4.13(b)). The mean differences are illustrated in the box plot in Figure 4.13(b). All variables included in the study were tested for skewness and kurtosis and showed approximately normal distribution.

Table 4.10 Frequency distribution, mean and standard deviation of judgements

(a) Frequency distribution

Interest Judgement	Judge G	Judge Q	Judge U	Judge AG
0	0	3	0	1
1	1	1	0	4
2	3	1	0	6
3	8	8	1	8
4	9	13	3	9
5	10	9	21	8
6	10	11	19	14
7	10	9	14	4
8	5	3	2	2
9	4	2	0	4
Total	60	60	60	60

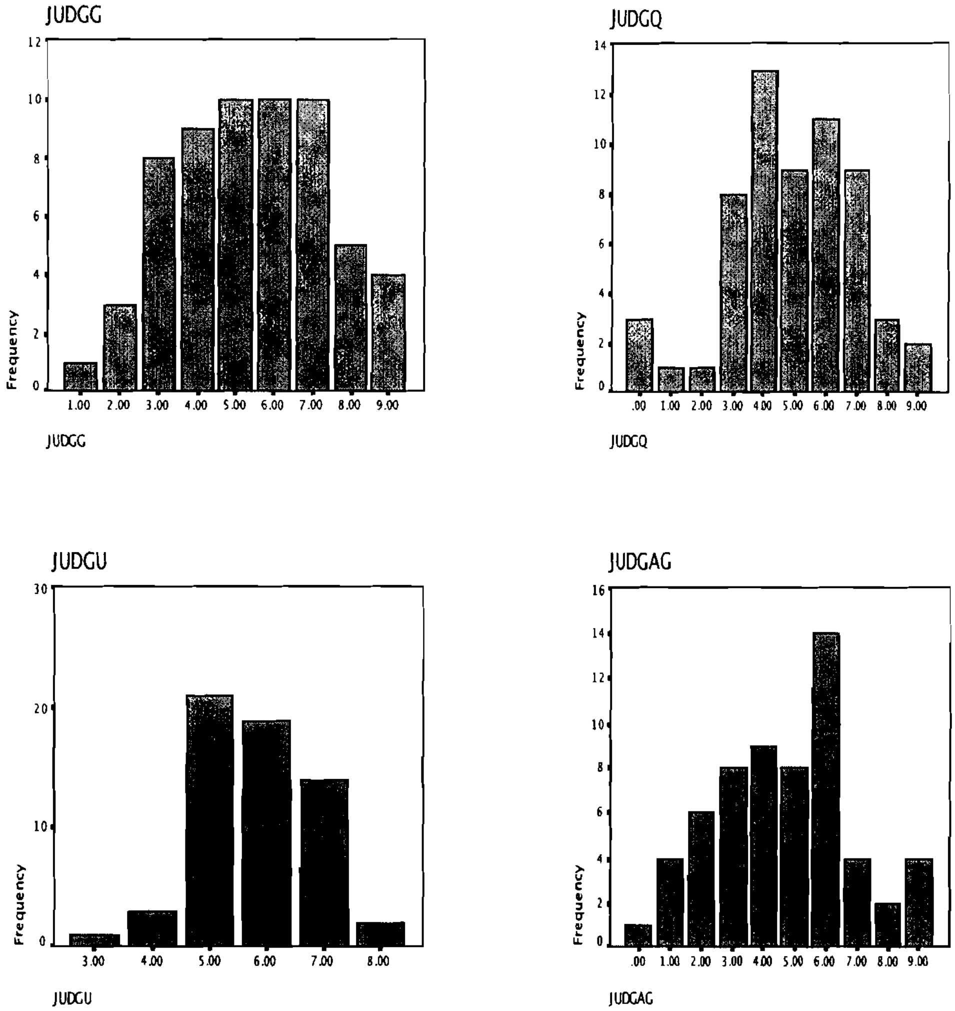
(b) Overall mean and standard deviation

Judge	Judgement of interest Mean (SD)	Different from[1]
0.0groupJudge G	5.3 (1.9)	
0.2groupJudge Q	4.9 (2.0)	
0.5groupJudge U	5.8 (1.0)	Judge AG
0.8groupJudge AG	4.6 (2.2)	Judge U

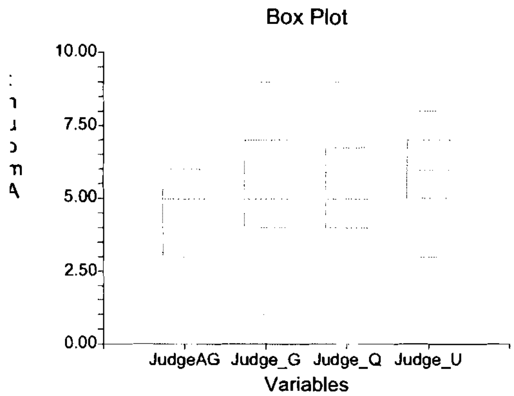
[1]Bonferroni all pairwise multiple comparison test, alpha=0.05 critical value=2.6383

Figure 4.13 Distribution of interest judgements

(a) Individual frequency charts of interest judgements



4.13 (b) Box plot for interest judgements



The multiple correlations between cues and judgement

Table 4.11 shows the multiple correlation between the six cues and judgments. In each case the multiple correlation was substantially low except for judge AG (R=0.788) from the group 0.8. The multiple correlation was statistically significant for Judge AG (Multiple R=0.788, (F(6,53) = 14.464, p<0.0001).

Table 4.11 Model summary

Judge	R	R Square	Adjusted R Square	StdError of theEstimate	Durbin-Watson	F(6.53)
0.0 group judge G	.288	.083	-.021	2,013	0.897	.796
0.2 group judge Q	.274	.075	-.030	2.091	1.823	.718
0.5 group judge U	.309	.095	-.007	1.025	1.603	.932
0.8 group judge AG	.788	.621	.578	1.439	2.338	14.464***

***p<0.0001

The degree of autocorrelation as determined by the Durbin–Watson statistic is shown in column 6 of Table 4.11. As can be seen the Durbin–Watson statistic for Judge AG is 2.3 and represents the upper critical value. For Judges G, Q and U the Durbin–Watson statistic values are less than 2 showing that there is no evidence of autocorrelation among the residuals.

Figure 4.14 shows the analysis of residuals – histograms and normality probability plots as well as scattergram plots of residual vs. predicted Y values. As can be seen from each the distribution of each residual is reasonably normally distributed but leptokurtic in the case of Judge AG.

Figure 4.14(b) shows the normal probability plots. These show that points are clustered around a straight line indicating normal distribution with exception of Judge AG. Figure 4.14(c) shows the scattergram plots of residual vs. predicted Y values and relationship between the judges and cues. In the case of Judge AG there was evidence of a positive linear relationship.

Figure 4.14 Analysis of residuals

(a) Residuals analysis-histogram

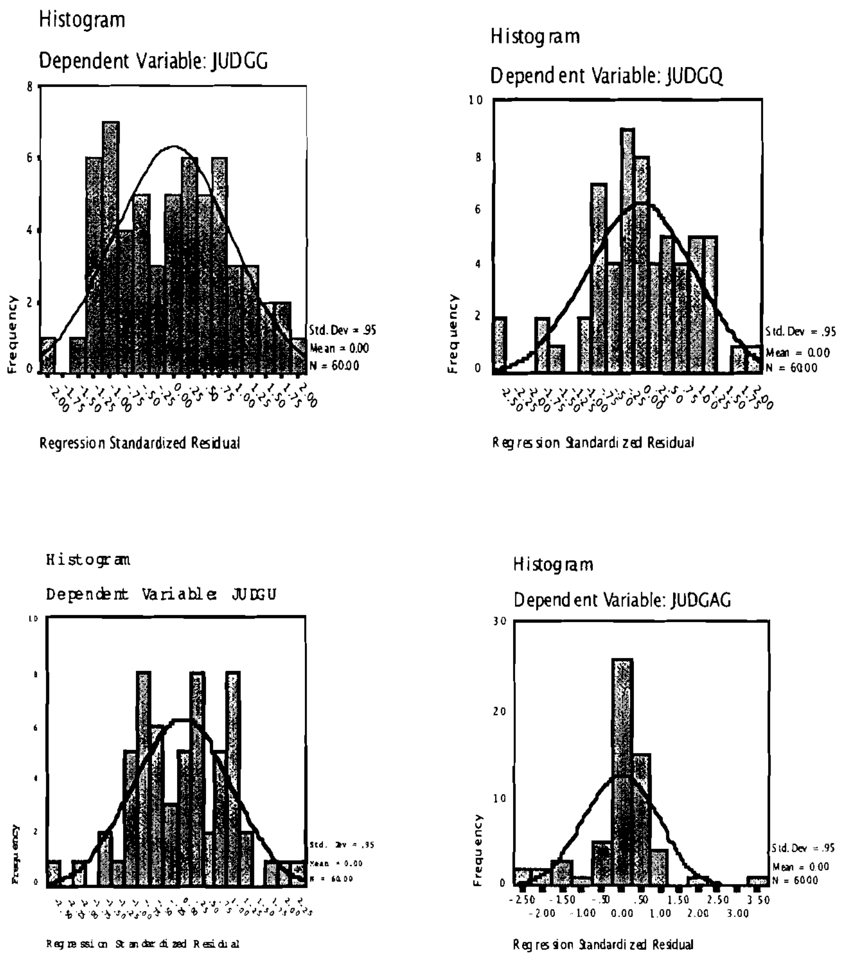


Figure 4.14 Analysis of residuals (continued)

(b) Residual-normal probability plot

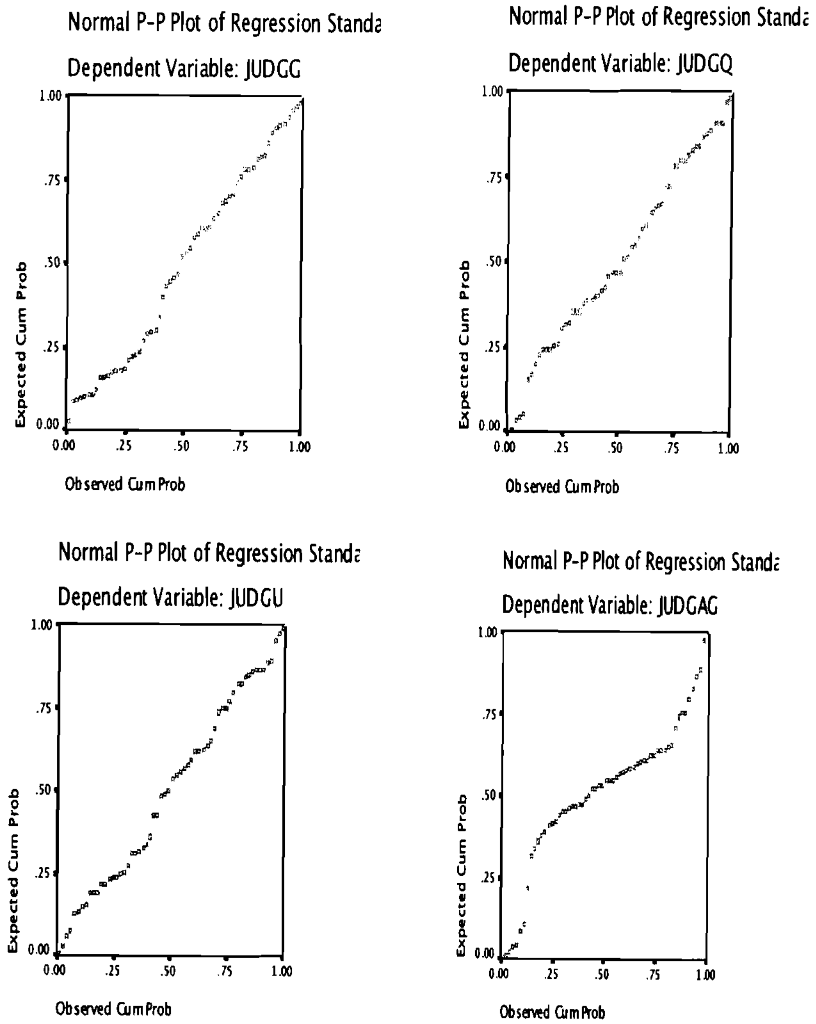
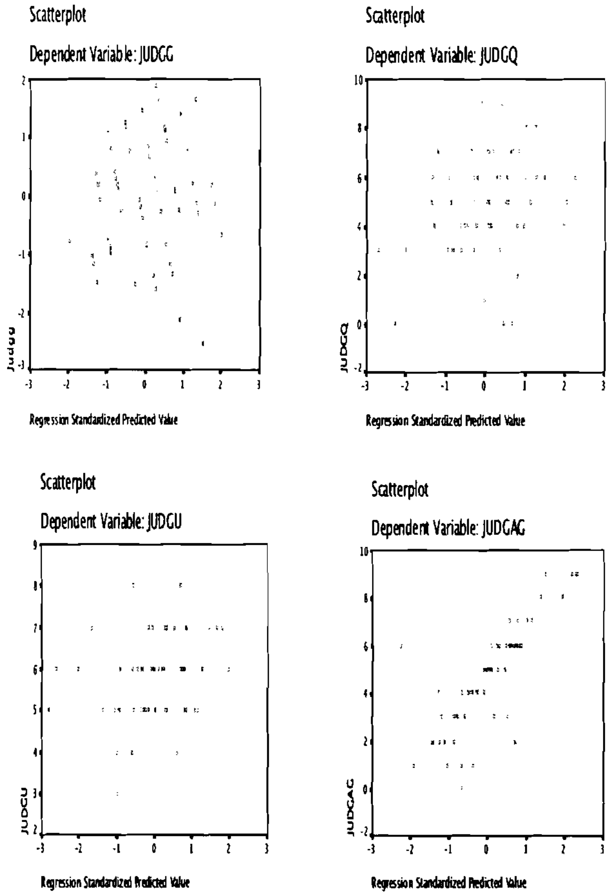


Figure 4.14 Analysis of residuals (continued)

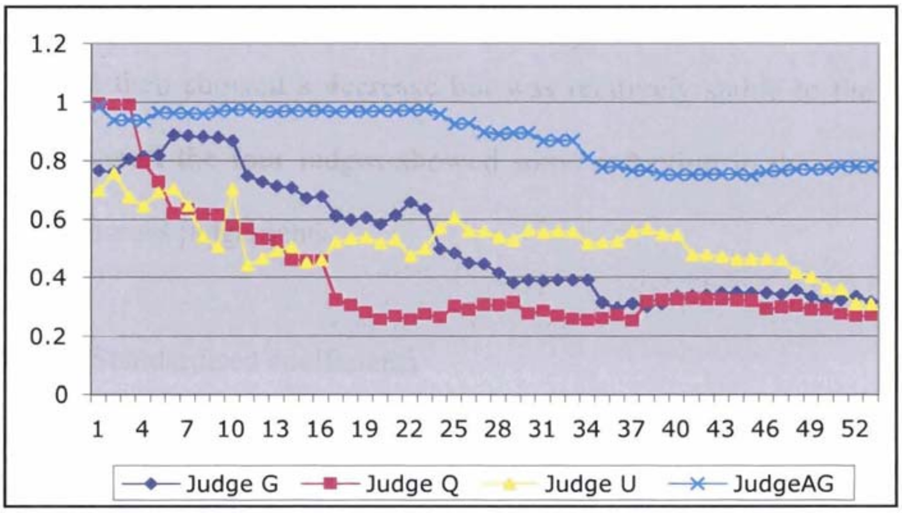
(c) Residuals analysis - predicted judgement plot



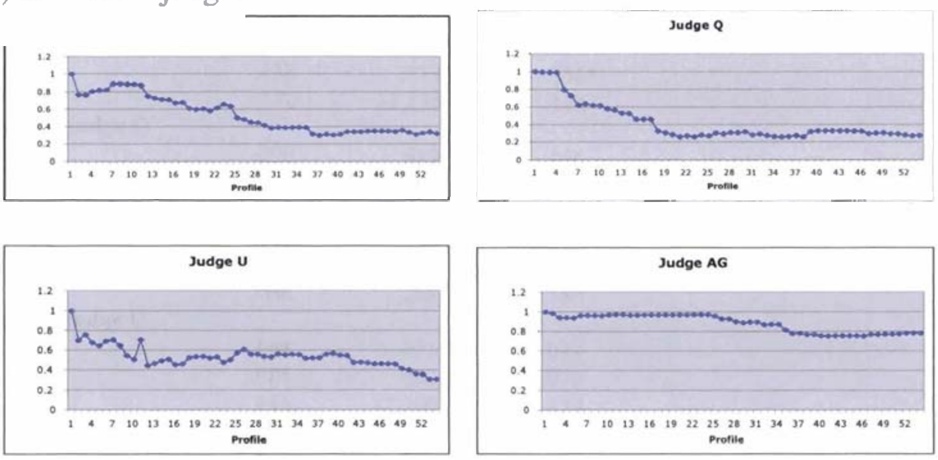
Before analysing standard beta weights, an additional analysis was performed on each judge. The multiple correlation was calculated for each judgement from the 7th to the 60th profile. The aim was to investigate if there were any changes in judgement from the first to the last profile over time. The results are illustrated in Figure 4.15. The reader should note the different scale of vertical axes when interpreting the charts.

