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<td>&quot;INFORMATION, ROLE AND ATTITUDES WITHIN UNIVERSITIES TOWARDS ENERGY CONSERVATION.&quot;</td>
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INFORMATION, ROLE AND ATTITUDES
WITHIN UNIVERSITIES
TOWARDS ENERGY CONSERVATION

by: H. J. MILES

University of Surrey

Dissertation for the Degree of
MASTER OF PHILOSOPHY
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SUMMARY OF THE THESIS

This Thesis presents discussion and empirical evidence arguing that role (both occupational and social) is a crucial concept in the analysis of attitude formation and change and the person's behaviour.

Earlier chapters involve discussion of roles, attitudes and attitude change and in later chapters evidence is presented showing that role-specific attitudes can be demonstrated empirically.

The topic area for these investigations and discussions was that of energy conservation.

Chapter 1 discusses what is meant by role and how role is related to information and attitudes. It includes a consideration of attitude change. The second chapter reviews research work carried out within the broad area of 'social responsibility', which includes energy conservation.

The first two studies presented are exploratory studies of energy use and conservation in universities. The first is a straightforward analysis of energy consumption at Surrey University, revealing a number of interesting use-cycles and demonstrating that people's behaviour can significantly affect energy use. The second, 'Energy Conservation in British Universities' is a survey of the ways in which British Universities were attempting at the time to reduce their energy consumption and costs. It was felt that such a survey could provide valuable information not only as a purely descriptive analysis of patterns of energy conservation adopted in universities, but also in terms of assumptions made about attitudes and the behaviour of university personnel with regard to energy use, and more particularly about the possibilities of influencing such attitudes and behaviours in a favourable direction, i.e. towards greater energy conservation.

An analysis of responses allowed universities to be arranged along a dimension from those taking most energy conservation action to those taking least. This dimension was found to conform to a cumulative scale.
By taking the further step of treating the cumulative scale as a flow diagram, it was possible to demonstrate that position on it was possibly linked to movement through a series of designated procedures.

Three other studies were carried out. The general methodology for these drew heavily on information obtained from the first two studies.

The first of these studies is described in Chapter 4, "The Effects of Energy Conservation Publicity". Information/publicity was published in a large institution (Surrey University) which was intended to boost energy conservation awareness and behaviour by university personnel. The effects of this information were analysed from 118 respondents in short interview situations.

The effects of the information were clearly apparent upon the awareness of respondents about energy conservation matters, and a process of decay over time was found (measured by an Awareness Index). Few occupational differences were found.

Chapter 5 describes a more comprehensive questionnaire study intended to examine the relationships between attitudes, beliefs and knowledge of energy conservation, and to look for any occupational or social role effects. Once again significant sex differences emerged, though the strong relationship between sex and occupation was also apparent in this study. Significant differences were also found between 'experienced' subjects (those who had been interviewed for the Publicity Study) and 'naive' subjects (those who had not) in terms of their response rates (motivation to respond) as well as their degree of expressed concern, indicating the importance of previous information on attitudes.

The last study, presented in Chapter 6, was a more direct test of the effects of role upon the evaluation of other role groups by subjects, and of the concept of 'centrality of beliefs'. The hypotheses presented were supported fully or partially by the results.
differences emerged with respect to 'occupational stereotypy', defined as occupationally specific ways of evaluating occupational groups, including one's own.

The final chapter draws together the findings from these studies and discusses them in the light of the role/attitude model and attitude change. Relevant recent research from the literature is discussed and further research proposed. The applicant concludes that a role-based model of attitudes, beliefs and behaviour, rooted in a cognitive model of Man, can provide useful generalisations drawn from work in the areas of attitudes towards energy conservation and applied to general relationships between attitude and behaviour. He feels that such a model adequately accounts for the relevant personality, situational and normative factors.
ROLE, ATTITUDES AND ATTITUDE CHANGE: A DISCUSSION

Chapter 1

1.1 General Approach

In the present Chapter the key concepts to be explored in this thesis are presented. These derive from an approach or model of Man best described as a "cognitive materialist" one.

It is cognitive in that it allows of unique and irreducible cognitive elements in any explanations of people's behaviour, and it is materialist in that it perceives these cognitive elements as being causally related to the person's social being and environment.

It is seen as no contradiction by the applicant to assert the strongly determining influence of material conditions, ultimately of the economic base of society, upon behaviour and attitudes and yet at the same time to reject a positivist approach.

It is argued that such a cognitive approach must elevate the concept of role to a position of considerable importance in the explanation of human behaviour. Role, it will be suggested, should be seen as the mediator between the material basis of the person's social being and the cognitive aspects of his or her 'making sense of the world'.

There would seem to be clear distinctions that can be made between activities, information and meanings with regard to role. Whereas activities, i.e. behaviour, may be considered an end in themselves, this actually ignores the fact that the intention may not be fully described by the behaviour. In other words, the meaning that a certain event has for a given person depends not so much upon the objective aspects of the event but on the interpretation put on those events. That interpretation will vary according to beliefs and attitudes that the person has about aspects of the event. For certain events the interpretations by a whole number of people may be very similar, for example shock and distress at someone's death. On the other hand someone else, who believed the dead person was evil and a menace to humanity, might actually show pleasure at
the death, while normally showing shock and distress at the death of a friend or relative.