Figure 4.15 Analysis of multiple correlation between cues and judgement after each profile

(a) Overall



(b) Individual judges



Judge G varied in his or her judgement. The level of multiple correlations decreased before the first 30 judgments and stabilised after the 40th to 49th judgements. Judge Q also showed a decrease from the highest level of multiple correlation (1.0) to a much lower level of multiple correlations equal to around 0.2 and again becoming relatively constant between judgements of 40 and 60. Judge U varied in his or her judgements.

The level of multiple correlations decreased before the first 30 judgments and was slightly stable from 41st to 48th and decreased again to the 60th judgement. Judge AG showed a constant multiple correlations from 7th to the 31st and then showed a decrease but was relatively stable to the 60th profile. Overall the four judges showed some reduction in the multiple correlation across judgements

Table 4.12 Standardised coefficients

	Standardised Coefficient beta	t	Correlation of judgements and cues
0.0 group judge G			
A	.109	.735*	.319*
B	-.094	-.646	.100
C	.155	1.102	.114
D	.033	.236*	.423*
E	.138	.959*	.336*
F	-.170	-1.236	.112
0.2 group judge Q			
A	.090	.619	.166
B	.247	1.588	.052
C	-.057	-.398	.497*
D	-.118	-.828	-.387*
E	-.091	-.650	.453*
F	.046	.285	.180
0.5 group judge U			
A	.088	.491	.041
B	.088	.490	.079
C	.446	-2.200	-.113
D	.229	1.269	.109
E	.042	.225	.058
F	.106	.623	.066
0.8 group Judge AG			
A	.233	-1.081**	.666**
B	.084	.367**	.699**
C	.169	.809***	.714***
D	.465	1.983***	.748***
E	.196	1.844***	.542***
F	.193	.776***	.735***

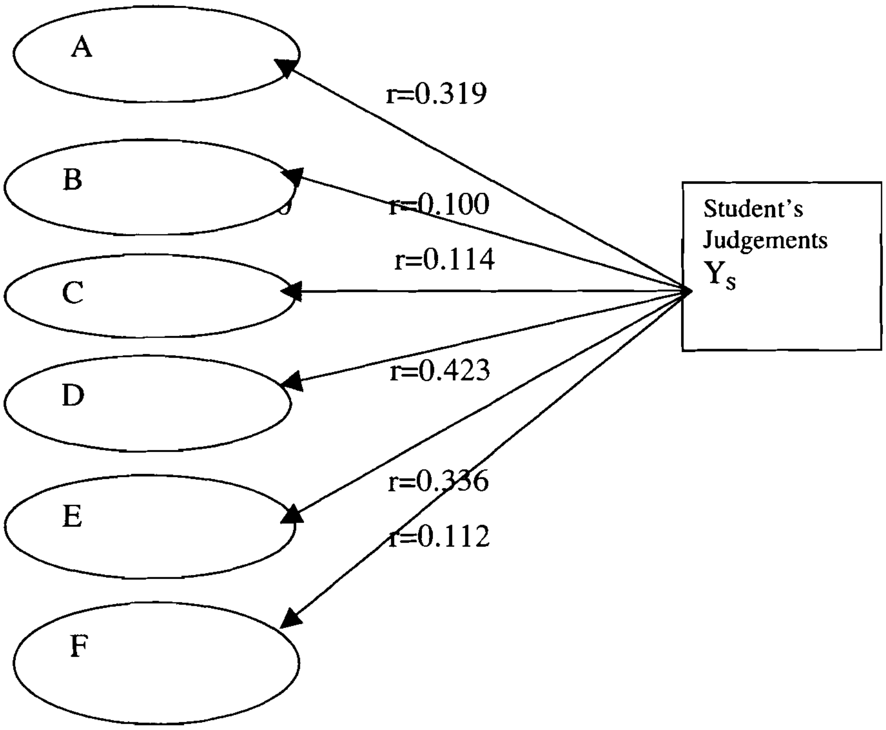
*p<0.05, **p<0.01, ***p<0.001

The standardised beta weights

For Judge G (group 0.0) the cue F was mainly used for the judgment of interest (see Table 4.12, column 2), but the standardised beta coefficient (-0.170) was not statistically significant for predicting his or her level of interest (t=-1.236 p<0.222). Figure 4.16(a) shows the six different predictors' values and these represent the correlation between the cues and the student judgements of interest in a subject. For Judge G the largest r-value was 0.423 and it represents the correlation between the cues and the judgement.

Figure 4.16 Correlations of judgements and cues

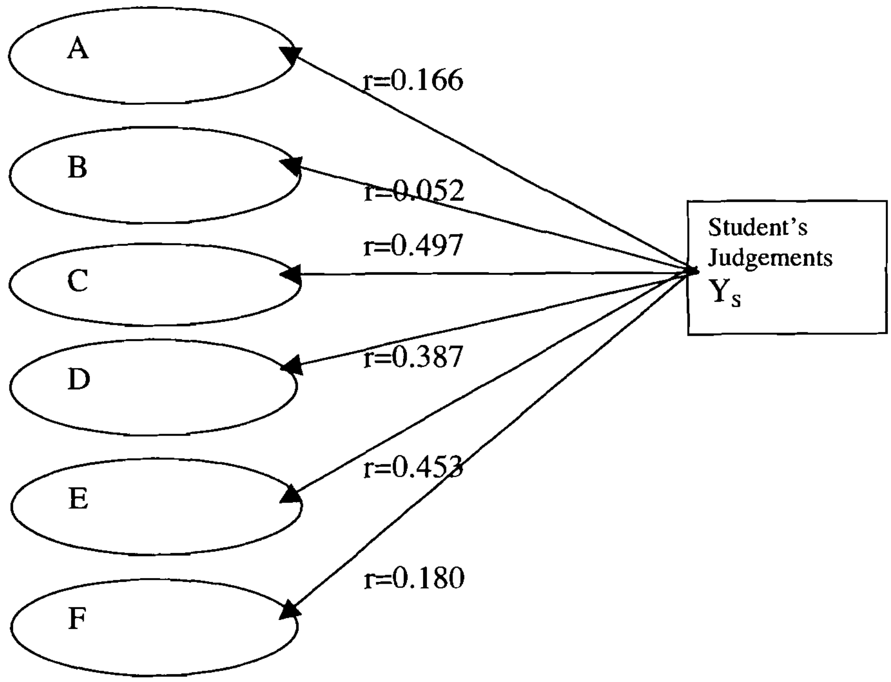
(a) Correlations of judgements and cues 0.0 (Judge G)



For Judge Q (group 0.2) the most important cue was B and the standardized beta coefficient (0.247) was statistically significant for predicting his or her level of interest (t=1.588, p<0.118). Figure 4.16 (b) shows the different values from six different predictors. These values represent the correlations between the cues and the student judgement interest in a subject. The largest r-value for this judge was 0.497 but it is not representative of the student's interest in a subject and could not be used to predict student interest in a subject.

Figure 4.16 Correlations of judgements and cues (continued)

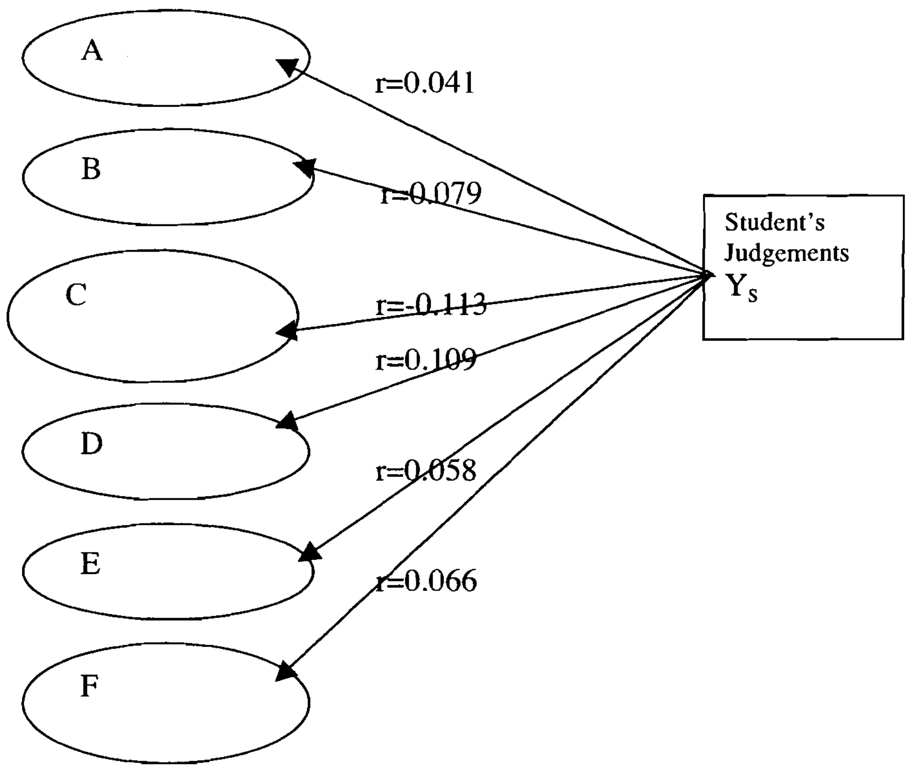
(b) Correlations of judgements and cue 0.2 (Judge Q)



For judge U (group 0.5) the most important cue was C and the standardized beta coefficient (0.446) was statistically significant for predicting his or her level of interest ($t=-2.200$, $p<0.03$). However, cue C had a correlation of -0.113 with the level of judgement of interest (see Table 4.12 Column 5 and Figure 4.16 (c)).

Figure 4.16 Correlations of judgements and cues (continued)

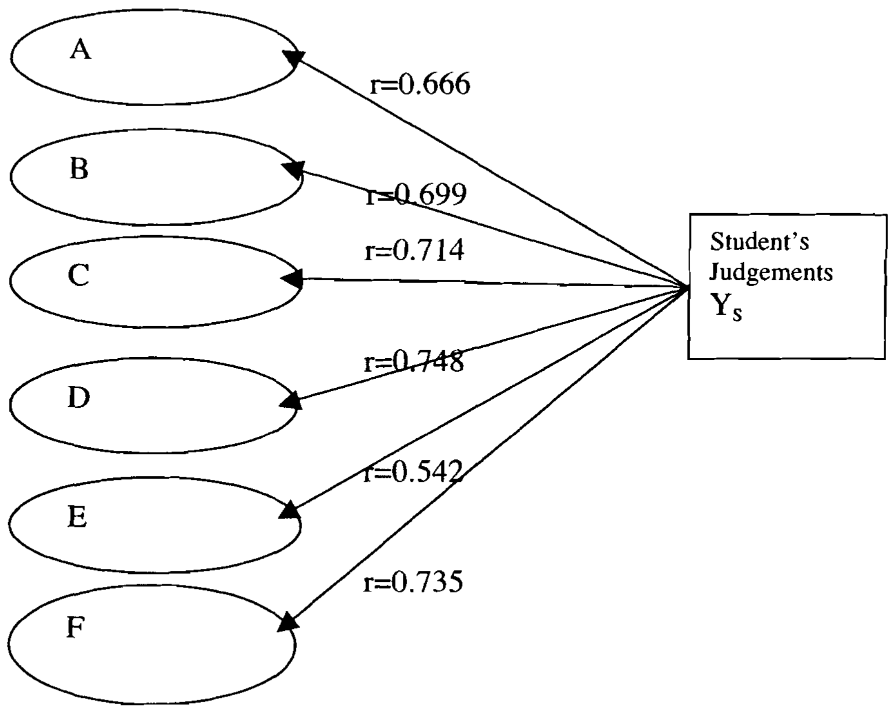
(c) Correlations of judgement and cue 0.5 (Judge U)



For judge AG (group 0.8), Cue D was the most important and the standardized beta coefficient (.465) was statistically significant for predicting his or her level of interest ($t=1.983$, $p<0.05$) was correlated 0.748 with the level of interest (see Column 5). Figure 4.16 (d) shows the different r-values for the six predictors. The largest r-value was 0.748.

Figure 4. 16 Correlations of judgements and cues (continued)

(d) Correlations of judgements and cue 0.8 (Judge AG)



Summary

The results show that the pattern of judgements across the range of four intercorrelation of 0.0, 0.2, 0.5 and 0.8 were varied. The mean levels of judgement across the four individuals were heterogeneous. The beta weights confirmed the idiosyncrasy of individual judgement. In addition test and retest reliability were performed for all case studies and the means and standard deviation of each scale for all case studies was assessed including the calculation of the reliability coefficient (Alpha.). In the statistical process all items contained within the original scale were maintained. The reliability test for all case studies showed that these items were positively correlated among themselves. Also the scales have fairly comparable variances, there were little difference between the two alphas, indicating that all scales obtained were quite reliable and valid.

Overall, there was some support for the view that increased cue intercorrelations at the highest level (0.8) affected the perception of interest. Generally it was the case that the highest level of multicollinearity resulted in the highest level of multiple correlations. They also resulted in increased cue-judgement correlations for the 0.8. In the next chapter the results are discussed and summarised. The chapter also outlines the conclusions and limitations of those four case studies. The results are considered within a wider context of the overall effects of cue intercorrelations.

CHAPTER 5

DISCUSSION AND SUMMARY

This study employed policy capturing in the single lens model using numerical judgments and the design was associated with the statistical process of multiple regression in order to investigate an individual's judgement. The conditions under which the cues were correlated were varied in order to determine the effect on the judgement process. As such, the results have implications not only for the judgement of educational interest but also any judgement under conditions of uncertainty. The results also have implications for the ways in which the world is perceived and the construction of reality when the world is presented to an individual in differing ways.

As far back as 1940, Brunswik suggested that the statistical approach of multiple regressions could be a fundamental method for understanding both the person-and-task-system in the context of human perceptions. This perspective was founded on an idiographical-statistical approach to decision making. It may well be described as a first step in understanding the characteristics of and conditions for the behaviour of every individual. Furthermore, the idiographic statistical approach came to be represented by samples of situations within an ecology in which it was advocated that each organism's behaviour should be statistically tested and examined individually before attempting to generalise or compare its behavioural trends with another organism. This study has followed that same research paradigm.

The study of how students use information to make a judgment of interest in a subject entailed hypothetical profiles that comprised a combination of cues. At the outset the key research question was: Does increasing the correlation between the items of information impact upon the nature of judgements made by people in terms of: (a) the correlation between each item of information and the judgement; or (b) the multiple correlation between all items and the judgement? The two aspects of this question will be considered in the following sections. The multiple correlation is essentially an outcome and secondly the correlations between each cue and the judgement in both is an outcome and also a component of the judgement. The first section looks at the larger picture of the effects of multicollinearity on the multiple correlation.

Multiple correlation and multicollinearity

Multiple correlation is traditionally or technically used to describe a captured judgement policy or process. The closer the multiple correlation indexes to 1 the better a researcher is able to describe the judge's policy. Table 5.1 summarises the multiple correlation for all 16 participants as well as the overall median value for the 0.0, 0.2, 0.5 and 0.8 conditions. Figures 5.1 (a-e) show the same judgement variations in the multiple R that were summarised in Table 5.1.

Table 5.1 Multiple R and median multiple R

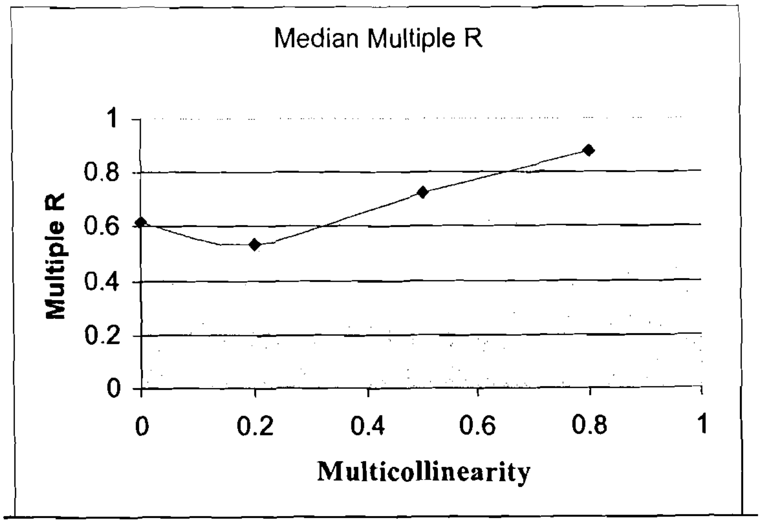
Conditions	Case study 1 Multiple R	Case study 2 Multiple R	Case study 3 Multiple R	Case study 4 Multiple R	Median Multiple R
0.0	0.934	0.386	0.848	0.288	0.617
0.2	0.824	0.638	0.439	0.274	0.538
0.5	0.929	0.587	0.870	0.309	0.728
0.8	0.968	0.991	0.105	0.788	0.881

Overall, the study directly addressed the topic of cue judgement relationships. As can be seen, the four fundamental function forms that are considered in the judgement analysis appeared at various levels (see Figures below). In addition the results described in the figures below can be seen as non-linear and U-shaped function forms in which a portion of inverted and U-shaped function can be considered as negative and positive linear. These describe the cue-judgement relationships between the level of multicollinearity and the multiple correlation.