The activities associated with a role are the visible, functional aspects of performing that role. Information is relevant not only in that adopting, or being, a given role may actually open up or close certain avenues of information, but also in the fact that the information is subject to selectivity by the person. Information in terms of feedback (e.g., Annett, 1969) is also of considerable importance.

It is suggested here that the selectivity attributable to the role arises through the possession of a belief system, making some information for a given person more relevant, and other information less relevant. The belief system itself develops through interaction of the person and the environment, depending therefore to a large extent upon the person's past experience.

The suggestion here, then, is that it is primarily the organisation of the person's belief system which varies with role, and that role differentiation produces differing belief system 'sieves' through which information from the environment passes.

Turning to energy conservation specifically, the core of this thesis rests on the argument that people's attitudes towards energy use and energy conservation in a given environment derive from information drawn from the environment, but information which must pass through people's differing belief system 'sieves'. Differing belief systems arise, it is proposed, through role difference among people.

But is energy conservation related to attitudes and behaviour? A search through the literature reveals a relatively small amount of work reported on energy conservation per se other than on purely technical aspects (e.g., wind electric generators, solar water heaters, heat pumps, etc.) Much of the popular press and science magazine articles have also concentrated on these aspects.
On the other hand there are a good many more studies found in the psychological, sociological and ecological literature which deal with attitudes and public opinion towards an identifiable group of topic areas, such as pollution, littering, energy conservation, and physical resources. All of these are what one might call environmental/ecological topics. A better label, suggested by O'Riordan (1977) refers to a particular characteristic of these topics — that they all involve the notion of social responsibility. This notion will be more fully discussed in Chapter 2.

However, a number of workers (e.g. Swan 1970, Sewell 1971, Sewell and Foster 1971, Bruvold 1973) persuasively argue that people's attitudes are highly significant in any analysis of energy conservation, and Chapter 3 will describe studies which illustrate this crucial point.

1.2 What is Role?

Lenski (1970) describes role as having four main functions:

(1) Specialisation, which tends to increase the efficiency of human labour;

(2) An integrative effect of specialisation, i.e. making people more dependent on one another;

(3) As a mechanism of social control, i.e. indicating what more powerful members deem necessary or desirable;

(4) As a mechanism for transmission of traditions and customs.

(3) and (4) will be seen to be the functions which this thesis is most concerned with.

Brown (1965) asks the apparently simple question 'what is role?' He answers that not all social categories (e.g. smoker or cyclist) can be considered as social roles (unlike 'father' or 'engineer'). "The rough implicit criterion," he goes on, "that separates smokers or cyclists from fathers or engineers seems to be the number of norms that are stated in terms of the category. A rather substantial
"number of norms must exist for a category if it is to be a role."

Role is not a mask which can be discarded or changed at will. It will be argued that roles become part of the fabric of the person, defining him or her in relation to society as a whole and in relation to other role-incumbents as members of a role group who may or may not have strong common cause with one another (depending upon the importance of the given role).

Again Brown writes:

"Important roles leave a residue in the personality, indeed personality is largely an integration of all the roles that have been played."

Jacoby (1975) explains the conceptual difference between this and the 'role-playing' view of role in the following way:

"The attitude of Rogers and others to the concept and fact of 'role' crystallises the differences between a positive humanism and a dialectical one. To them the concept and fact of roles are a violation of humanity. The role is a facade, consciously assumed so as to hide the real self. ... (but) roles are not merely adopted by the subject as a facade that can be dropped with a little willpower. They are an alienated mode of behaviour custom-fit for an alienated society. ... The social evil reaches into the living fibres; people not only assume roles, they are roles."

What the psychologist is ultimately interested in is how the person construes his or her world and whether such construings can be shown to have a degree of role-specificity (as is the intention in this thesis) in terms of the attitudes and behaviour the person expresses and carries out.

Role is therefore not an 'office' or a set of behaviours. It involves both of these but it more importantly involves a set of expectations peculiar to specific kinds of roles. These expectations refer not
only to the expectations regarding the person's attitudes and behaviour held by others, but also the person's own expectations about himself or herself. These personal expectations need not be what one may immediately articulate, or indeed articulate at all, but they are part of what nevertheless has meaning for the individual.

1.3 **Role in organisational psychology**

One field of psychology where role has been an important concept for a long time is organisational psychology.

Silverman (1970), considering role in an organisational context, defines it as:

\[
\text{office + expectation + organisational image}
\]

He proposes an action frame of reference as the convention within which to consider the meaning of acts. That is, role is a position definable in terms of job descriptions but necessarily including expectations about functions associated with that position. These occur within a frame of reference of an organisation in terms of how its structure and functions are perceived by the role-incumbent and relevant others.

Role has been a concept widely used in organisational psychology to analyse the structure and functions of organisations. For example, Sanford (1964) sees formalised role in an institution as a major defence against conflict, both rational (in terms of conflicting personal and organisational goals) and irrational (such as unconscious conflicts within and between personalities).