This picture varied across the four case studies and within the case studies but it is clear that the multiple correlation is not uniformly and monotonically related to the level of multicollinearity. It may be difficult to say that increasing the multicollinearity automatically increased the multiple R in human judgements. There is a clearer overall picture, however, at the extremes of 0.0 and 0.8 multicollinearity where the relationship is that 0.0 intercorrelations resulted in lower multiple R than the 0.8 intercorrelations (with the exception of case study 3). The specific results for each group are summarised below.

Figure 5.1 Judgement variations across the four case studies based on multiple R and the level of multicollinearity

(a) Overall median multiple R



(b) Case study 1

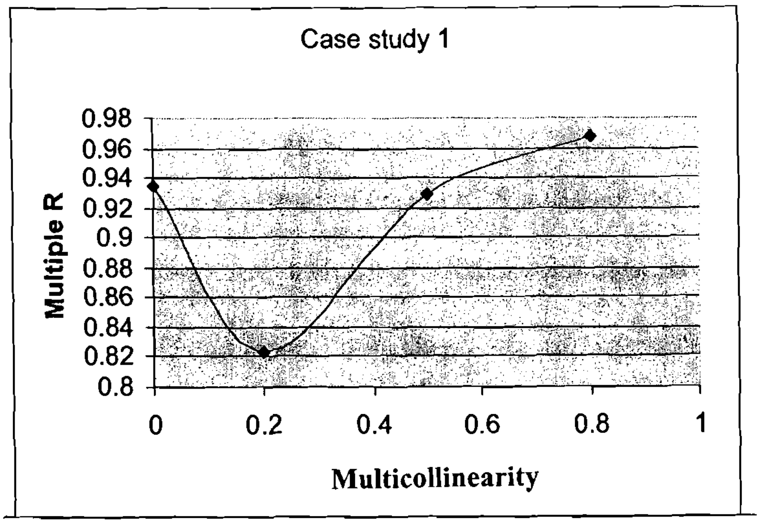
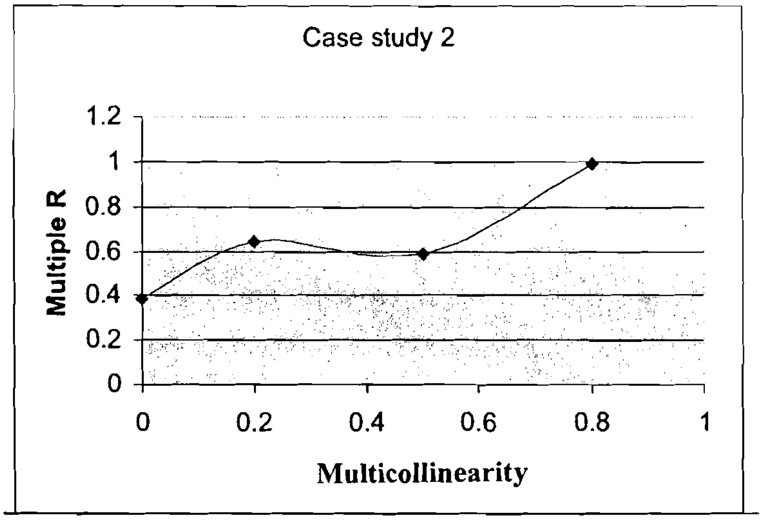


Figure 5.1 Judgement variations across the four case studies based on multiple R and the level of multicollinearity (continued)

(c) Case study 2



(d) Case study 3

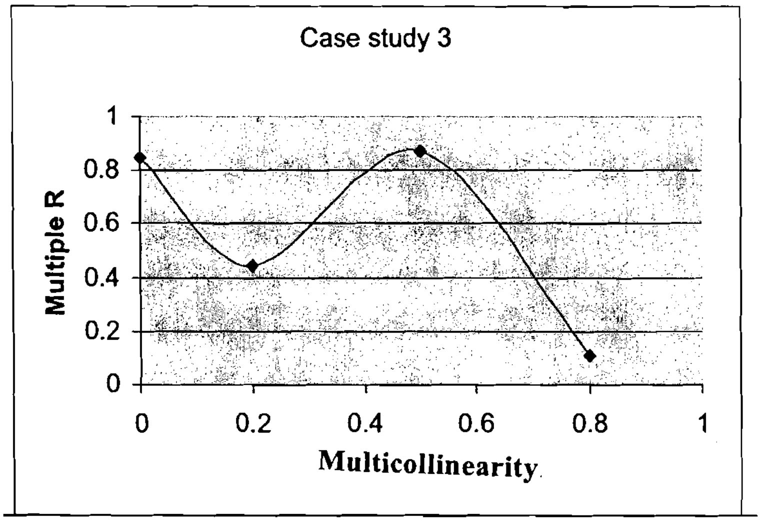
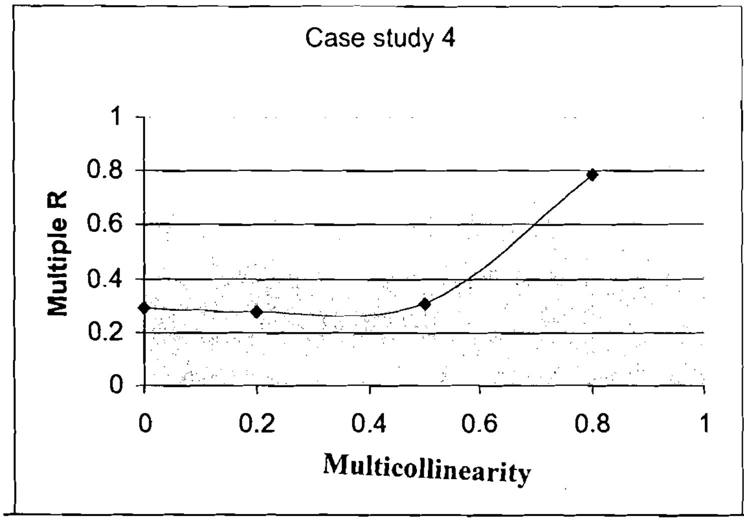


Figure 5.1 Judgement variations across the four case studies based on multiple R and the level of multicollinearity (continued)

(e) Case study 4



As can be seen the multiple correlation and multicollinearity varied from one case study to another. For case study 1 the multiple correlation between cues and judgements was substantially high ranging from (0.824 for Judge N in group 0.2 to 0.974 for Judge V in group 0.8). With the exception of Judge B (in group 0.0) there was an indication of an increase in multiple correlation from group 0.2 to 0.8 with increase in multicollinearity. The level of increase was not uniform and the overall values of multiple R were substantially higher for this case study compared to case studies 2, 3 and 4. For case study 1, the pattern of the multiple R is shown in Figure 5 1b.

For the case study 2 the results showed an initial increase in multiple correlation with the increase in multicollinearity from 0.0 to 0.2, but then, there was a fall between 0.2 and 0.5 and then a large increase for the 0.8 conditions. For case study 2, the pattern of the multiple R is shown in Figure 5.1c.

In the case study 3 the multiple R varied inexplicably. There was no uniform rise or increase in multiple correlation between the cues and judgements, however, there was a fall then a rise and a fall again in multiple correlation across the four groups. This pattern was unusual and different from the other studies. For case study 3, the pattern of the multiple R is shown in Figure 5.1d. For case study 4, the pattern of the multiple R is shown in Figure 5.1(e). The multiple R-values varied from 0.288 to 0.788 and the multiple R decreased slightly (if at all) from the 0.0 to 0.2 conditions then increased dramatically from the 0.5 to 0.8 conditions. These results might be considered consistent with the predictions in Chapter 2 (see especially Table 2.1) where in some instances the multiple correlation would (a) increase, in others (b) it would decrease then increase and in other instances (c) it would decrease with the level of multicollinearity. [By way of comparison, the correlation between the level of multicollinearity and the multiple R for the 16 participants was only 0.28 compared with 0.04 from the values in Table 2.1 (note computation of these correlations is not strictly applicable given the potentially U-shaped distribution).] In any event, it was noted that for any combination of variables related to interest, the multiple correlation is likely to produce results that are difficult to predict and this is even more the case when there are six independent variables and a mixture of positive and negative correlations.

As can be seen in these results from the 16 participants, there was no uniform increase but a variation in falls and rises across all studies. It may be the case that the intermediate conditions of multicollinearity are perceived in a complex fashion and that the distinction between 0.2 and 0.5 in multicollinearity are too difficult for all participants to perceive or apply in their judgements. Most importantly, however, the median multiple R increased from 0.617 (for the 0.0 conditions) to 0.881(for the 0.8 condition). The important implication here is that the level of multicollinearity at its extremes may be able to influence the perception of interest and by extension, possibly the perception of the 'real' world. The variations in findings with the multiple R, however, contrast markedly with the consistency of findings in the cue-criterion or cue-judgement correlations.

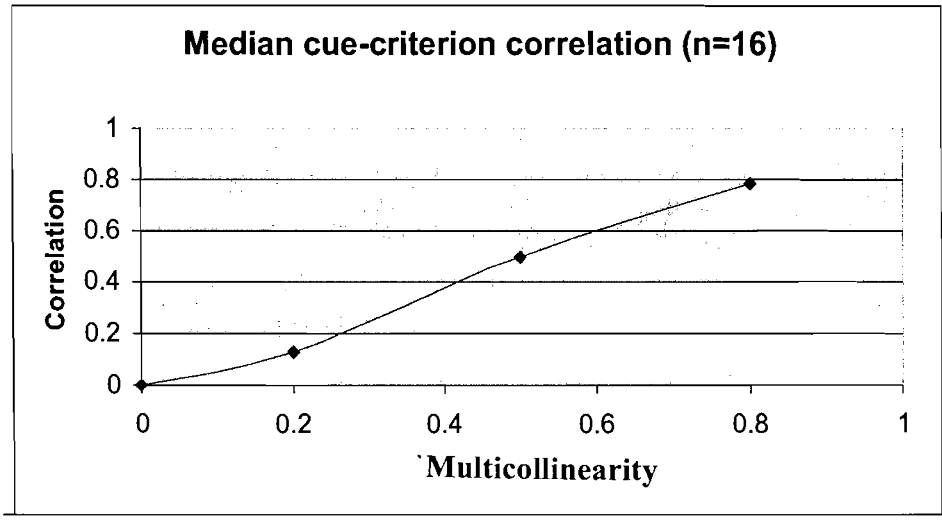
Correlation between each item of information and the judgement under varying conditions of multicollinearity

Table 5.2 summarises the median cue-criterion correlation for each of the 16 participants as well as providing an overall median value for all 16 participants. In this case the results are quite clear-cut and almost uniform across all studies. Increases in multicollinearity led to a marked and monotonic increase in the cue-criterion correlation from the 0.0 group to the 0.8 group. It is also illustrated in Figure 5.2.

Table 5.2 Median cue-criterion correlations

Conditions	Case study 1 Median r	Case study 2 Median r	Case study 3 Median r	Case study 4 Median r	Overall Median r
0.0	-0.078	-0.068	0.005	0.0045	0.002
0.2	0.4225	0.2935	-0.131	0.0595	0.125
0.5	0.736	0.378	0.6725	0.062	0.494
0.8	0.915	0.8995	-0.0165	0.7065	0.781

Figure 5.2 Judgement variations across the four case studies based on the median cue-criterion correlation and the level of multicollinearity



This meant that as the level of multicollinearity increased, the participants relied on each of the cues almost to the same extent as the level of the multicollinearity. Thus, the level of cue intercorrelations had a greater effect on individual cue-criterion relationships than it had on the multiple R.

In the single lens model, it was only possible to control the content of the cues and the value of the intercorrelations. Indeed as indicated in Chapter 2, it was not possible to know in advance what value an individual will place upon a factor when determining his/her level of interest. It seems strange, therefore, that there was this unique relationship between multicollineairty and cue-criterion correlations. There was no special *a priori* reason in Table 2.1 for there to be a relationship between the values of r_{ab} (cue-criterion) and r_{bc} (cue intercorrelation or multicollinearity) or between r_{ac} (cue-criterion) and r_{bc}(cue intercorrelation or multicollinearity). In this study, irrespective of the content of the cues and the disparity in results with the multiple R it was noted that the multicollinearity between variables was related to the links between a predictor of interest and the criterion judgement of interest.

The values of the cue-criterion correlations also influenced slightly the value of the multiple R. This was noted in the earlier section on the multiple R results, especially at the extremes of the 0.0 and 0.8 groups. As the values of the cue-criterion correlations increased so did the multiple R. This also followed directly from the multiple correlation formula. To summarise, these results showed that the level of multicollinearity affected the cue-judgement correlations in the single lens model but was varied in its effect on the level of multiple correlation between the cues and the judgements in the single lens model. This former result was not consistent with predictions or expectations and has not previously been reported in the literature on social judgement analysis (Cooksey, 1996).

The effect of selecting the most reliable participants

The previous sections have dealt with the results from the four case studies of 16 participants who were specially selected on the basis of test re-test reliability. At the outset there was a concern to obtain data of high quality and reliability was a necessary but not sufficient condition for validity. The reader may rightly ask, however, whether this selection has influenced or skewed the results in some fashion.

The results for all 156 participants that are listed in Appendices D to G were summarised and the results appear in Table 5.3. This table indicates the median cue-criterion correlations for all participants across the four conditions, the median multiple R values that were obtained and the median test-restest correlations.

Table 5.3 Median correlations with increasing multicollinearity

	Multicollinearity condition			
Criterion measures	**0**	**0.2**	**0.5**	**0.8**
Cue-criterion(N=624)	0.044	0.133	0.078	0.183
Multiple R(N=156)	0.315	0.364	0.365	0.337
Test-retest(N=156)	0.103	0.196	0.181	0.359

Cue-criterion correlations

Similar to the findings in the previous section the cue-criterion correlations increased but not uniformly, and certainly not with the same level of equivalence as the level of multicollinearity. There was still a substantial difference between the 0.0 and 0.8 groups but it was nowhere near as large as for the selected 16 participants.

Multiple correlation

The multiple correlation for all 156 participants was relatively constant and did not show the quasi U-shaped distribution for the selected 16 participants. Nor were the results consistent with theoretical predictions. Overall, it was considered that the multiple R was not predictable under conditions of multicollinearity.

Test-retest correlation

Across the 156 participants in the study there was an increase in the test-retest correlations but only at the extremes of the 0.0 and 0.8 groups.

For the 0.0 condition the test-retest reliability was only 0.103 but 0.359 for the 0.8 condition (see last line of Table 5.3). As expected these test-retest reliabilities were much less than the selected participants. Overall it seemed appropriate but conservative to work with those participants who had much higher reliabilities.

The contribution of the study

The purpose of this study was to investigate and identify how students from various ages and backgrounds used available information to make a judgement of a subject in which they may be interested. This study represents one of the first quantitative detailed analyses of how students use available information to make a judgement or a decision about a subject. It was intended to provide a study that was largely quantitative in its emphasis but one which was also intensively descriptive through the use of 16 case studies. Of course, the disadvantage of this type of study is that it is purely idiographic in nature, which makes it impossible to extend the findings to other persons, and moreover, also it involves a sampling of a situations rather than people.

Generally the results showed that participants were different in terms of their judgements and also varied in their perceptions of the situation. There was a plethora of idiosyncratic responses to the various profiles and cues. This individual variation was consistent even across the four content areas.

One finding was that a large increase in multicollinearity (from 0.0 to 0.8) tended to lead to an increase in the multiple R. There were exceptions but this was consistent with the findings of the case studies and to a lesser extent for all 156 participants. Overall, using the multiple correlation as an outcome led to results that were difficult to predict because there were six independent variables and a mixture of intercorrelations.

Looking at the results from the case studies, the most important observation was that the effects of cue intercorrelations were evident in the interaction between the criterion and cue correlations. As can be seen when cues are less intercorrelated participants seemed to be using cues much less and the cues themselves appeared to have less effect on how the judgment was constructed. When the cues were highly correlated participants seemed to use the cues to make a high level of judgment but it is not clear that they were aware of what they were doing. The simplest interpretation of this kind of result may mean that the intercorrelations between the cues leads judges to promote a high level of use of the cues irrespective of their individual value.

In other words, when cues are highly correlated they tend to relate positively to the judgement irrespective of whether they are vital to the judgement and the converse applied for cues that were less related, namely cues were less correlated to the judgement irrespective of whether they were important to the participant. This is contrary to the efficiency of prediction because if cues are highly correlated then an additional cue is not adding greatly to the prediction and is redundant. It seems that one must be very careful when interpreting these results.

While at the outset one might reasonably expect cue intercorrelations to affect the multiple R based on earlier studies, there was no precedent for considering that multicollinearity affected the cue-criterion relationship. To emphasise this point again because it is relevant to the way in which the world is perceived – the relationship between factors in a situation affects the relationship between each factor and the perception of the entire situation. This observation is important for interests, which are multiply determined. As noted by Renninger, Hidi and Krapp (1992), interests are not abstractions but are a pattern of choices among alternatives.

Although Hursch, Hammond and Hursch (1964) indicated how we utilise information from several cue variables in predicting the state or value of some criterion, this was done for the double lens model rather than the single lens model. In this study it was still the case that individuals used information from several cues but they did so in idiosyncratic ways. Moreover, the findings of this study are also consistent with the early work of Smedslund (1955) and Summers (1962) who pointed out that people tended to learn to use cues or information in a manner appropriate to their ecological situation. The judgement strategies for cue-criterion correlation, were to some extent a function of cue characteristics (see Schench & Naylor, 1965).