On the other hand Kahn and Wolfe (1974) see factors like tension, dissatisfaction with job, etc. as being to some extent symptomatic of role-conflict, though this is not necessarily within the organisation but may be between conflicting roles held by an individual within and outside an organisation.

Allen (1972) indicates the strength or pervasiveness of some organisational roles when considering the role of a trade union official. He writes;
"The role of a union official is set so that the behaviour of any person who becomes an official is almost entirely predictable. The only significant variations which occur are those which exist within the hierarchy of roles within a union... The dominance of the role over the individual explains why the union behaviour of a communist and an anti-communist often varies so little; why, in other words, there is continuity of activities despite marked changes in personnel."

Other researchers, such as Harré and Secord (1972), maintain that meanings are important to the individual when considering behaviour and that behaviour can only be properly understood by discovering what meanings previous information had for that individual. So it is things done by a person rather than things done to a person that are important in the first instance. That is, how the person perceives his or her interaction with the environment is a proper subject of study, though this does not mean that forces acting on the individual are unimportant. Rather, such forces or factors lie beyond the meanings ascribed by the person. Harré and Secord therefore go beyond what is done by the person to what is meant, the aims and intentions of the person.

Occupational role, the aspect of role most commonly investigated in organisational psychology, would appear to serve important functions such as 'institutionalising' conflict and providing behavioural parameters. Such functions might also be expected to exist for less formalised sex and kinship roles.

1.4 Attitudes

Sherif and Sherif (1967) attempt to define attitudes by what they are not. They suggest five criteria;

(1) They are not innate;

(2) They are more or less enduring;

(3) They imply relationships between people and objects;
(4) Such relationships are not neutral - they have motivational/affective properties;

(5) The relationships are accomplished by forming categories differentiating between objects and peoples' positive or negative relations to objects in various categories, e.g., an attraction to one person implies a comparison with others.

An attitude, for Sherif and Sherif, is defined operationally as the individual's set of categories for evaluating a stimulus domain. Their studies provided empirical evidence for their view that the structure of attitude can be determined in terms of latitudes of acceptance, rejection and noncommitment for an issue, and that the latitude of rejection will be greater than the latitude of acceptance for a highly involved subject. In other words such subjects will tend to use more stringent criteria in evaluating such an issue. This is presumably because the person's own attitude in such cases will be more clearly defined and the criteria more clear-cut.

Triandis (1971) favours a three-component model of attitude - cognitive, affective, and behavioural. These are in fact at the core of Sherif and Sherif's list of criteria, i.e. evaluative comparison is a cognitive comparison, the evaluation is affective, and attitudes, they point out, can only be measured either behaviourally or by verbal report. The question of the link between attitude and behaviour, implicit in this thesis, is discussed in Appendix 3.

1.5 Attitude Change

Some studies have focussed on the components of attitude change. Many are particularly concerned with the type of information that may change attitudes. For instance Triandis (op. cit.) considers source and message factors in some detail, such as channel factors or selective exposure (e.g., for political audiences). Sherif and Sherif (op. cit.) also conclude that attitude change involves communication and that the investigator needs to
know where the individual places the information and the communicator in relation to his/her own position.

Kaplan (1972) points out that the attitude literature, even where precise models of attitude structure are presented, make little if any distinction between the processes of impression or attitude formation, and attitude change. For example, Fishbein's model (Fishbein, 1972) assumes both processes can be handled equally well without adjustment. On the other hand many researchers do actually seem to conceive of the processes as separate (e.g. Brown, 1965). Kaplan suggests the mediating effects of acceptance and impact, such that attitude change involves acceptance + impact whereas attitude formation involves acceptance only.

Triandis reviews several attitude change theories, such as cognitive consistency (discussed below), social judgement theory (Sherif and Sherif), and Active Participation Theory (Lewin, 1947), which sees attitude change as due to changing operational conditions within group participation schemes. Here the power of role is once again evident.

For example, encouraging people to adopt certain roles - role-playing - can sometimes considerably alter their behaviour. People put in the role of experimental assistant in a 'pain' and learning experiment continued giving punishment electric shocks to 'subjects' well past the pain threshold, even (apparently) killing them. (Milgram, 1974). Although some of these 'assistants' evinced considerable disquiet about the procedure the role imperatives or rules seemed to be so strong as to overcome these.

Bandura, Ross and Ross (1963) have shown how children will imitate a model. Children will tend to imitate the destructive behaviour of a child on film if given the opportunity. However, when the film showed the child being punished, they were less likely to perform the behaviour than if they saw no consequences for the model or the model was rewarded. When incentives were given to all the children to perform the behaviour seen on the film these distinctions disappeared. This led these researchers to
make a distinction between learning the behaviour of a model and performing it, a distinction which had also been made by Maccoby (1959) and Whiting (1960), though they called this role-learning and role-performance. In other words, you don't have to be a father to know what the role of 'father' entails, hence powerful roles will have their influences well beyond the role-incumbents themselves.

1.6 Consistency theories

Perhaps some of the most useful theories of attitude change have been those involving the principle of consistency (Festinger, 1957; Osgood and Tannenbaum, 1955). These epitomise what Harre and Secord regard as second stage aspects of science, which try to answer the question 'Why?' rather than 'What?', that attempt to give an explanation rather than a description.

The person is conceived of as a consistency-seeking organism. Consistency is sought between beliefs, between belief and information, and between belief and behaviour. Cognitive elements are arranged to maintain maximum consistency in relation to incoming information.

However Pepitone (1966) points out that consistency theories do not adequately deal with the importance of the belief, a point acknowledged by Brown (1965) in that he accepts that:

"In order actually to determine the total magnitude of dissonance in a person's thinking about any single element, one would need to have a means of eliciting and counting the total population of relevant elements and also a means of assessing their relative importance."

He suggests that there is no adequate procedure for doing so as long as the element is not clearly defined, and he goes on;

"We have no idea how much cognition makes an element and no possibility of computing total dissonance."

A useful distinction can be made here between conflict and dissonance. Conflict through decision making arises through the person being pulled in
different directions, whereas dissonance occurs when a person is committed to a course of action, when the pressure to reduce dissonance is not pushing the person in two directions simultaneously. The dissonance is between the desired state of affairs and the actual state of affairs as perceived by the person.

1.7 Belief, Centrality and Information

Rokeach (1975) argues that the beliefs of other people have to be inferred, since the verbal report and the actual belief may be different and neither need accurately reflect the true state of affairs, i.e. environmental or situational. The degree of rationality associated with the person is assumed from his or her reports. Rokeach goes on to make three assumptions about the analysis of beliefs.

(1) Not all beliefs are equally important to the individual;
(2) Beliefs vary along a central-peripheral dimension; the more central the belief the more it will resist change;
(3) The more central the belief changed the more widespread the repercussions will be in the rest of the belief system.

If we consider in particular the third assumption, it means that if people are being provided with information to try and change their beliefs about energy (for example), to encourage them to conserve energy, it follows that it is easier to try and change some peripheral belief rather than a central one. It might be suggested that the defining qualities would be the strength held and degree of importance to the individual of the belief (the two are not the same - a peripheral belief may actually be strongly held). It ought, then, to be possible to gain some empirical measure of these qualities, for example how prepared an individual is to defend the belief, or what it would require to negate it, or how integrated it was with other beliefs, i.e. which other beliefs might have to be changed to accommodate information contradictory to the belief in question in order to maintain internal consistency.

From Rokeach's assumptions, and considering energy conservation once
again, it would probably be more easy to get people to conserve energy by convincing them that they waste their own money by not doing so than by trying to convince them that they might help alleviate Third World poverty by conserving energy.

Does Rokeach supply any evidence for what are, after all, assumptions? He was concerned to develop a conceptual system of beliefs. He defined belief centrality...

"... solely in terms of connectedness: the more a given belief is functionally connected or in communication with other beliefs, the more implications and consequences it has for other beliefs and, therefore, the more central the belief."

He presented statements to subjects involving several kinds of beliefs classified a priori in terms of importance. Subjects were asked to rank them in the order which they would wish to relinquish them, and to indicate how strongly they believed them and to estimate how many other people believed as they did.

Rokeach found that the theoretical distinctions made between the types of beliefs were empirically demonstrated. The most deeply held beliefs were those which were widely shared and rarely subject to discussion or controversy. The results also suggested that in the event of a conflict between two beliefs varying in centrality, the more central belief would become dominant.

For example, information contradicting dogmatic beliefs may be summarily rejected. Sometimes this may be verbalised as 'obviously ridiculous' information by the person. This may help to explain instances of 'irrational' acceptance or rejection of information (Brown, 1965).

It should be noted that in this thesis the person is not thought of as having a catalogue of immutable attitudes which pop up like a reference card system whenever needed. Rather, an attitude towards an object involves a search of the belief system regarding the meaning that the
object (information) has for the person. This search can be complicated by all sorts of factors, such as ambiguity in the information, conflicting beliefs, etc.

Complexity with respect to attitude change could refer either to the complexity of the person's belief system or to the complexity of the information with which the person has to deal. However, even very complex information can be broken down into discreet 'bits' of information (Chapanis, 1965) complete in themselves and about which a person may have a belief. In other words, it is suggested that the prime factor in a consideration of attitude change is not the complexity of the information itself but the complexity of the person's belief system, i.e. the person's ability to assimilate or reject 'bits' of information which may or may not contradict currently held beliefs and attitudes.

1.8 The relevance of the concept of role - a summary

A central point argued above has been that role must be considered as a basic factor in attitude formation and change. It can further be strongly argued that there are two role-types fundamental to the person's interactions with others and his or her social environment. These two role-types, occupational and social (primarily sex role) reflect the person's social being and are instrumental in the determination of the person's social consciousness.

Studies reported later in this thesis rest on the contention that occupation and family comprise the two most important 'role-rule sets' (Harre and Secord, 1972) to which the person's other roles are subsidiary. While it is self-evident that modern society involves a high degree of division of labour, and hence a wide variety of occupational roles, the point that may be contentious is that occupational role will carry over into non-working aspects of living. Hence being a doctor or road-sweeper is not only relevant at work but in social and family contexts. As far as sex-role is concerned, the suggestion is not that people can be classified
as one or the other of two opposites - male or female. It is suggested that maleness and femaleness exist on a continuum, but that society does designate sex-type on an all-or-nothing basis. Brown (1965) discusses this point at length, as well as examining cross-cultural aspects of sex-typing and masculinity/femininity. Sex-role is clearly more basic than occupational role and, as will be examined in the studies to follow, is probably closely linked to occupational role.