In 1976, Armelius and Armelius found that consistency was directly related to cue-criterion correlation and that the cue judgement beta weights were directly related to the magnitude of the cue intercorrelations. Previously Armelius and Armelius (1974) attempted to separate the effects of cue-criterion correlations and the cue intercorrelations. They found that a subject's performance was positively related to cue-criterion correlations and not cue intercorrelations. Nonetheless these authors agreed that it was not possible to make the general conclusion that cue intercorrelations had no effect on performance. Like Armelius and Armelius (1975), this study also examined the effect of cue intercorrelations but in this case in the context of a single lens model. Again it was found that some participants were able to reach an optimal level of performance whereas others were not, but in contrast to the earlier work there was some evidence of a cue intercorrelations effect on judgements. Although not entirely comparable in their focus the study of Dudycha, Dudycha and Schmitt (1974) also investigated the effect of cue redundancy with different levels of multiple correlation and varied cue intercorrelations but constant cue-criterion correlations. Whereas they reported that judgement was impaired by the cue intercorrelations at the highest level of multiple R but not at the other levels in this research the multiple R tended to be higher at the highest levels of cue intercorrelation.

The significance of the previous studies was that they were all directed to cue intercorrelations and multiple cue probabilistic learning in the double lens model. Unfortunately, these studies did not really tell us whether high or low cue intercorrelations will affect people in their judgements when there is no obvious criterion of accuracy. Many of our everyday judgements are made under conditions of such uncertainty and complexity and it is important for us to know how the relationship between components of a situation affects the final judgements.

Interests provided a useful domain for the investigation of cue intercorrelations. As can be seen from the analysis each student acquired different policies but there is the likelihood that there is some direct underlying influence of cue intercorrelations on the judgement process. It seems likely that cue intercorrelations affected reliability, cue-criterion correlations and to a lesser extent the multiple correlation.

Suggested areas for further studies

Future research needs to consider some of the limitations of this study. In the first instance it is important to ensure that individuals are consistent in their judgements. Many of the participants had negative reliabilities. With the benefit of hindsight it was noted that this might have been an artefact. The test-retest correlation was based on repeating 15 profiles at the end but the profiles selected were the every third profile (that is profile 3 to profile 45). A glance at the multiple correlations between cues and judgements after each profile (for example Figure 4.3) shows that there are different judgemental learning patterns. By correlating the profiles 3 to 45 with the last 15 profiles (profiles 61 to 75) there may have been some confounding of learning effects with the test-retest reliability. Accordingly, it is recommended that future studies ignore the first few judgements until the pattern of judgemental learning stabilises.

Secondly, it is important to ensure that participants are familiar with the contents of the cues. It may be the case that in case studies 2-4 that there were cultural limitations on the judgement process. As a consequence an intensive study of individuals rather than an emphasis on group analyses is recommended.

Thirdly, it may be helpful to vary the level of cue intercorrelation as in a time series design, maybe starting at 0.0 and increasing to 0.8 or varying the pattern to determine to what extent the varied pattern interacts with judgements. Possibly it may be advisable to use a smaller number of cues as the large number of cues (six) and their varied relationships may affect the multiple R in a complex manner. It may be preferable to start with smaller studies on 2-3 cues.

Finally, It may be also advisable to look at the traditional and cultural difference between the two countries (Australia and Nigeria) and participants. The participants of this research were students from the University of Technology Sydney, Australia, the University of Lagos and Obafemi Awolowo University Ife, Nigeria. The emphasis is placed on these institutions in these two countries because both are member countries of the Commonwealth and all participants are familiar with and use of English Language. Moreover, all these Universities were developed and operate within the British educational tradition. These institutions have similar practices that make it possible to exchange academic lecturers and students without the problem of communication or language barrier. In addition, it was more convenient for the researcher to collect data from these countries without having to translate the data collected. Despite the similarities, discussed above, there are obviously many significant and quite profound differences between Australians and Nigerians towards tradition and culture. Australians students are typically traditionally progressive and culturally liberated while Nigerian students are more traditionally conservative and culturally cooperative. These differences may have played an important role in the student's judgement of interests or may have affected the study/influenced the results.

Concluding comments

This study was designed to investigate how students combine and use information to make a judgment in a subject in which they may be interested. The analysis of these responses using Brunswik's single lens model can be described as a first step in investigating how students combine and use information to make a judgment in a subject. The approach used was designed to explore the relationship between students (judges) and a subject they may be interested in and also to explore the relationship between students and the environment in which they are studying.

It seems likely that the role of cue intercorrelations in the judgement of interest is that cue criterion correlations increase with increased levels of multicollinearity; secondly increased multicollinearity may affect the multiple correlation in a non-linear manner; while cue intercorrelations at the extremes may also affect the stability of judgements. This study was conducted within the paradigm of research advocated by Brunswik as an idiographic and statistical case study. The results continue to highlight the large individual differences in human judgements and point the way to further research using the single lens model. The important point of this study is that one's perception of the world whether it is one's educational interest or some other factor may well be a function of the ways in which components of the educational world (the cues) are intercorrelated. If this is true and it can be validated in future research then it has substantial implications for constructivist views and epistemology because it may mean that the perception of one's world may ultimately be a function – at least in part - of the ways in which the components of that world are intercorrelated.

Bibliography

Ainley, D. M. (1997). The factor structure of curiosity measures: Breadth and depth of interest curiosity styles. *Australian Journal of Psychology*, *39*, 53-59.

Ainley, D. M. (1998). Interest in learning and disposition of curiosity in secondary students: Investigating process and context. In L. Hoffmann, A. Krapp, K.A Renninger, & J. Baumert (Eds.), Interest and learning. Proceedings of the Seeon-Conference on Interest and Gender. IPN-Schriftenreihe Kiel: IPN

Ainley, D. M. (1999). Interest and learning: From attraction to absorbing interest. In J.A. Athanasou (Ed.), *Adult Educational Psychology* (pp.159-181). Katoomba: Social Science Press.

Alexander, P. A. (2003). *Expertise and academic development: A new perspective on a classic theme.* Invited keynote address to the Biennial meeting of the European Association for the Research on Learning and Instruction (EARLI). Padova, Italy.

Armelius, B. & Armelius, K. (1974). Utilization of redundancy in multiple-cue judgment: Data from a suppressor variable task. *American Journal of Psychology, 87,* 385-392.

Armelius, B. & Armelius, K. (1975). Integration rules in a multiple-cue probability learning task with intercorrelated cues. *Umea Psychological Reports,* No. 80.

Armelius, K. & Armelius, B. A. (1976). The effect of cue- citerion correlations, cue intercorrelations and the sign of the cue intercorrelations on performance in suppressor variable tasks. *Organizational Behavior and Human Performance. 17,* 241-250.

Athanasou. J.A. (1994). Some effects of career interest. Subject preferences and Quality of teaching on the educational achievement of Australian technical and further education students. *Journal of Vocational Education Research. 19,* 23-38

Athanasou, J.A. (1998). Perceptions of interest: A lens model analysis. *Australian Psychologist, 33,* 223-227.

Athanasou, J.A. (1999). Judgement of interest in vocational education subjects. *Australian and New Zealand Journal of Vocational Education Research, 7,* 60-77.

Athanasou, J.A. & Aiyewalehinmi, O. (2001). A case study of student judgments of interest in a subject. *Ife Psychologia, 9*(1), 74-82.

Beal, D., Gills, J.S., & Stewart, T. (1978). The lens model: Computational procedures and applications. *Perceptual & Motor skills*, *46*, 3-28.

Berlyne, D. E. (1960). *Conflict, arousal, and curiosity*. New York: McGraw-Hill.

Bjorrkman, M. (1968). *The effect of training and number of stimuli on the respones variance in correlation learning.* Umea Psychology Reports, University Press.

Bottenberg, R. A. & Christal, R. E. (1961). *An iterative technique for clusteringcriteria which retains optimum predictive efficiency.* Lackland Air ForceBase, Texas: Personnel Laboratory, Wright Air Development Division. (WAAD-TN-61-30, ASTIA Document AD-261-615).

Bower C.A. & Flinders, D.J. (1990). *Responsive teaching: An ecological approach to classroom pattern of language culture and thought.* NewYork: Teacher's College Press.

Brehmer. B. (1974). Hypotheses about relations between scaled variables in the learning of probabilistics inference tasks. *Organizational Behavior and Human Performance, 11*, 1-27.

Brehmer, A. & Brehmer, B. (1988). What have we learned about human judgment from thirty years of policy capturing? In B. Brehmer, and C.R.B. Joyce (Eds.), *Human judgment: The SJT View* (pp. 75- 14). Amsterdam, North-Holland: Elsevier.

Brehmer, S. & Kassin, S.M. (1993). *Social psychology.* (2nd ed.). Boston: Houghton Mifflin Company.

Brunswik, E. (1940). Thing constancy as measured by correlation coefficients. *Psychological Review, 47*, 68-78.

Brunswik, E. (1952). *The conceptual framework of psychology.* Chicago: University of Chicago Press.

Brunswik, E. (1955). Representative design and probabilistic theory in a functional psychology. *Psychological Review, 62,* 193-217.

Brunswik, E. (1956). *Perception and the representative design of psychological experiments* (2nd ed.) Berkeley, CA: University of Califonia Press.

Carroll, J. D. (1963). Functional learning:The learning of continuous functional mapping relating stimulus and response continua. Educational Testing Service, Princeton, NJ: *Research Bulletin RB*-63-66.

Christal, R. E. (1963). *JAN: A Technique for analysing Individual and Group Judgment.* Lackland Air Force Base, Texas: 6570th Personnel Research Laboratory, Aerospace Medical Division, February. (PRL-TDR-63-3, ASTIA document AD-403 813).

Cook, R. L., & Stewart, T. R. (1975). A comparison method for obtaining subjective descriptions of judgmental policy. *Organizational Behavior and Human Decision Processes, 13*, 31-45.

Cooksey, R.W. (1988). Social judgment theory in education: Current and potential application. In B. Brehmer & C.R. B. Joyce (Ed.), *Human judgment: The SJT view* (pp. 273-316). Amsterdam, North-Holland: Elsevier.

Cooksey R.W. (1996) *Judgment analysis: Theory, methods and application.* San Diego: Academic Press.

Cooksey, R. W., Freebody, P. & Davidson, G. (1986). Teacher's prediction of children's early reading achievement: An application of social judgment theory. *American Educational Research Journal, 23*, 41-64.

Dewey, J. (1913). *Interest and effort in education.* NewYork: Houghton Mifflin

Doherty, M. E., & Ullman, D. G. (1980). Assessing discrimination: An application of social judgment technology. *Journal of Applied Psychology, 65,* 284-288.

Dudycha, L., Dudycha, N., & Schmitt, N. (1974). Cue redundancy: Some overlooked analytical relationships in MCPL. *Organizational Behavior and Human Performance, 11,* 222-234.

Fishburn, P.C. (1988). Expected utility: An anniversary and new era. *Journal of Risk and Uncertainty, 1,* 267-283.

Fishburn, P.C. (1989a). Foundations of decision analysis: Along the way. *Management Science,* 35, 387- 405.

Fishburn, P.C. (1989b). Retrospective on the utility theory of von Neumann and Morgenstern. *Journal of Risk and Uncertainty, 2,* 127-158.

Flavell, J.H. (1987). Speculation about the nature and development of metacognition. In F. Weinert & R. Kluwe, (Ed.), *Metacognition, motivation, and understanding* (pp. 21- 29). Hillsdale, NJ: Erlbaum.

Garner, R. (1987). *Metacognition and reading comprehension.* Norwood, NJ: Ablex Publishing.

Goldstein, W. M., & Hogarth, R.M. (1997). *Judgment and decision research: Some historical context.* Cambridge: Cambridge University Press.

Halpen, D.F. (1984). *Thought and Knowledge: An introduction to critical thinking.* Hillsdale, NJ: Lawrence Erbaum Associates.

Hammond, K.R. (1955). Probabilistic functioning and clinical method. *Psychological Review, 62,* 255-262.

Hammond, K.R. (Ed). (1966a). *The psychology of Egon Brunswik.* New York: Holt Rinehart and Winston.

Hammond, K.R. (1966b). Probabilistic functionalism: Egon Brunswik's integration of the history, and method of psychology. In K.R. Hammond (Ed.), *The psychology of Egon Brunswik* (pp.15-80). New York: Holt Rinehart and Winston.

Hammond, K. R., McClelland, G. H. & Mumpower, J. (1980). *Human judgment and decision making: Theories, method and procedures.* New York: Praeger.

Herbart, J.F. (1965). General theory of pedagogy, derived from the purpose of education. In J.F. Herbart (Ed.*), Writing an education 2,* 2-255*,* Dusseldorf: Kuepper.

Hidi, S. (1990). Interest and its contribution as a mental resource for learning. *Review of Educational Research, 60,* 549-571.

Hoffman, P. J. (1960). The paramorphic representation of clinical judgment. *Psychological Bulletin, 47,* 116-131.

Hogarth, R.M. (1993). Accounting for decisions and decisions for accounting. *Organisation and Society, 18,* 407-424.

Holland, J.L. (1973). *Making vocational choices: A theory of careers.* Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Horkheimer, (1972). *Traditional and critical theory,* New York: The Seabury Press.

Houston, S.R. (Ed.)(1974). *Judgment analysis: Toll for decision makers.* New York: MSS.

Hursch, C.J., Hammond, K. R., & Hursch, J. L. (1964). Some methodological consideration in multiple-cue probability studies. *Psychological Review, 71,* 42-60.

Kahneman, D. (1991) Judgment and decision-making: A personal view. *Psychological Science 2,* 142-145.

Kerlinger, F. N. (1979). *Science and behavioural research: A conceptual approach.* New York: New York Press.

Krapp. A., Hidi. S. & Renninger. K. A. (1992). Interest. learning and development. In K. A. Renninger. S. Hidi. & A. Krapp (Eds.*). The role of interest in learning an development.* (pp. 361-395). Hillsdale, NJ: Erlbaum.

Krapp, A. & Prenzel, M. (Eds.). (1992). *Interesse, Lernen, Leistung.* Munster: Sachendorff.

Krapp, A. (1993). The construct of interest. Characteristic of individual interests and interest-related actions from the perspective of a person-object theory. *Studies in Educational Psychology, 4.* Institut fur Erziehungswissenschaft und Padagogische Psychologie, Universitat der Bundeswehr Munchen.

Kreitler, H. & Kreitler, S. (1982). The theory of cognitive orientation: Widening the scope of behavior prediction. In B. Maher & W.B. Maher (Eds.), *Progress in experimental personality research, 11* (pp. 101-169). New York: Academic Press.

Leary, D.E. (1987). From act psychology to probabilistic functionalism: The place of Egon Brunswik in the history of psychology. *In M.G Ash & W.R. Woodwar (Eds.), Psychology in twentieth-century thought and society* (pp.115-142). Cambridge: Cambridge University Press.

McCinnon, J.W. & Renner, J.W. (1971), Are colleges concerned with intellectual development? *American Journal of Physics, 39,* 1047-1052.

Meehl, P.E. (1954). *Clinical versus statistical prediction: A theoretical analysis and a review of the evidence.* Minneapolis: University of Minnesota Press.

Naylor, J. C. & Clark, P. (1968). Intuitive inference strategies in interval learning tasks as a function of validity magnitude and sign. *Organizational Behavior and Human Performance, 3,* 47-61.

Naylor, J, C. & Schenck, E.A. (1968). The influence of cue redundancy upon the human inferences process for tasks degrees of predictability. *Organisational Behavior and Human Performance, 3,* 47-61.

Olson, J.M., Herman, C.P. & Zanna, M.P. (Eds)(1986). Relative deprivation and social comparison: *The Ontario symposium. Hillsdale,* New Jersey: Erlbaum.

Parkin, J. (1993.*) Judging plans and projects: Analysis and public participation in the evaluation process.* Aldershot: Averbury.

Renninger, K. A., Hidi, S. & Krapp, A (1992). *The role of interest in learning and development.* Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Renninger, K. A. & Stavis, J. (1995). *The roles of interest, task difficulty, and gender in the process of students' work with mathematical word problems.* Poster, Society for Research in Development. Indianapolis, IN.

Renninger, K. A. & Wozniak, R.H. (1985). Effect of interest on attention shift, recognition, and recall in young children. *Developmental Psychology, 21,* 624-632.

Restle, F. (1961). *Psychology of judgment and choice.* New York: Wiley.

Russel, P. (1999). Motivation. In J.A. Athanasou (Ed.), *Adult educational psychology* (pp. 97-127). Katoomba: Social Science Press.

Schank, R. C. (1979). Interestingness: Controlling inferences. *Artificial Intelligence, 12,* 273-297.

Schench, A. & Naylor, J. C. (1965). *Some data concerning performance indices based upon the multiple regression model when applied in a standard multiple cue situation.* Paper presented at Midwestern Psychological Association Meetings, Chicago.

Schiefele, U. (1991). Interest learning and motivation. *Educational Psychologist, 26,* 37 54.

Smedslund, J. (1955). *Multiple probability learning.* Oslo: Akademisk Forlag.

Summers, S. A. (1962). The learning of responses to multiple weighted cues. *Journal of Experimental Psychology, 64,* 29-34.

Tomlinson-Keasey, C. (1972). Formal Operation in females ages 11 to 54 years of age. *Developmental Psychology, 6,* 364-386.

Tversky, A. (1972). Elimination by aspects: A theory of choice. *Psychological Review, 79,* 281-291.

Ullman, D.G. & Doherty, M.E. (1984). Two determinants of the diagonosis of hyperactivity: The child and the clinician. In M. Wolraich & D.K. Routh (Eds). *Advances in behavioral pediatrics (pp. 167-219).* Greenwich. CT: JAI Press.

Valsiner, J. (1992). Interest: A metatheoretical perspective. In K.A. Renninger, S. Hidi & A. Krapp, (Eds.), *The role of interest in learning and development.* (pp. 27-41) Hillsdale, NJ: Lawrence Erlbaum Associates.

Weaver, E. A. (2000). Forward from Ken Hammond. Personal communication (to J. Athanasou 4. 10. 00).

Wherry, R. J., Sr., Naylor, J. C., Wherry, R. J., JR. & Fallis, R. (1965). Generating multiple samples of multivariate data with arbitrary population parameters. *Psychometrika, 30*, 303-314.

Wood, P. (2004). *Multiple correlation grater than one.* Personal communication (to J. Athanasou) AERA-D; Measurement and Research Methodology Forum.

APPENDICES

APPENDIX A COPY OF JUDGEMENT INSTRUMENTS

UTS FACULTY OF EDUCATION
SUBJECT INTEREST SURVEY

Thank you for taking part in this study.

Instructions

You have to answer questions about your interest in a subject that you are studying. Look at each profile of information. The profile contains answers to six questions.

It contains ratings from 0 (nil) to 9 (very high) on some questions about the subject.

Now you have to make a judgement from the information contained in each profile. You have to judge how interested you might be in the subject. Make all your judgements on the separate answer sheet.

This is the question you are being asked:

How interested would you be in taking a subject that has been described in this way?

How to record your judgement

You circle a number from 0 to 9 on the answer sheet.

You can use any number from 0 to 9.

EXAMPLE: Look at the student profile in judgement no. 1. You might decide that you would not be interested in taking this subject at all. You would then rate your interest as 0 or 1.

If your interest is very low you might rate it around 2 or 3.
If you were moderately interested you might rate it around 4 or 5.
If your interest was high you might rate it as 6 or 7
And if your interest was very high, you might circle 8 or 9
Feel free to ask any questions if you are not sure what to do.

STUDENT PROFILE No. _1_ JUDGEMENT No. _1_

How challenging is this subject for you?	[*9*]
How fascinating or stimulating is this subject for you?	[*3*]
How would rate the quality of teaching or lecturing in this subject?	[*4*]
How useful is your text in this subject?	[*9*]
How good are the learning facilities for this subject?	[*6*]
How well are theory and practice related in this subject?	[*2*]

PLEASE RATE YOUR INTEREST IN THIS SUBJECT

No interest									**Very high interest**
0	1	2	3	4	5	6	7	8	9

SECOND SECTION OF THE SAMPLE QUESTIONNAIRE FOR CASE STUDY 2

EXAMPLE: Look at the six pieces of information about a subject that are shown in the practice example below. *How interested would you be in studying a subject that is described in this way?*

Your rate your judgement from 0 to 9.

You might decide that you would not be interested in taking this subject at all. You would then rate your interest as 0 or 1.

If your interest is very low you might rate your interest around 2 or 3.

If you were moderately interested you might rate your interest around 4 or 5.

If your interest was high you might rate your interest as 6 or 7

And if your interest was very high you might circle 8 or 9

Feel free to ask any questions if you are not sure what to do.

PRACTICE EXAMPLE

Easy Subject	[9]
Importance of the Subject	[3]
Quality of Teaching	[1]
Best Subject	[6]
Time Spent Studying	[3]
Time Spent on Assignments, Project etc	[5]

Circle one number

No interest							**Very high interest**		
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

SECOND SECTION OF THE SAMPLE QUESTIONNAIRE FOR CASE STUDY 3

EXAMPLE: Look at the six pieces of information about a subject that are shown in the practice example below. The numbers show how much of each activity is involved in a subject.
How interested would you be in studying a subject that is described in this way?
Your rate your judgement from 0 to 9.

You might decide that you would not be interested in taking this subject at all. You would then rate your interest as 0 or 1.

If your interest is very low you might rate your interest around 2 or 3.

If you were moderately interested you might rate your interest around 4 or 5.

If your interest was high you might rate your interest as 6 or 7

And if your interest was very high you might circle 8 or 9

Feel free to ask any questions if you are not sure what to do.

PRACTICE EXAMPLE
[9] **REALISTIC** – includes skilled, technical, service or outdoor activities
[3] **INVESTIGATIVE** – includes scientific, medical and some technical activities
[1] **ARTISTIC** – includes artistic, literary and musical activities
[6] **SOCIAL** – includes educational and social welfare activities
[3] **ENTERPRISING** – includes managerial and sales activities
[5] **CONVENTIONAL** – includes office and clerical activities

Circle one number:

No interest							**Very high interest**		
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

SECOND SECTION OF THE SAMPLE QUESTIONNAIRE FOR CASE STUDY 4

EXAMPLE: Look at the six pieces of information about a subject that are shown in the Practice Example below. In this example the A, B, C, D, E, or F can stand for any aspects or features of a subject that are important to you. A could be anything you decide, B can be anything you like, C can be anything and so on.

You will be asked this question:
How interested would you be in studying a subject that is described in this way?
Your rate your judgement from 0 to 9.

You might decide that you would not be interested in taking this subject at all. You would then rate your interest as 0 or 1.

If your interest is very low you might rate your interest around 2 or 3.

If you were moderately interested you might rate your interest around 4 or 5.

If your interest was high you might rate your interest as 6 or 7

And if your interest was very high you might circle 8 or 9

Feel free to ask any questions if you are not sure what to do.

PRACTICE EXAMPLE

A	[9]
B	[3]
C	[1]
D	[6]
E	[3]
F	[5]

Circle one number:

No interest							**Very high interest**		
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

ANSWER SHEET USED IN ALL FOUR STUDIES

STUDENT INTEREST SURVEY

AGE GROUP [ ] 15-19 [ ] 20-24 [ ] 25-34 [ ] 35-44
[ ] 45-54 [ ] 55-60 [ ] 60+

[ ] MALE [ ] FEMALE

[ ] UNDERGRADUATE [ ] POST-GRADUATE

[ ] PART-TIME STUDENT [ ] FULL-TIME STUDENT

WHAT COURSE ARE YOU CURRENTLY ENROLLED IN?

How interested would you be in a subject that has been described in this way?

PROFILE NUMBER	**No interest**									**Very high interest**
1.	0	1	2	3	4	5	6	7	8	9
2.	0	1	2	3	4	5	6	7	8	9
3.	0	1	2	3	4	5	6	7	8	9
4.	0	1	2	3	4	5	6	7	8	9
5.	0	1	2	3	4	5	6	7	8	9
6.	0	1	2	3	4	5	6	7	8	9
7.	0	1	2	3	4	5	6	7	8	9
8.	0	1	2	3	4	5	6	7	8	9
9.	0	1	2	3	4	5	6	7	8	9
10.	0	1	2	3	4	5	6	7	8	9

11.	0	1	2	3	4	5	6	7	8	9
12.	0	1	2	3	4	5	6	7	8	9
13	0	1	2	3	4	5	6	7	8	9
14	0	1	2	3	4	5	6	7	8	9
15.	0	1	2	3	4	5	6	7	8	9
16.	0	1	2	3	4	5	6	7	8	9
17.	0	1	2	3	4	5	6	7	8	9
18.	0	1	2	3	4	5	6	7	8	9
19.	0	1	2	3	4	5	6	7	8	9
20.	0	1	2	3	4	5	6	7	8	9
21.	0	1	2	3	4	5	6	7	8	9
22.	0	1	2	3	4	5	6	7	8	9
23.	0	1	2	3	4	5	6	7	8	9
24.	0	1	2	3	4	5	6	7	8	9
25.	0	1	2	3	4	5	6	7	8	9
26.	0	1	2	3	4	5	6	7	8	9
27.	0	1	2	3	4	5	6	7	8	9
28	0	1	2	3	4	5	6	7	8	9
29	0	1	2	3	4	5	6	7	8	9
30.	0	1	2	3	4	5	6	7	8	9

How interested would you be in a subject that has been described in this way?

PROFILE NUMBER	No interest									Very high interest
31.	0	1	2	3	4	5	6	7	8	9
32.	0	1	2	3	4	5	6	7	8	9
33.	0	1	2	3	4	5	6	7	8	9
34.	0	1	2	3	4	5	6	7	8	9
35.	0	1	2	3	4	5	6	7	8	9
36.	0	1	2	3	4	5	6	7	8	9
37.	0	1	2	3	4	5	6	7	8	9
38.	0	1	2	3	4	5	6	7	8	9
39.	0	1	2	3	4	5	6	7	8	9
40.	0	1	2	3	4	5	6	7	8	9
41.	0	1	2	3	4	5	6	7	8	9
42.	0	1	2	3	4	5	6	7	8	9
43	0	1	2	3	4	5	6	7	8	9
44	0	1	2	3	4	5	6	7	8	9
45.	0	1	2	3	4	5	6	7	8	9
46.	0	1	2	3	4	5	6	7	8	9
47.	0	1	2	3	4	5	6	7	8	9
48.	0	1	2	3	4	5	6	7	8	9
49.	0	1	2	3	4	5	6	7	8	9
50.	0	1	2	3	4	5	6	7	8	9
51.	0	1	2	3	4	5	6	7	8	9
52.	0	1	2	3	4	5	6	7	8	9

53.	0	1	2	3	4	5	6	7	8	9
54.	0	1	2	3	4	5	6	7	8	9
55.	0	1	2	3	4	5	6	7	8	9
56.	0	1	2	3	4	5	6	7	8	9
57.	0	1	2	3	4	5	6	7	8	9
58	0	1	2	3	4	5	6	7	8	9
59	0	1	2	3	4	5	6	7	8	9
60.	0	1	2	3	4	5	6	7	8	9
61.	0	1	2	3	4	5	6	7	8	9
62.	0	1	2	3	4	5	6	7	8	9
63.	0	1	2	3	4	5	6	7	8	9
64.	0	1	2	3	4	5	6	7	8	9
65.	0	1	2	3	4	5	6	7	8	9
66.	0	1	2	3	4	5	6	7	8	9
67.	0	1	2	3	4	5	6	7	8	9
68.	0	1	2	3	4	5	6	7	8	9
69.	0	1	2	3	4	5	6	7	8	9
70.	0	1	2	3	4	5	6	7	8	9
71.	0	1	2	3	4	5	6	7	8	9
72.	0	1	2	3	4	5	6	7	8	9
73	0	1	2	3	4	5	6	7	8	9
74	0	1	2	3	4	5	6	7	8	9
75.	0	1	2	3	4	5	6	7	8	9

APPENDIX B COMPLETE LISTING OF PROFILES AND CUES PRESENTED TO PARTICIPANTS

(a) CUES FOR 0.0 CASES

Profile	Cue 1	Cue 2	Cue 3	Cue 4	Cue 5	Cue 6
1	4	7	4	4	5	4
2	6	3	6	7	8	6
3	4	6	9	4	4	4
4	4	8	4	4	8	2
5	4	3	5	5	8	3
6	2	3	5	4	9	4
7	4	6	6	2	7	7
8	0	5	4	2	6	4
9	3	7	5	5	1	5
10	4	6	5	5	3	6
11	4	3	6	4	2	3
12	3	4	6	2	4	5
13	4	5	3	4	5	2
14	2	8	4	0	7	6
15	6	5	5	4	7	4
16	6	2	6	5	1	3
17	8	2	4	5	6	8
18	1	7	7	4	6	7
19	2	5	8	4	3	4
20	3	4	6	4	4	1
21	9	3	1	6	3	5
22	5	7	2	3	4	1
23	3	7	4	2	3	5
24	2	7	4	3	5	2
25	8	4	6	6	3	7
26	5	3	4	7	4	5
27	5	4	8	2	6	5
28	5	3	5	4	4	5
29	2	1	8	7	6	5
30	4	0	7	3	3	2
31	5	5	5	4	3	7
32	1	5	4	2	5	4
33	6	6	3	4	0	3
34	3	7	9	2	4	3
35	3	5	4	3	7	4
36	6	5	4	3	1	4
37	3	5	4	5	4	2
38	1	3	7	2	6	0
39	4	3	0	5	6	6
40	1	7	3	6	7	7
41	5	9	1	4	7	4
42	3	5	5	5	4	3
43	3	8	7	5	1	2
44	5	8	3	3	4	9
45	3	6	1	5	7	6
46	1	7	6	3	6	4
47	6	4	5	5	3	4
48	4	2	6	5	6	4
49	0	6	2	5	5	6
50	2	3	6	6	6	3
51	4	5	6	7	1	3
52	8	1	5	1	4	4
53	4	4	6	9	5	5
54	4	9	4	5	4	4
55	4	3	4	6	6	5
56	4	7	5	3	6	3
57	1	5	3	6	6	6

58	3	6	3	5	6	3
59	5	6	4	4	7	2
60	5	8	8	4	4	6
Repeated Profiles						
61	4	6	9	4	4	4
62	2	3	5	4	9	4
63	3	7	5	5	1	5
64	3	4	6	2	4	5
65	6	5	5	4	7	4
66	1	7	7	4	6	7
67	9	3	1	6	3	5
68	2	7	4	3	5	2
69	5	4	8	2	6	5
70	4	0	7	3	3	2
71	6	6	3	4	0	3
72	6	5	4	3	1	4
73	4	3	0	5	6	6
74	3	5	5	5	4	3
75	3	6	1	5	7	6

(b) CUES FOR 0.2 CASES

Profiles	Cue 1	Cue 2	Cue 3	Cue 4	Cue 5	Cue 6
1	8	8	9	5	8	8
2	5	0	5	7	6	3
3	8	6	2	7	7	4
4	9	6	3	4	4	5
5	8	5	9	4	5	6
6	4	2	4	9	0	0
7	7	2	3	4	3	5
8	5	8	6	5	7	4
9	5	4	5	5	2	4
10	5	3	5	7	7	5
11	3	5	2	2	5	5
12	6	5	5	7	5	6
13	5	5	8	6	4	5
14	2	1	4	4	2	5
15	7	7	2	7	5	3
16	6	4	2	5	6	4
17	5	3	3	8	5	6
18	9	2	3	7	3	5
19	5	9	6	6	5	9
20	5	5	4	8	5	5
21	5	4	5	5	4	5
22	6	2	5	3	6	2
23	4	5	8	7	1	3
24	4	5	4	5	2	3
25	2	2	3	2	3	1
26	4	6	5	7	7	2
27	7	2	5	5	7	3
28	4	6	7	6	5	7
29	8	5	0	6	3	4
30	6	5	3	6	5	5
31	6	4	4	6	2	5
32	6	3	2	1	5	4
33	5	5	4	8	7	5
34	5	5	4	7	8	7
35	4	1	3	0	3	0
36	5	6	6	9	4	4
37	5	4	4	5	7	6
38	8	4	5	8	9	6
39	5	6	9	6	5	5
40	6	8	6	7	8	6
41	9	6	8	5	4	5
42	7	9	5	5	6	6
43	4	7	7	5	5	4
44	7	2	7	8	5	7
45	2	2	7	5	7	3
46	6	1	1	3	6	3
47	5	7	6	6	6	4
48	0	4	6	2	4	4
49	4	6	3	7	3	4
50	7	2	4	4	2	5
51	7	3	5	4	1	5
52	6	6	8	8	4	6
53	6	4	4	2	4	4
54	4	2	7	4	5	4
55	6	6	5	5	4	5
56	4	2	6	4	2	2
57	4	3	0	2	9	5
58	6	5	5	5	4	9
59	7	5	6	7	3	5
60	3	5	3	5	9	4

Repeated	Profiles					
61	8	6	2	7	7	4
62	4	2	4	9	0	0
63	5	4	5	5	2	4
64	6	5	5	7	5	6
65	7	7	2	7	5	3
66	9	2	3	7	3	5
67	5	4	5	5	4	5
68	4	5	4	5	2	3
69	7	2	5	5	7	3
70	6	5	3	6	5	5
71	5	5	4	8	7	5
72	5	6	6	9	4	4
73	5	6	9	6	5	5
74	7	9	5	5	6	6
75	2	2	7	5	7	3