Obviously the above description is highly schematic and the actual state of affairs is a complex and dynamic one. In conclusion a number of probable characteristics of attitudes and roles can be listed. These can perhaps best be summarised as:

1. Roles refer to sets of rules governing:
   (a) the organisation of information within cognitive sets
      (which gives rise to meanings for the person),
   (b) role-expectations that the person believes are held by relevant others and are important in determining sets of rules.

2. Beliefs and attitudes vary along a central-peripheral dimension of importance within cognitive sets;

3. Beliefs and attitudes are organised in cognitive sets;

4. Attitude change varies with:
   (a) the centrality of the particular belief(s) challenged by the information,
   (b) situational factors, such as structural ambiguity,
   (c) the degree of differentiation between the person's attitude and attitude norms perceived for a given role.

Every individual operates within a number of roles and therefore operates within a complex system of rules about behaviour and information selection which are adopted in a more or less rational manner but to a large extent below the level of consciousness or awareness. That is, the
individual does not have to be able to articulate the rule-sets to be said to comply with them and to be said to be acting more or less rationally by doing so.

This chapter has concentrated to a considerable extent on a discussion of role and information. Basic to the chapter and thesis is a particular notion of role. It is necessary at this point to briefly summarise this approach.

'Role' in the thesis does not correspond directly to the definitions used, for example, by Silverman (op. cit.) or Sanford (op. cit.). 'Role' in this thesis is being used more in the form implicit in what Harre and Secord (op. cit.) have written, or Allen (see P. 5), in that it denotes an interaction with information from the person's environment through the agency of the person's belief system.

It is necessary to use this approach to role because, firstly, the thesis rests on the premise that attitudes are altered by information (publicity, propaganda, etc.). Secondly, role is conceptualised as a framework for development of energy-related attitudes in this thesis. It denotes a nexus of information, a complex of selectivities acting on information from the environment, which affects the development of the person's beliefs and attitudes.
1.9 Some Research Questions

The discussion above gives rise to a number of points which will need to be considered either empirically or theoretically in this thesis. It will be necessary to consider:

(a) How information is best presented in order to alter attitudes. In other words, which are appropriate media, what should the style of content be?

(b) It would be expected that role differences will affect attitudes and exposure to information. How should an empirical analysis of this proceed? Which major role or roles should be selected for study?

(c) If information is crucial for attitude change can an experimental situation be set up whereby information is introduced in a controlled manner and its effects upon attitudes investigated?

(d) Which roles are more basic than others? In terms of the two mentioned so far, it might be expected that sex-role underlies occupational role, and hence this should be reflected in experimental data.
Chapter 2

A REVIEW OF ENERGY CONSERVATION LITERATURE

2.1 A characteristic such as social responsibility is obviously not exclusive to energy conservation but it does provide some sort of unifying criterion indicating in turn a much broader field in which to consider the relationships of roles and attitudes. It is suggested that the more the person behaves in energy-conserving, anti-pollution, non-littering, etc., ways, the more he or she is behaving in socially responsible ways.

For the purposes of this thesis it is these broader areas of human behaviour and social interaction that are of primary interest rather than the more technical aspects of energy conservation.

2.2 Socially desirable behaviour

O’Riordan (1977) suggests that both ‘attitude -- behaviour’ and ‘behaviour -- attitude’ models are inadequate to explain attitude change and behaviour modification and he proposes a transactional model, i.e. ‘individual -- environmental stimuli’.

He recognises the interplay between activities and information in the context of what he calls ‘environmentalism’. This involves the idea of ‘socially responsible behaviour’. Environmentalism (such as energy conserving behaviour) is in essence the execution of social responsibility. We may argue however that this is not quite so clear cut as it might at first appear. The proviso ought perhaps to be made that energy conserving behaviour is only socially responsible behaviour when it involves the exercise of what might be called ‘the social conscience’ of a person in the pursuance of social, rather than selfish, values. The meaning, the reason, attributed by the person is important.

Hence someone who conserves energy because he or she believes that in some way they are benefiting the wider community is acting in a socially responsible way, whereas this cannot justly be claimed of someone who conserves energy for purely self-financial reasons.
O'Riordan argues that environmentally responsible behaviour tends to be associated with information search to justify and support that behaviour. We can also argue that this information search will tend to lead to a more consistent and coherent belief system.

O'Riordan further argues that the explanation for the discrepancy between 'words' and 'deeds', between concern and active commitment is the notion of 'cultural inertia'. He argues that a cultural legacy analysis is fundamental to particular socio-political institutions of Western societies and it is necessary to be aware of this in order to come to grips with disparities between environmental words and environmental deeds.

This is further discussed in Section 2.3.2.

A similar conclusion concerning the question of values is reached by Swan (1970) in a study of responses to air pollution. He found that lower socio-economic status subjects showed less concern for environmental pollution and concluded that:

"... this may ultimately mean that we cannot expect widespread citizen support for air and water pollution control until everyone is provided a higher standard of living."

He also found racial differences in concern, with black subjects (perhaps not surprisingly) showing more concern with racial issues than pollution, though socio-economic status was the prime factor.

Sewell (1971) carried out an investigation of the environmental attitudes of engineers and public health officials in Western Canada and found that observed differences in attitude to environmental pollution was associated with professional grouping, years in the profession, present rank and career mobility, and beliefs about Man's control over nature. This was an important study from the point of view of this thesis because it concerned attitudinal differences related to occupational role.

Bruvold (1973) reviewed Sewell (1971) and research by other workers and concluded that the current approach at that time saw attitude in
relation to two other variables - information and experience. This view, he suggested, parallels classic notions regarding affective, cognitive and conative elements of attitude. We can add that a role-based model of attitude and attitude change is not inconsistent with this approach, in that role would incorporate and account for many of the aspects of differential experience named as a main variable by Bruvold, and would also accommodate a notion of role-specific information or information search in the formation or change of attitudes. A role-based model goes beyond the classic three element attitude model in the notion of a belief system and the organisation of beliefs into cognitive sets.

Is there evidence that different role groups will conceptualise a given topic differently?

Barker (1974) considered the conceptualisation of air pollution by specialist groups. This is the only study apart from Sewell’s and that of Canter (1972) that could be found in the recent literature which deals explicitly with subjects’ roles. The most relevant comments are found in Barker’s conclusion:

"Each group sees its role as representing a set of professional or disciplinary values and procedures which should determine policies and programs. The conflicts which lead to a divisive form of decision making can be deepened by a lack of communication and co-operation between the specialists. Blame is usually placed upon differences in jargon and a certain amount of protectionism. Certainly both are found, but basic differences in modes of thought and information organisation may offer a more fundamental explanation for the lack of communication." (My underlining - HH)

This conception brings a new dimension to bear in the understanding of institutional conflict and decision making which does not see role purely as a defence against conflict (Sanford, 1964) nor to a large extent in intrapersonal conflict terms (Kahn and Wolfe, 1974), but as bringing about basic
differences in the organisation of beliefs and information, leading to different attitudes and behaviour between roles.

Cantor (1972) carried out an evaluation of the Yorkhill Hospital for Sick Children using a repertory grid technique which illustrated that people tended to evaluate aspects of their environment in ways which seemed role-dependent. More recently Cantor (1977) has suggested that:

"The major cause of differences between people in their environmental conceptions is the difference in their roles vis-a-vis the environment,"

In a very recent paper (Cantor and Walker, 1978) Canter and Walker used content analysis of open-ended interviews with various environmental role-incumbents (caretaker, architect, etc.) to show that as a result of role-defined interactions a person will build up over time a conceptualisation of a given environment which differs from the conceptualisation of other role-figures associated with the environment. Quite considerable differences in evaluation of a given environment were made by different role-figures. Canter and Walker concluded that the role-figures were differing in the criteria they used to evaluate the environment, and that these variations related directly to their mode of interaction with the environment, i.e. their environmental roles.

The literature dealing with attitudes, which has been described above as of the social responsibility type, is of two basic kinds:

1. Those which involve the manipulation of information to individuals in order to produce desired changes in attitudes or behaviour - 'energy consumerism';

2. Those which set out to investigate the psychological aspects of people with respect to these social responsibility topics - 'factors influencing the person's responses to environmental issues'.

2.3 The 'social responsibility' literature.
Research in energy consumerism is frequently behaviourist in orientation. Subjects tend to be regarded as passive organisms, the stimulus is usually a form of money incentive or information, and the response is measured by changes in behaviour or attitude with respect to energy consumption, i.e. changed consumption patterns and/or changes in verbal reports or responses to attitudinal items with respect to the subject's use of energy.

Some experiments have used controlled economic environments, i.e. where individuals receive tokens or points for work performed (Battalio et al, 1974). More often monetary incentives have been applied in situ, sometimes in combination with various forms of information or feedback (Winett and Nietzel, 1975; Peck and Doering, 1976). Battalio et al have used laboratory animals as subjects to show that altering the relative values of commodities (the budget set) will alter consumption patterns (Battalio et al, 1975; Battalio and Kagel, 1976).

Annett (1969) has pointed out how feedback or knowledge of results can be crucial in changing behaviour. Certainly the energy consumption research illustrates that the kind of information given to subjects is relevant to behaviour change. For example, the Winett and Nietzel study cited above showed that reductions in electricity use were significantly greater over a period of four weeks for a group of consumers given information on how to reduce consumption than for a group who only received feedback on what they had consumed. Similarly, in an unpublished paper of 1976, Battalio and Kagel concluded that the distribution of government information on energy conservation strategies, together with detailed electricity costs information, had no positive effect on energy conservation for their subjects.

Nevertheless, the experimental orientation of both these studies was a behaviourist one and it can be argued that this passive approach to
the nature of the person is inadequate to explain the differing responses by subjects to the kinds of information presented to them. Apparently subjective factors like the meaning of the information to the subjects were ignored in favour of the degree of behavioural response elicited (energy consumption over a given period).