(c) CUES FOR 0.5 CASES

Profiles	Cue 1	Cue 2	Cue 3	Cue 4	Cue 5	Cue 6
1	2	2	1	4	2	3
2	1	0	2	4	2	4
3	0	1	2	5	3	2
4	1	5	5	8	4	5
5	6	3	5	5	4	4
6	1	3	4	7	4	3
7	2	6	3	3	5	4
8	1	4	1	2	4	4
9	6	6	5	7	7	6
10	5	9	6	9	5	6
11	4	4	3	5	4	5
12	2	3	3	3	3	4
13	2	4	0	1	3	3
14	5	3	4	6	3	4
15	3	1	1	1	3	4
16	6	3	5	5	6	5
17	4	4	3	4	7	3
18	2	3	2	4	1	3
19	3	0	1	1	4	2
20	5	4	5	4	4	5
21	1	5	3	4	4	3
22	9	9	9	9	9	9
23	3	5	3	5	5	4
24	4	5	2	5	5	4
25	3	2	3	3	4	5
26	5	3	5	2	5	7
27	7	5	5	6	7	5
28	0	1	2	1	4	4
29	0	0	0	0	0	0
30	2	2	2	5	3	2
31	1	6	4	4	3	3
32	5	3	4	3	3	4
33	2	3	5	2	3	3
34	4	5	4	5	4	6
35	4	3	3	3	2	3
36	3	2	1	0	3	2
37	2	3	0	3	4	3
38	3	4	2	1	4	2
39	0	1	2	2	2	3
40	5	5	4	5	4	2
41	3	3	5	4	3	3
42	6	6	4	6	6	6
43	4	6	5	9	5	7
44	4	4	2	7	4	2
45	5	4	3	5	5	7
46	3	4	4	7	6	2
47	5	9	3	3	6	3
48	4	3	4	1	5	4
49	4	3	3	5	5	2
50	7	4	3	7	5	5
51	5	3	4	5	4	5
52	6	3	2	2	3	3
53	6	5	5	7	5	6
54	1	4	1	2	0	5
55	4	4	6	4	4	5
56	0	3	1	4	5	3
57	4	3	1	2	3	2
58	4	5	4	4	5	4
59	3	6	4	4	5	3
60	3	4	3	4	6	4

Repeated	Profiles					
61	0	1	2	5	3	2
62	1	3	4	7	4	3
63	6	6	5	7	7	6
64	2	3	3	3	3	4
65	3	1	1	1	3	4
66	2	3	2	4	1	3
67	1	5	3	4	4	3
68	4	5	2	5	5	4
69	7	5	5	6	7	5
70	2	2	2	5	3	2
71	2	3	5	2	3	3
72	3	2	1	0	3	2
73	0	1	2	2	2	3
74	6	6	4	6	6	6
75	5	4	3	5	5	7

(d) CUES FOR 0.8 CASES

Profiles	Cue 1	Cue 2	Cue 3	Cue 4	Cue 5	Cue 6
1	6	4	6	7	6	7
2	4	5	5	6	6	5
3	4	3	2	3	3	3
4	6	4	3	5	5	5
5	2	1	1	3	1	1
6	6	5	5	5	5	4
7	3	1	2	4	3	2
8	3	2	2	3	4	4
9	4	3	3	4	4	2
10	1	2	2	4	2	2
11	6	5	3	5	5	5
12	8	6	6	9	6	7
13	5	4	3	6	6	6
14	6	5	6	6	6	6
15	3	1	2	4	3	4
16	6	7	6	9	9	9
17	8	8	7	9	9	9
18	3	4	2	3	2	3
19	4	2	2	4	3	3
20	6	6	6	7	6	5
21	7	7	9	8	8	7
22	6	3	4	5	4	5
23	5	4	3	5	5	4
24	5	4	4	5	5	4
25	7	5	5	5	6	6
26	4	3	3	4	4	4
27	6	4	4	6	4	5
28	2	0	1	2	2	1
29	9	9	9	9	9	9
30	3	3	3	3	2	2
31	4	2	3	6	4	4
32	3	2	2	2	2	3
33	2	2	3	1	3	0
34	5	4	3	4	4	4
35	0	1	2	1	2	1
36	1	1	2	2	3	1
37	2	3	3	2	3	2
38	7	5	5	7	6	5
39	5	4	4	6	5	6
40	6	6	5	6	6	6
41	1	0	0	0	0	0
42	3	2	2	3	3	4
43	2	2	2	3	3	2
44	5	5	4	6	5	5
45	4	4	4	6	5	5
46	2	2	2	3	2	2
47	7	5	6	6	7	5
48	6	5	5	6	6	6
49	3	3	4	4	4	2
50	3	2	3	4	3	3
51	3	3	4	4	5	3
52	5	3	4	6	4	3
53	2	1	0	1	2	0
54	2	2	2	2	2	2
55	2	3	2	2	1	1
56	6	4	4	6	5	5
57	5	5	4	7	5	5
58	8	7	6	8	7	7
59	7	6	5	5	6	7
60	6	4	6	6	7	5

Repeated	Profiles					
61	4	3	2	3	3	3
62	6	5	5	5	5	4
63	4	3	3	4	4	2
64	8	6	6	9	6	7
65	3	1	2	4	3	4
66	3	4	2	3	2	3
67	7	7	9	8	8	7
68	5	4	4	5	5	4
69	6	4	4	6	4	5
70	3	3	3	3	2	2
71	2	2	3	1	3	0
72	1	1	2	2	3	1
73	5	4	4	6	5	6
74	3	2	2	3	3	4
75	4	4	4	6	5	5

APPENDIX C ENTIRE SET OF JUDGEMENTS FROM ALL FOUR COHORTS

Case Study 1 –A priori selected factors

Judgement	Judge B 0.0	Judge N 0.2	Judge Q 0.5	Judge V 0.8
1	4	9	2	6
2	5	1	2	5
3	4	2	1	3
4	6	3	4	5
5	3	7	2	2
6	6	0	5	5
7	6	4	4	3
8	5	5	3	4
9	7	4	6	4
10	6	8	7	3
11	3	2	4	5
12	4	6	4	9
13	5	8	2	6
14	8	6	5	5
15	5	3	2	4
16	3	4	4	9
17	3	2	5	9
18	6	3	3	3
19	5	5	2	4
20	3	4	4	6
21	4	4	3	8
22	7	1	9	5
23	7	7	4	5
24	7	4	4	5
25	4	0	4	6
26	3	5	5	4
27	4	4	6	6
28	3	8	2	2
29	1	1	0	9
30	0	3	3	3
31	5	3	4	5
32	5	4	4	3
33	6	5	3	3
34	7	5	5	5
35	5	2	3	2
36	5	6	2	2
37	5	5	3	3
38	3	4	3	7
39	3	9	2	6
40	7	8	4	6
41	9	9	4	0
42	5	5	6	4
43	8	7	7	3
44	8	7	5	6
45	6	4	5	6
46	7	1	5	3
47	4	6	5	7
48	2	5	4	5
49	6	3	4	4
50	3	4	5	4
51	5	3	4	4
52	1	8	3	5
53	4	5	6	1
54	9	4	3	2
55	3	7	4	2
56	7	2	3	6
57	5	5	3	6
58	6	7	4	6
59	6	4	4	6

60	8	3	4	7
61	6	2	2	4
62	3	0	4	5
63	7	5	6	4
64	4	6	3	7
65	5	3	3	4
66	7	4	3	4
67	3	5	4	8
68	7	5	4	5
69	4	4	6	6
70	0	3	3	3
71	6	5	3	3
72	5	6	2	3
73	3	9	2	5
74	5	7	6	3
75	6	5	5	5

Case Study 2- Subject relevant factors

Judgement	Judge I 0.0	Judge S 0.2	Judge V 0.5	Judge AN 0.8
1	2	8	7	7
2	5	5	5	5
3	9	7	6	3
4	7	4	7	5
5	4	5	7	1
6	1	9	6	4
7	6	7	6	2
8	0	7	4	4
9	3	5	5	2
10	5	7	5	2
11	3	3	5	5
12	6	6	4	7
13	7	8	5	6
14	8	4	4	6
15	9	7	6	4
16	2	6	6	9
17	3	8	4	9
18	7	9	3	3
19	5	9	3	3
20	8	8	4	5
21	3	5	3	7
22	8	6	8	5
23	9	7	3	4
24	3	5	5	4
25	6	3	3	6
26	9	7	5	4
27	3	7	5	5
28	0	7	3	1
29	1	8	2	9
30	9	6	3	2
31	0	6	5	4
32	5	6	5	3
33	8	7	3	0
34	4	8	5	4
35	2	6	5	1
36	5	7	3	1
37	7	9	3	2
38	3	9	4	5
39	1	8	2	6
40	0	9	6	6
41	4	9	3	0
42	6	7	4	4
43	7	5	4	2
44	5	8	5	5
45	7	7	5	5
46	0	6	3	2
47	5	7	5	5
48	2	2	4	6
49	4	6	4	2
50	2	7	7	3
51	7	7	5	3
52	4	8	6	3
53	3	7	6	0
54	5	2	4	2
55	7	6	2	1
56	1	4	1	5
57	5	9	3	5
58	3	6	4	7
59	5	7	4	7
60	8	9	2	5
61	4	8	3	3
62	2	7	2	4

63	5	4	6	2
64	2	5	3	7
65	6	7	4	4
66	3	7	6	3
67	4	5	1	7
68	7	4	5	4
69	2	6	7	5
70	1	8	2	2
71	6	6	3	0
72	0	9	3	1
73	2	9	1	6
74	4	9	6	4
75	9	7	5	5

Case Study 3- Holland Interest Types

Judgement	Judge C 0.0	Judge L 0.2	Judge AC 0.5	Judge AK 0.8
1	7	4	2	1
2	6	6	4	2
3	9	3	5	1
4	4	5	5	3
5	7	3	4	3
6	9	6	3	4
7	7	8	3	5
8	6	5	1	6
9	1	4	6	5
10	3	5	6	6
11	2	6	5	7
12	4	5	3	6
13	5	6	1	7
14	7	7	4	6
15	7	6	1	5
16	1	5	5	3
17	6	6	3	4
18	6	4	3	5
19	3	5	2	6
20	4	6	4	5
21	3	7	1	4
22	4	6	9	5
23	3	6	5	6
24	5	7	4	6
25	3	7	2	5
26	4	6	7	6
27	6	5	6	6
28	4	7	0	7
29	6	6	0	7
30	3	7	2	6
31	3	8	4	4
32	5	7	4	3
33	0	7	3	5
34	4	6	5	4
35	7	7	3	5
36	1	5	3	4
37	4	7	0	5
38	6	6	1	4
39	6	7	2	5
40	7	7	4	4
41	7	8	3	5
42	4	7	6	6
43	1	6	6	7
44	4	7	2	8
45	1	7	5	7
46	6	7	4	4
47	3	7	3	5
48	6	8	4	6
49	5	8	3	5
50	9	7	5	7
51	1	8	5	6
52	4	8	2	6
53	5	7	6	5
54	4	8	1	6
55	6	7	2	7
56	6	6	1	6
57	6	7	2	5
58	6	7	4	6
59	7	5	4	7
60	4	6	3	8
61	4	5	3	3
62	9	6	3	4

63	1	6	6	5
64	4	5	4	4
65	7	6	1	5
66	6	7	2	6
67	3	6	4	5
68	5	7	5	4
69	6	7	6	5
70	3	7	2	5
71	0	7	3	4
72	1	6	3	3
73	6	8	2	4
74	4	8	6	5
75	7	9	5	6

Case Study 4-self Selected Cues

Judgement	Judge G 0.0	Judge Q 0.2	Judge U 0.5	Judge AG 0.8
1	5	6	5	7
2	6	3	6	6
3	7	7	5	3
4	6	4	7	5
5	7	0	5	3
6	8	3	6	5
7	8	7	5	1
8	3	8	7	3
9	2	7	7	4
10	3	5	6	4
11	4	7	5	5
12	7	4	4	9
13	6	9	5	6
14	5	7	6	6
15	4	5	7	4
16	4	5	5	9
17	3	3	7	9
18	3	4	6	3
19	4	5	5	4
20	5	6	5	7
21	6	1	5	8
22	5	5	5	5
23	4	6	6	5
24	5	0	7	5
25	4	4	5	5
26	6	4	5	4
27	5	7	5	6
28	7	6	5	2
29	8	6	6	9
30	9	9	7	3
31	2	6	3	3
32	1	8	4	6
33	3	3	5	2
34	5	7	5	1
35	7	4	6	4
36	9	4	6	1
37	8	3	7	2
38	7	3	6	2
39	6	7	5	7
40	5	4	5	6
41	6	8	6	6
42	9	6	6	0
43	8	7	6	3
44	7	6	7	3
45	6	0	7	6
46	4	3	5	6
47	3	6	6	6
48	5	4	7	6
49	6	5	6	4
50	7	5	6	4
51	7	5	7	4
52	7	4	6	6
53	6	2	7	1
54	5	4	8	2
55	4	6	6	2
56	3	6	5	6
57	2	5	4	7
58	3	4	6	8
59	4	3	8	5
60	9	4	7	6
61	1	7	1	3
62	3	3	3	5
63	4	7	4	4

64	5	4	2	9
65	4	5	6	4
66	3	4	5	3
67	4	1	5	8
68	4	0	6	5
69	5	7	6	6
70	7	9	7	3
71	6	3	6	1
72	9	4	5	2
73	7	7	5	6
74	6	6	4	3
75	5	0	7	6

APPENDIX D – RESULTS FOR ALL STUDENTS IN STUDY 1

Study 1 Multiple correlation between cues and judgements and reliability of judgements

Judge	Mean judgements	Standard Deviation	Multiple correlation between cues and judgements	Test-Retest reliability
0.0 group				
A	3.33	1.57	0.839	0.723
B	5.00	1.97	0.945	0.850
C	3.78	1.80	0.226	0.735
D	4.53	1.74	0.189	-0.113
E	4.65	0.92	0.700	0.605
F	4.88	0.98	0.804	0.665
G	3.78	2.53	0.299	0.885
0.2 group				
H	4.87	1.21	0.903	0.487
I	3.33	2.04	0.877	0.760
J	4.52	1.55	0.771	0.409
K	4.83	1.52	0.616	0.149
L	4.37	1.89	0.858	0.845
M	4.78	2.00	0.744	0.358
N	4.55	2.30	0.830	0.954
0.5 group				
O	4.52	2.05	0.912	0.883
P	3.55	1.43	0.789	0.562
Q	3.87	1.55	0.937	0.933
R	3.78	1.49	0.699	0.513
S	5.32	1.71	0.850	0.866
T	4.45	1.94	0.740	0.598
U	3.73	1.69	0.927	0.666
0.8 group				
V	4.70	2.00	0.965	0.929
W	3.87	2.19	0.911	0.702
X	3.78	2.04	0.887	0.825
Y	3.58	2.02	0.933	0.941
Z	3.93	2.09	0.954	0.957
AA	3.58	2.19	0.866	0.624
AB	4.58	1.83	0.955	0.874

Correlations between each cue (cue correlations) and the judgements for each participant

Judge	Challenging	Fascinating	Teaching	Text	Facilities	Theory/Practice
0.0 group						
A	0.829	-0.069	-0.092	0.056	-0.240	0.158
B	-0.291	0.930	-0.239	-0.198	0.042	0.123
C	0.017	0.168	0.014	-0.115	-0.135	-0.039
D	-0.021	-0.077	-0.043	0.083	0.036	-0.040
E	0.411	0.118	0.175	0.318	0.019	0.290
F	0.170	0.200	0.168	0.309	0.293	0.514
G	0.204	-0.153	0.013	-0.053	0.145	-0.013
0.2 group						
H	0.424	0.680	0.474	0.523	0.422	0.691
I	0.288	0.711	0.613	0.244	0.226	0.557
J	0.382	0.559	0.457	0.267	0.388	0.486
K	-0.071	0.224	0.515	0.104	0.346	0.036
L	0.509	0.632	0.268	0.454	0.464	0.602
M	0.309	0.578	0.489	0.435	0.216	0.423
N	0.096	0.488	0.672	0.195	0.202	0.571
0.5 group						
O	0.552	0.685	0.735	0.842	0.660	0.603
P	0.541	0.564	0.629	0.624	0.633	0.610
Q	0.675	0.776	0.744	0.744	0.728	0.689
R	0.534	0.523	0.582	0.592	0.600	0.665
S	0.623	0.765	0.683	0.669	0.714	0.590
T	0.543	0.539	0.610	0.640	0.587	0.496
U	0.616	0.898	0.667	0.641	0.673	0.554
0.8 group						
V	0.903	0.883	0.878	0.956	0.927	0.928
W	0.862	0.843	0.852	0.875	0.849	0.905
X	0.825	0.866	0.841	0.833	0.820	0.855
Y	0.855	0.904	0.868	0.857	0.836	0.841
Z	0.893	0.893	0.877	0.918	0.907	0.900
AA	0.837	0.846	0.842	0.862	0.866	0.866
AB	0.883	0.882	0.853	0.905	0.929	0.926

APPENDIX E RESULTS FOR ALL STUDENTS IN STUDY 2

Study 2 Multiple correlation between cues and judgements and reliability of judgements