An overall impression that the reviewer gains from these studies is of their narrowness of conception in terms of the nature of the subject and his/her milieu. Almost by definition in this research subjects are consumers, passive in essence and isolated, and the question of roles, even quite central roles related to job and family, tend to be brushed aside.

The reviewer has come across no studies falling within the category of energy consumerism which attempt to relate attitudes to role in terms of a person's position in the 'energy production-supply-consumption' system, for example.

A study by Seaver and Patterson (1976) showed that increasing feedback and social commendation could reduce fuel-oil consumption for a sample of American domestic consumers. Interestingly the social commendation appeared to be the crucial factor. Once again cognitive aspects, even attitudes, were not considered and the explanation for the empirical findings was in terms of social reinforcement.

Most of these studies also involve an implicit 'economic' approach, more in keeping with the field of econometrics at times than psychology (e.g. Taylor, 1975).

2.3.2 Factors influencing the person's responses to environmental issues.

As in the previous section some of the research covered under this heading is markedly behaviourist, such as Trigg et al's (1976) study of anti-pollution behaviour.

They write:

"Internal versus external locus of control refers to the degree to which individuals believe that reinforcers and other environmental occurrences are contingent upon their own behaviour. Internal
individuals tend to believe that their rewards are contingent upon their abilities, effort and skill. External individuals tend to believe that their rewards are contingent upon luck, chance or powerful others."

Trigg et al used Levenson's (1972) IPC instrument to measure locus of control and concluded that their data:

"... Supported the hypothesis that internals have more accurate information about environmental pollution, they have also demonstrated that when (and only when) people had favourable expectations about future levels of pollution, internal locus of control was associated with greater involvement in conventional forms of social action."

The way in which locus of control is described by Trigg et al seems to refer to something that might more straightforwardly be described as subjects' self-confidence. What their conclusion then implies is that for those subjects who thought it possible to control pollution (to some extent at least) the more self-confident group tended to get more involved with social action the intention of which, in their minds, was to bring this about. This would seem a more straightforward explanation of the results.

Other studies have considered the effects of various factors on environmental attitudes and actions. For example, Dunlap (1975) has looked at the political orientation of subjects. He found evidence which would tend to contradict a naive consensus view for resolving environmental issues. He found that Republican and Conservative students consistently indicated lower rates of pro-environmental attitudes and actions than their Democratic and Liberal-Left counterparts. In part this reflected a tendency for the more right-wing students to reject any serious possibility of an eco-catastrophe. Hence a major recommendation from Dunlap's study was that to mobilise wide sections of society for pro-environmental actions requires convincing the population that an eco-catastrophe is in fact a
genuine possibility. How this might be done he does not pursue.

Perhaps the right-wing students are correct in rejecting the serious possibility of an eco-catastrophe. Dunlap implies that the weight of evidence is against them. One can note, for instance, that even the Federal US Administration, rarely noted for its radicalism, has openly discussed the possibility of such a catastrophe. The question then arises as to why this tends to be rejected by the right-wing students. Perhaps these students had more rigid belief systems, more central beliefs, with respect to pollution and ecological continuity and were unable to accept new and uncomfortable information especially as much of it came from sources politically to the Left of the Republican Party.

Dunlap's findings are echoed by Arbuthnot (1977) who found that subjects regularly using recycling centres scored significantly lower on both 'general conservatism' and 'lack of personal control' factors than those not regularly using the recycler. In other words, the 'good' conservationists tended to be less conservative and more self-confident about changing things (using here the conversion of terms described above in respect of Trigg et al.’s 'locus of control' experiment).

Arbuthnot also found that the recycler subjects' behavioural commitment seemed generalised over various types of related activities, i.e. they were more likely to belong to ecology groups and so on.

Relationships between attitudes, behaviour and personality variables were also examined in terms of their prediction of environmental behaviour and knowledge, and Arbuthnot concluded:

"The fact that personality and attitudes also are predictive of recycling behaviour indicates that the content of public education programs and appeals for pro-environmental actions on the part of the general populace need to be differentially tailored to meet the needs and concerns of differing potential target groups."

This multivariate approach is also suggested by the work of
Bickman (1973). In an experiment which compared littering behaviour with verbal attitudes to the same he concluded that:

"Environmental problems will not be solved by simply influencing verbally expressed attitudes."

In other words, a blanket conservation appeal unsuited to different levels of awareness and lacking the potential to alter behaviour rather than verbally expressed attitudes (lip-service) is unlikely to have great success. This ties in with the findings of Battalio and Kagel (1976) reported above.

What can be noted in these studies, contrary to those from a behaviourist position, is the examination of personality and situational factors as behavioural predictors. Attitude change therefore becomes seen as a phenomenon requiring a more complex model than social reinforcement alone can provide. Craik and McKechnie (1977) argue that the development of an ecological personality conception may prove rewarding:

"The analysis of man-environment relations has engaged an impressive array of scientific paradigms currently active in the social sciences, especially psychology. A broad range of normal science research can be envisaged for personologists within the man-environment domain. Beyond that, the engagement of the personality paradigm in this new arena may bear significant consequences for its own conceptual formulation and methods."

The problem with a personality-based approach is that it tends towards a highly individualistic view of man, for example looking for 'traits' in the study of behaviour and attitudes. What this thesis argues is that the person's roles in society underlie quite major aspects of personality.