Judge	Mean judgements	Standard Deviation	Multiple correlation between cues and Judgments	Test-Retest Reliability
0.0 group				
Judge A	4.81	2.40	.696	-.297
Judge B	4.73	2.32	.612	-.364
Judge C	4.86	2.43	.694	-.404
Judge D	4.98	1.94	.262	.003
Judge E	4.55	2.72	.251	.226
Judge F	3.93	2.04	.228	.213
Judge G	6.83	1.40	.307	-.256
Judge H	7.21	1.34	.230	.015
Judge I	4.60	2.68	.386	.270
Judge J	8.95	0.21	.296	-.154
0.2 group				
Judge K	4.16	1.27	.291	-.322
Judge L	7.95	0.87	.325	.013
Judge M	8.25	0.75	.364	.047
Judge N	6.36	1.97	.670	-.095
Judge O	4.40	2.82	.256	.275
Judge P	5.30	1.58	.632	.196
Judge Q	6.26	2.09	.258	-.504
Judge R	4.05	2.28	.271	-.319
Judge S	6.61	1.74	.638	.605
Judge T	4.93	2.13	.220	.548
0.5 group				
Judge U	5.01	1.81	.330	-.145
Judge V	4.40	1.47	.587	.475
Judge W	4.75	2.03	.314	-.231
Judge X	4.06	1.99	.724	.552
Judge Y	5.36	2.01	.325	.092
Judge Z	4.26	0.86	.231	.173
Judge AA	6.20	1.77	.269	-.102
Judge AB	5.85	2.48	.468	.282
Judge AC	5.68	2.29	.384	.053
Judge AD	4.66	2.31	.326	-.123

0.8 group				
Judge AE	5.91	1.86	.365	.526
Judge AF	5.65	1.53	.165	-.226
Judge AG	5.56	2.18	.431	.141
Judge AH	4.88	0.90	.111	.439
Judge AI	6.90	1.89	.214	.388
Judge AJ	6.93	1.35	.326	-.206
Judge AK	5.80	1.40	.406	.236
Judge AL	4.53	2.92	.274	-.500
Judge AM	6.93	1.33	.291	.057
Judge AN	4.05	2.22	.991	.999

Correlations between each (cue correlations) and the judgements for each participant

Judge	Easy subject	Important subject	Quality teaching	Best subject	Time spent studying	Time spent project
0.0 Group						
A	.738	.216	.166	.184	.143	.048
B	.665	.141	.194	.091	.177	.014
C	.731	.190	.161	.193	.132	.059
D	.015	.180	.107	.049	.128	.070
E	.174	.002	.037	.057	.041	.165
F	.150	.031	.113	.107	.037	.069
G	.109	.064	.171	.176	.117	.094
H	.124	.093	.028	.022	.121	.155
I	.245	.414	.091	.039	.063	.127
J	.305	.265	.277	.023	.200	.026
0.2 Group						
K	.51	.082	.305	.090	.035	.130
L	.144	.007	.189	.054	.037	.298
M	.055	.017	.329	.074	.068	.275
N	.050	.192	.116	.077	.275	.328
O	.025	.177	.081	.145	.127	.018
P	.203	.137	.279	.048	.104	.354
Q	.151	.170	.236	.028	.055	.061
R	.021	.182	.177	.051	.143	.092
S	.284	.027	.066	.412	.250	.029
T	.050	.111	.163	.082	.127	.123
0.5 Goup						
U	.259	.297	.121	.150	.034	.036
V	.407	.020	.084	.305	.280	.247
W	.106	.058	.167	.284	.021	.040
X	.175	.017	.112	.209	.120	.307
Y	.045	.268	.062	.340	.031	.009
Z	.088	.179	.092	.107	.235	.073
AA	.129	.250	.003	.046	.115	.139
AB	.028	.384	.063	.546	.168	.054
AC	.082	.382	.090	.012	.207	.255
AD	.229	.064	.075	.176	.393	.114
0.8 Group						
AE	.443	.229	.440	.160	.239	.274
AF	.065	.063	.033	.392	.188	.277
AG	.115	.092	.162	.573	.723	.482
AH	.143	.231	.065	.077	.061	.065
AI	.192	.232	.104	.183	.006	.188
AJ	.248	.245	.412	.091	.431	.539
AK	.128	.052	.414	.546	.434	.787
AL	.140	.161	.328	.484	.205	.013
AM	.324	.065	.311	.191	.287	.365
AN	.082	.027	.181	.076	.186	.808

APPENDIX F RESULTS FOR ALL STUDENTS IN STUDY 3

Study 3 Multiple correlation between cues and judgements and reliability of judgements

Judge	Mean judgements	Standard Deviation	Multiple correlations Between cues and judgement	Test-Retest Reliability
0.0 group				
Judge A	5.23	2.62	.417	-.046
Judge B	5.63	2.40	.351	.194
Judge C	4.68	2.08	.848	.708
Judge D	3.80	2.50	.376	-.349
Judge E	6.33	1.83	.312	-.196
Judge F	4.71	2.27	.393	.229
Judge G	5.85	1.64	.337	-.167
Judge H	5.38	0.69	.315	.103
Judge I	8.56	0.69	.237	.980
Judge J	7.88	0.97	.244	.707
0.2 group				
Judge K	7.06	1.05	.322	.155
Judge L	6.28	1.22	.439	.608
Judge M	4.90	2.17	.218	-.116
Judge N	4.66	2.50	.396	-.396
Judge O	5.18	2.06	.425	-.175
Judge P	4.90	1.29	.300	.070
Judge Q	5.88	1.25	.239	.309
Judge R	5.13	1.90	.212	.292
Judge S	5.85	2.11	.277	.074
Judge T	4.38	2.42	.396	256
0.5 group				
Judge U	5.15	1.47	.777	.562
Judge V	4.76	4.76	.185	.175
Judge W	4.26	1.30	.459	-.265
Judge X	4.61	1.50	.711	.512
Judge Y	4.00	2.77	.249	.288
Judge Z	5.40	2.21	.311	.173
Judge AA	8.01	8.01	.294	-.100
Judge AB	6.65	1.74	.347	-.221
Judge AC	3.45	1.88	.870	.802
Judge AD	3.91	2.04	.770	.371
0.8 group				
Judge AE	8.08	1.01	.296	.498
Judge AF	6.78	1.79	.337	.410
Judge AG	5.78	2.59	.171	.286
Judge AH	6.38	1.09	.269	-.084
Judge AI	5.78	0.97	.266	-.134
Judge AJ	5.81	1.08	.266	-.127
Judge AK	5.21	1.50	.105	.607
Judge AL	6.63	2.13	.376	.006
Judge AM	5.20	2.88	.369	.359
Judge AN	4.38	2.32	.316	-.029

Correlation between each (cue correlations) and with the judgement for each participant

Judge	Realistic interest	Investigative Interest	Artistic interest	Social interest	Enterprising interest	Conventional interest
0.0 group						
A	.180	.250	-.095	-.234	-.075	.026
B	.177	.122	-.295	.029	-.032	.038
C	-.272	-.014	.024	-.107	.832	.094
D	-.112	.240	-.073	.149	.004	-.137
E	-.087	-.010	.044	-.180	.248	.039
F	-.069	.147	-.259	-.127	-.146	-.100
G	.150	.188	-.161	-.168	-.016	.070
H	-.048	-.063	.149	-.148	.065	-.244
I	.003	-.076	-.104	.170	-.084	-.001
J	-.056	-.018	-.010	-.225	.020	-.106
0.2 group						
K	-.174	-.143	-.136	.044	-.185	-.148
L	-.329	-.179	-.038	-.230	-.202	-.060
M	-.151	-.083	-.057	-.139	-.101	-.152
N	.177	-.070	-.048	.150	-.284	.059
O	.285	.084	-.032	.325	.126	.055
P	-.182	.016	.139	-.090	.011	.121
Q	-.015	-.084	-.056	.038	.140	.099
R	.012	-.154	.042	-.053	.007	-.098
S	-.106	-.062	.139	-.083	.070	.109
T	-.339	.010	-.043	-.012	-.068	-.170
0.5 group						
U	.384	.499	.621	.723	.417*	.563
V	-.018	-.015	-.071	-.020	.068	-.100
W	.002	.126	-.105	.117	.273	.003
X	.538	.588	.384	.478	.495	.530
Y	-.094	-.104	-.095	.052	-.131	.023
Z	-.178	-.211	-.121	-.018	-.136	.012
AA	-.025	.035	-.086	.102	-.117	.053
AB	-.097	-.239	-.102	-.128	.003	-.210
AC	.664	.521	.770	.681	.558	.699
AD	.489	.503	.689	.636	.558	.598
0.8 group						
AE	-.145	-.087	-.047	-.182	-.123	-.137
AF	-.089	-.134	-.175	-.160	-.098	-.171
AG	-.017	-.009	-.011	-.026	-.064	-.010
AH	.055	.138	.087	.061	.131	.131
AI	-.113	-.122	-.058	-.094	-.086	-.104
AJ	-.146	-.176	-.162	-.066	-.129	-.123
AK	-.034	-.278	.287	-.234	.083	.251
AL	.180	.183	.183	.301	.244	.268
AM	.291	.206	.139	.224	.230	.265
AN	.243	.173	.202	.238	.252	.199

APPENDIX G RESULTS FOR ALL STUDENTS IN STUDY 4

Study 4 Multiple correlation between cues and judgments and reliability of judgement

Judge	Mean judgements	Standard Deviation	Multiple correlation between cues and judgements	Test – Retest Reliability
0.0 group				
Judge A	6.08	1.98	.273	.167
Judge B	4.80	1.68	.368	.011
Judge C	5.16	2.51	.260	-.205
Judge D	5.48	1.58	.473	.331
Judge E	6.55	1.45	.327	-.111
Judge F	4.71	2.26	.329	-.046
Judge G	5.38	1.99	.288	.365
Judge H	4.96	1.95	.309	-.296
Judge I	6.58	1.80	.309	.998
Judge J	3.63	2.18	.304	-.231
0.2 group				
Judge K	5.71	2.13	.205	.230
Judge L	8.10	0.81	.204	-.194
Judge M	4.58	2.28	.736	.320
Judge N	7.10	1.64	.391	.990
Judge O	5.31	2.22	.337	-.178
Judge P	4.10	2.89	.195	-.023
Judge Q	4.91	2.06	.274	.990
Judge R	4.90	2.17	.460	.596
Judge S	6.56	1.72	.659	.192
Judge T	6.28	1.78	.248	-.231
0.5 group				
Judge U	5.80	1.02	.309	.522
Judge V	4.10	2.42	.307	-.061
Judge W	5.10	1.72	.251	.181
Judge X	4.05	2.32	.305	.205
Judge Y	5.53	.92	.213	-.059
Judge Z	4.18	2.26	.275	.240
Judge AA	3.65	2.51	.388	.077
Judge AB	3.08	2.11	.365	-.390
Judge AC	4.83	2.55	.405	-.233
Judge AD	4.78	2.13	.276	-.030

0.8 group				
Judge AE	7.35	2.35	.218	.480
Judge AF	4.31	1.71	.355	.041
Judge AG	4.66	2.21	.788	.934
Judge AH	4.16	2.24	.948	.755
Judge AI	4.63	1.99	.906	.077
Judge AJ	4.66	2.64	.220	-.644
Judge AK	5.60	2.33	.321	.077
Judge AL	8.61	0.49	.214	-.071
Judge AM	6.31	1.15	.189	.349
Judge AN	8.70	0.76	.467	.452

Correlation between each (cue correlations) and with the judgements for each participant

Judge	A	B	C	D	E	F
0.0 group						
Judge A	.065	.049	-.048	.118	.080	-.128
Judge B	-.197	.212	.117	.046	-.034	.156
Judge C	-.007	.019	.124	-.119	-.198	-.117
Judge D	-.168	.176	-.397	.063	.130	-.080
Judge E	-.024	.225	.060	-.050	-.082	.193
Judge F	-.227	.133	-.062	-.083	-.073	. 080
Judge G	.062	-.168	.158	.026	.056	-.159
Judge H	.078	-.087	.038	-.045	.228	.117
Judge I	.007	.002	.146	.149	.001	-.172
Judge J	.218	-.150	-.135	.041	.087	.021
0.2 group						
Judge K	-.077	-.132	.018	-.158	-.051	-.038
Judge L	.029	.094	-.064	.122	-.038	.077
Judge M	.166	.428	.593	.479	.180	.415
Judge N	-.096	.081	-.158	-.161	-.151	-.224
Judge O	-.059	.105	.254	.088	.050	-.094
Judge P	.036	.127	.076	.149	-.033	.111
Judge Q	.128	.212	-.001	-.038	-.016	.120
Judge R	.301	.172	.204	.297	.215	.275
Judge S	.481	.407	.142	.323	.361	.444
Judge T	-.060	.063	-.030	.197	.065	.055
0.5 group						
Judge U	.041	.079	-.113	.109	.058	.066
Judge V	.088	.254	.064	.070	.158	.172
Judge W	.041	-.074	.039	.094	.111	.096
Judge X	.010	-.177	.052	.055	-.115	-.030
Judge Y	.042	.183	.149	.146	.110	.127
Judge Z	.135	-.059	.065	-.049	-.049	.127
Judge AA	-.084	-.190	-.085	-.293	-.269	-.095
Judge AB	-.250	-.139	-.152	.019	-.262	-.046
Judge AC	-.124	.002	-.054	.025	-.303	-.034
Judge AD	.077	-.049	.071	-.023	.028	.139

0.8 group						
Judge AE	.128	.105	.129	.076	.170	.129
Judge AF	.209	.071	.043	.109	-.001	.102
Judge AG	.666	.699	.714	.748	.542	.735
Judge AH	.910	.899	.872	.910	.528	.894
Judge AI	.788	.800	.786	.900	.433	.849
Judge AJ	.115	.143	.082	.054	.098	.075
Judge AK	-.126	-.051	-.065	-.127	.044	-.172
Judge AL	-.156	-.184	-.158	-.168	-.022	-.137
Judge AM	.071	.090	.149	.084	.068	.073
Judge AN	-.249	-.222	-.105	-.298	-.116	-.319

APPENDIX H

A CASE STUDY OF STUDENT JUDGEMENTS OF INTEREST IN A SUBJECT[1]

James A Athanasou & Olu Aiyewalehimi
University of Technology, Sydney

1

University of Technology, Sydney
Faculty of Education
PO Box 123, Broadway 2007.
Email: Jim.Athanasou@uts.edu.au

Word length: 1967 including abstract, references but excluding tables and figures

[1] Published in Ife Psychologia, 9(1), 74-82

The purpose of this paper was to report an idiographic case study of how students might make a judgement of interest in a subject. This case involved two undergraduate students from the University of Technology Sydney. Their judgements of interests were based on information that described six aspects of a subject rated from very low (0) to very high (9). The six aspects (cues) were whether the subject was challenging, fascinating, the quality of teaching, the usefulness of the text, the quality of the facilities, and the extent to which theory and practice were related. Participants were presented with 60 separate profiles comprising random values of the six cues. They studied the six cues in each profile and then judged their own personal level of interest on a scale from 0 (no interest) to 9 (very high interest) based on the information contained each profile. Profiles (N=15) were repeated to determine consistency of judgement of interests. Results were analysed using a single lens model that describes human judgement of interest. Results showed individual differences and complexity in judgement with an overall there was an emphasis on the quality of teaching.

A CASE STUDY OF STUDENT JUDGEMENTS OF INTEREST IN A SUBJECT

A person's interest in a subject acts as a key factor in many models of learning (see Athanasou, 1998a; Athanasou & Petoumenos, 1998; Krapp, Hidi & Renninger, 1992). Typically educational achievement and satisfaction are inferred from ratings of student interest and these ratings involve perceptions and subtle decision-making about oneself. People employ such judgemental processes regularly in education and in the case of interest they may be based on the subject, the learning situation or many other factors. The purpose of this paper is to study how people make judgements about how interested they are in a subject.

The use of an idiographic design to ascertain the judgemental policy that people use to determine their interest was advocated by Athanasou (1998b). In this type of study participants make judgements across a representative sample of situations and the resulting data capture the policy that a person uses to indicate their interest. A typical finding in such studies is that there are individual variations in perceptions of interest and marked differences in the ability to make accurate judgements (Athanasou, 1999). From the earlier research, six factors were hypothesised *a priori* to form a tentative model of student interest in a subject. These were:

- The extent to which a subject was challenging;
- The extent to which a subject was fascinating;
- The quality of the teaching in a subject;
- The usefulness of the text for a subject;
- The standard of teaching and learning facilities; and
- The relevance of theory in a course to practice.

This model has its origin in the work of Renninger, Hidi and Krapp (1992) who stressed the role of interest in learning and development in key collection of papers (see also Athanasou, 1998a for a summary). They outlined two broad views of interest as individual interest (a deep-seated, relatively permanent, enduring involvement) and situational interest (a transitory curiosity or arousal). This study uses both individual and situational components (see Figure 1) and looks at their impact upon students' perceptions.

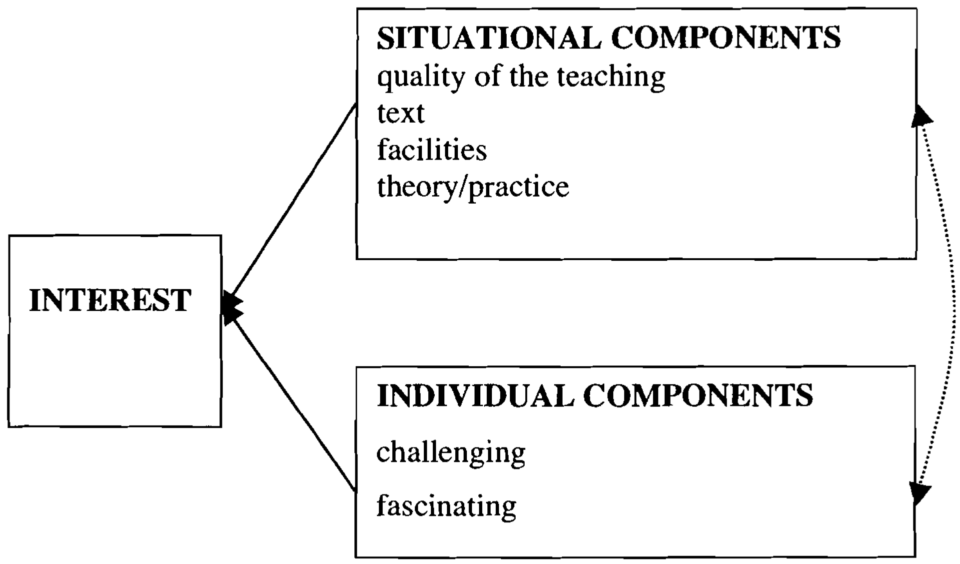


Figure 1. A tentative model of situational and individual components of interest

Policy capturing

The type of policy capturing used in this study may warrant some description for the reader who is not familiar with judgement analysis. The study is an idiographic analysis focusing on the lawfulness in each person's behaviour across a large number of situations. The emphasis is on the repeated sampling of one person in many situations rather than the sampling of many people across one situation, as in much survey research.

It involves participants being presented with large numbers of decision-making situations. The situations contain profiles or collections of information that involve educational descriptions. The profile is in the form of some ratings on a set of cues that describe a subject. The participants are asked to consider this information and then make a judgement of how interested they would be in this subject. The repeated decisions can then be analysed to capture the judgement policy of the person. Multiple regression analysis can be used to determine the role of particular variables in forming a person's judgement and the policy capturing may be represented in the form of a single-lens model analysis (see Figure 2).

Figure 2 represents the single lens model analysis system design for studying judgements where the criterion of interest is either unknown or measured. The single system is capable of providing information about the multiple correlation between a judgement and all cues, the correlations (r_{ij}) between each cue and a judgement, as well as descriptive statistics for each cue. It is called a lens model because it is represented pictorially as a type of lens that focuses cues on to a judgement.

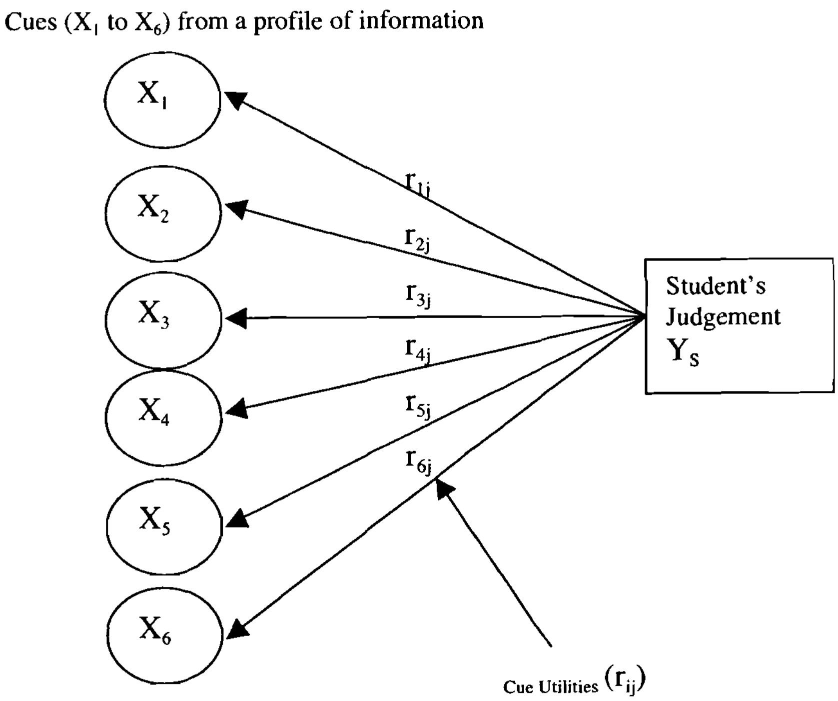


Figure 2. Single system lens model design for capturing of judgement policy.

The relationship between each aspect and the person's judgement is determined statistically. The primary aim was to describe the relationship between the level of interest in a subject and the cues when the cues values are randomly selected (i.e., uncorrelated). Cooksey (1996, p.125) argued that stability in judgment was maximised when cues were uncorrelated. A secondary aim was to determine the extent to which situational or individual components influenced interest.

METHOD

Participants

The participants were two female students (20 and 22 years) from the business faculty who responded to a recruitment to take part in the study. Participation was voluntary and not related to any course requirements.

Instrument

The instrument used in this study was a pre-printed booklet containing 60 judgement profiles. Each profile contained the six dimensions or cues (Challenging, Fascinating, Teaching, Text, Facilities and Theory/practice) rated from 0 (very low) to 9 (very high). The cue values were allocated randomly from a table of random numbers. The actual intercorrelation between the six cues is shown in Table1 The median intercorrelation was -0.02.

Table 1 Cue intercorrelations

	Challenging	Fascinating	Teaching	Text	Facilities	Theory Practice
Challenging	1.0					
Fascinating	-.24	1.0				
Teaching	.21	-.06	1.0			
Text	.21	-.20	.38	1.0		
Facilities	.02	-.02	.23	-.02	1.0	
Theory/Practice	.01	-.02	-.31	-.09	-.24	1.0
Cue Mean	4.5	4.0	4.9	4.7	4.0	3.6
Cue Standard deviation	3.2	2.6	2.7	2.9	2.5	2.9

Procedure

Participants were asked to study the cues in each profile and judge their overall level of interest also on a scale from 0 (very low) to 9 (very high). From the 60 profiles, 15 were repeated in order to determine consistency of judgement. The test-retest reliabilities for participant A was 0.456 and 0.797 for participant B.

Analyses

The analyses of the judgement of interest were undertaken for each individual using the single lens model as the framework. The multiple regression of six cues on the participant's judgement of interest was calculated separately for each person. The multiple correlation and beta weights are reported. A relative beta weight was also determined. The relative beta weight shows the importance of the cues for each person. It is calculated by taking the absolute sum of the beta weights and determining the percentage for each cue (see Cooksey, 1996). Since this is an idiographic study the results are reported independently for each participant.

RESULTS

Overall results

Basic judgement indices in terms of the single system lens model are shown in Table 2 below. Judgements averaged out around the middle of the 0- to 9-point scale and test-retest reliabilities based on 15 observations were low to moderate. Multiple correlations accounted for around 20-32% of the variance in judgements.

Table 2 Lens model parameters

	Participant A	Participant B
Mean judgement (SD)	4.8 (2.8)	5.18 (2.0)
Multiple correlation	0.568	0.454
Test-retest reliability of judgements	0.456	0.797

A number of diagnostic tests were used to detect whether there was violation of the assumptions underlying policy capturing and multiple regression. The plotting of standardised residuals showed that there was no substantial violation of the regression assumptions for Participant A but non-normality of judgements was evident visually for Participant B (see Figures 3a and 3b). Normality tests for skewness and kurtosis were satisfactory for Participant A but there were problems of kurtosis (-3.4, p=.0005) for Participant B. Visual inspection of Figure 3(c) showed that there was no substantial violation of the regression assumptions for Participant A but a violation of linearity for Participant B. The Durbin-Watson value for both participants indicated that successive residuals were not correlated was (1.62 - Participant A; 2.61 - Participant B).

Figure 3(a) Residual plots for examining the normality assumption – histogram of residuals

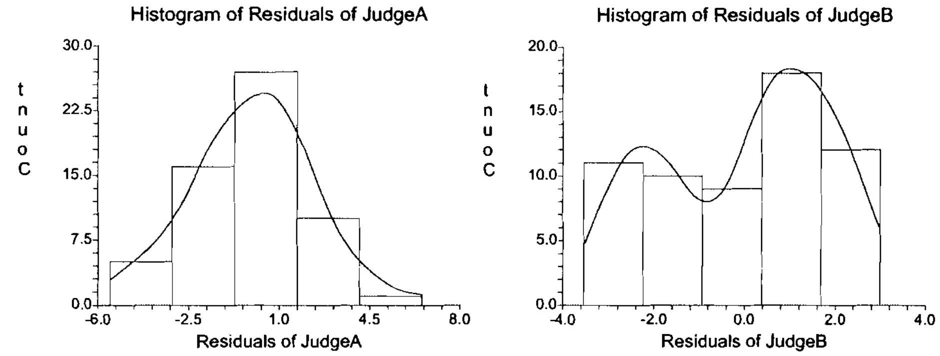


Figure 3(b) Residual plots for examining the normality assumption – normal probability plot of residuals

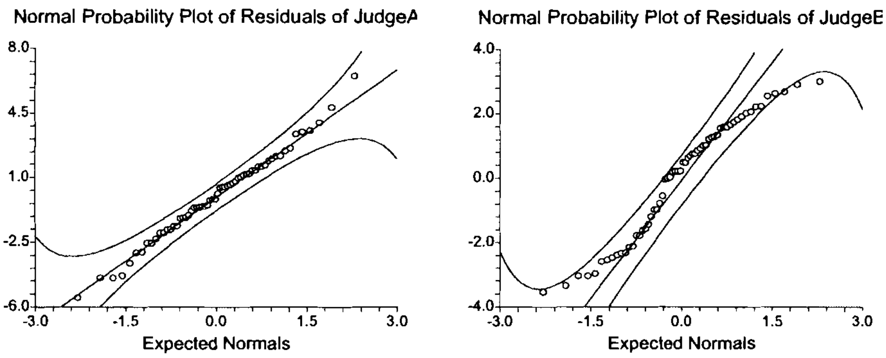
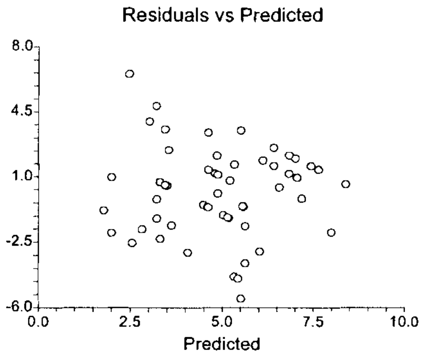
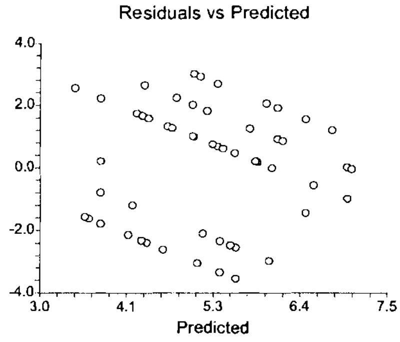


Figure 3(c) Plots of standardised residuals and predicted judgements





Individual results

Looking at the individual judgements, there is a marked contrast in the decision policies of the two judges. The B weights, their standard errors, t-tests and p values are shown in Table 3 together with the beta weights and the relative beta weights. The relative beta weights show the personal importance of cues for each participant. For participant A, the most important relative cues were those relating to the quality of teaching, the text and the extent to which the subject was fascinating. For participant B only the quality of teaching acted as a significant cue.

Table 3. Individual judgement policy statistics

Weighting scheme	**Challenging**	**Fascinating**	**Teaching**	**Text**	**Facilities**	**Theory & Practice**
Participant A						
Correlation with judgement	.22	.12	.42	.37	-.09	-.06
B weight	.13	.25	.37	.25	-.18	.03
SE	.10	.12	.13	.12	.13	.12
t-test	1.23	1.94	2.69	2.05	-1.35	0.29
p-value	.22	.05	.00	.04	.18	.76
Beta weight	.14	.23	.35	.25	-.16	.03
Beta relative weight	.12	,19	.30	.21	.13	.02
Participant B						
Correlation with judgement	-.20	-.11	-.29	-.01	.02	-.12
B weight	-.11	-.12	-.30	.08	.05	-.16
SE	.08	.10	.10	.09	.10	.09
t-test	-1.4	-1.2	-2.8	.92	.55	-1.7
p-value	.16	.20	.00	.36	.58	.09
Beta weight	-.18	-.16	-.40	.12	.07	-.22
Beta relative weight	.15	.13	.34	.10	.06	.19

DISCUSSION AND CONCLUSION

This study represents the first detailed analysis of how students made their judgement of interest in a subject. The value of a lens model analysis and policy capturing were highlighted in this case study.

The findings indicated considerable variation in how two participants made their judgements. The results confirmed earlier reports on significant individual differences in the perceptions of interest but less emphasis on factors such as ability or subject importance (Athanasou, 1998b, 1999). There were similarities between participants in the emphasis on the quality of teaching but additional factors also played a role in the decision making of participant A. The linear regression equation was satisfactory for capturing the policy of participant A but a non-linear equation and/or the addition of other cues may be needed for participant B.

The hypothesised model of interests outlined in the introduction emphasised both individual and situational components of interest. In this case study the students emphasised situational components, namely teaching and/or text. These may be hypothesised as instrumental for learning and achievement in a course. It is almost as if individual interest components such as challenge and fascination are relegated. It may be that the partition of interests into these two domains (individual vs situational) does not reflect the reality of subject interest for a student in higher education.

This study was intended to provide a case study that was largely quantitative in its emphasis. It is not possible to extrapolate the findings to other persons because of the idiographic nature of the study. It involved a sampling of situations rather than a sample of people. The only generalisation that might be made is to additional sets of cues. It is also recognised that the findings might be limited by the range or type of cues that were presented but the analysis of results showed that for participant A at least the range of cues was satisfactory. Nevertheless, it may be worthwhile to consider other cue arrangements.

It was not possible to specify a criterion for judgement in this study so the relationship of the six cues to any ultimate or real level of interest cannot be determined. In fact, this might well represent the ecology of interest, where a person's perception of their interest is ultimately the most important reality. Future studies in this program of research will focus on the role of cue intercorrelations in the judgements that people make.

References

Athanasou, J A, (1998a). Implications for vocational education research of some
German views on the nature of interests. *Australian Vocational Education Review, 5,* 1-11.

Athanasou, J.A. (1998b). Perceptions of interest; A lens model analysis. *Australian*
Psychologist, 33, 223-227.

Athanasou, J A & Petoumenos, K. (1998). Which components of instruction influence student interest? *Australian Journal of Teacher Education, 23,* 51-
57, 1998

Athanasou, J.A. (1999). Judgement of interest in vocational education subjects, *Australian and New Zealand Journal of Vocational Education Research, 7* 60-77.

Cooksey R.W. (1996). *Judgement analysis.* New York: Academic Press.

Krapp. A., Hidi. S., & Renninger. K. A. (1992). Interest. Learning and development.
In K.A.Renninger. S. Hidi. & A. Krapp (Eds.*). The role of interest in learning an Development.* (pp.361-395). Hillsdale NJ Erlbaum.

Renninger, K. A. Hidi, S & Krapp, A (1992). *The role of interest in learning and*
development. Hillsdale, NJ Lawrence Erlbaum Associates, Inc.

APPENDIX I

PERMISSION LETTERS

Dr. Elkanah Olumide Aiyewalehinmi
Faculty of Education Haymarket
University of Technology, Sydney
PO box 123
Broadway NSW 2007
Australia.

13 January 2001

Dean
Faculty of Education Haymarket
University of Technology, Sydney
PO box 123
Broadway NSW 2007
Australia.

I am a candidate in the Doctorate of Education supervised by Associate Professor James Athanasou and I am writing to seek permission to conduct a research study on adult education students. The main purpose of the study is to examine how students make use of available information to make a judgment of academic interest.

Participants are required to make 75 judgements of their potential level of academic interest in a hypothetical academic subject. Participation in the study is voluntary and is not related to any course or study requirements. An outline of the study will be provided to interested lecturers and students. Participation is in their own time and a small monetary reward is provided.

Your authorization is necessary as a pre-condition for the approval of my research ethics application by the Human Research Ethics Committee at UTS.

Submitted for our consideration and approval.

Yours faithfully

Elkanah Olumide Aiyewalehinmi.

GLOSSARY Of TERMS USED

Cues are information detail presented to a person.

Cue Intercorrelations are the relationships between items of information in a situation.

Double lens model is a robust representation for studying human judgment that can be varied without losing or distorting its essential concepts.

Idiographic design is a technique used to analyse the behaviour of each individual separately across a large number of situations. In other words the results are not aggregated across the subject.

Judgment is a function of learning in a task environment.

Judgement analysis is a technique used to identify and described a person's judgement policies.

Multicollinearity, indicates high correlation among the independent variables.

Multiple regression is an equation that represents the best prediction of a dependent variable from several independent variables.

Policy capturing is designed as a guide of action or as a general rule for making decision in some special cases.

Profile is information representing situations or cases for human judgement process.

Probability learning is multiple cue probability learning.

Probability learning is referred to a situation where a subject or learner has to predict an event, which is correlated to stimuli.

Regression analysis is used to show that independent variables were correlated with one another and with dependent variable.

Representative design is designed to identify how a researcher obtains the stimuli for judgement.

Residual scatterplots show the differences between the obtained and predicted dependent variable scores are normally distributed.

Single lens model represents the basic fundamental methodology for studying human judgement.