W.R.D. Sewell (1971) considered whether changes in environmental quality in themselves were enough to evoke relevant behavioural responses. In a study carried out with Foster (Sewell and Foster, 1971) he found that concern about environmental degradation had failed to arouse a comparable
degree of commitment to environmental revival. There seemed no direct relationship. We can reasonably suggest that the situation has not changed drastically, in terms of environmental pollution, in the eight years since the Sewell and Foster study.

Once again this implies that the situation is a complex one. Sewell argues that what is required is an understanding of how the public trades off one set of values against another. Note again that values and meanings seem to be important.

We can suggest (cf. Rokeach, 1975; Bickman, 1973) that changes in peripheral beliefs may mean only temporary changes in behaviour patterns. O'Riordan (1977) cites research work which indicates that the energy crisis of 1973 tended to change peripheral beliefs about the necessity to conserve energy and that these beliefs quickly reverted along with behaviour when the immediate shortage ended in America (Murray et al., 1974).

Murray et al write:

"Short term expectations are influenced by exposure to shortages and themselves determine evaluation and conservation behaviours. Longer term ones are insensitive to recent experiences of shortages, relatively stable over time, and unrelated to evaluation of the energy shortages and conservation behaviours."

Rokeach's central-peripheral notion seems compatible with Harris and Second's conception of attitude. Attitudes in their view are sets of cognitions given meaning by the application of rules which are role-characteristic. As described earlier, they also hypothesise second-order rules, rules to organise rules. In other words, when learning or adopting a role what one actually learns is not to mimic certain patterns of behaviour but the rules governing that behaviour in order to feel 'comfortable' in the role, whether it be teacher, father, Girl Guide, etc. Specific roles will therefore have specific role-rule sets. Yet these rule-sets must logically be ordered both within a given role and, since the person is an
integration of roles, between roles as well. This involves second-
order rules, according to Harre and Secord. Ambiguity in a situation,
or conflicting role-rule priorities, will give rise to role-conflict in
the person.

2.4 Conclusions.

A number of theoretical and experimental papers have been discussed
in this chapter, papers drawn from the broad area of social responsibility
topics. Several of these papers were criticised for being behaviourist
in orientation and a reinterpretation of some conclusions was presented
in terms of a role-based approach to attitude formation and change.

Several papers were discussed which illustrated the basic validity
of a role-based approach in understanding attitudes and attitude change,
indicating that:

(a) 'Role' may underlie many so-called personality factors;
(b) Different role-figures express differing attitudes and
evaluations of given environments;
(c) Information search and/or acceptance seems to show a degree
of specificity and selectivity related to role. We suggest
this is related to the organisation of a role-dependent
belief system as described in Chapter 1.

From these points we would expect role differences both in terms
of the form and content of information exposure (i.e. what information
people come across) and in terms of what people will recall or internalise
from that information.
Chapter 3

ENERGY CONSERVATION BACKGROUND STUDIES

3.1 Introduction.

The previous two chapters have laid the theoretical base upon which the experimental superstructure of this thesis has to be built. This chapter will present the early background studies for the thesis.

Since it was felt that the later studies on role, attitudes and publicity would require a given environment in which various roles functioned, it was decided on the basis of easy access, large size, considerable division of labour, and relevance of the energy conservation issue, to concentrate on 'the university' as the institutional environment.

3.2 Energy consumption in Universities.

Although this is a foreword to the studies reported in this chapter, much of the following section is clearly applicable to large institutions other than universities.

Like many other publicly funded organisations universities have been for some years under considerable financial pressure to keep energy conservation high on the list of priorities.

The price of oil has increased more than five-fold since mid 1973. Electricity and gas prices have also increased substantially, as have the costs of water and local authority rates. Greater savings in the costs of energy therefore still provide a major avenue of escape for financially hard pressed universities.

Apart from the actual costs of energy universities face the problem of maximising their efficiency of usage. A number of factors determining energy use have to be accepted to a considerable extent as given in any particular university even though the technological means may frequently exist to greatly improve energy use and saving. One reason is that these may be prohibitively expensive. For example, the vast majority of university buildings in this country were designed and built prior to 1973,
in an era of relatively cheap energy. Insulation is often notoriously poor in such buildings. Buildings designed now would probably include a much higher degree of insulation and although this would increase the initial cost of the building it would probably be much easier and less expensive than carrying out an insulation programme on a completed building.

Yet the actual situation faced by universities, and the University of Surrey was a good example, was that they have a given campus with a particular design of heating and energy supply system(s).

Inevitably, to react effectively to such stringencies, universities would have to consider which areas of energy use, and hence possible conservation, are under central control and which are under the control of the individuals in the universities. Would energy conservation publicity and information therefore be worthwhile to produce and disseminate? What would be the effects of such information?

3.3 Aims of the Chapter

The two studies reported in this Chapter are exploratory ones, intended to provide the groundwork for later studies. Arising from the discussion in the last two Chapters, certain points need to be raised and then answered empirically. In particular:

(a) It will be necessary to decide which attitudes to measure;
(b) Which questions are most relevant within the topic of energy conservation in the university environment;
(c) What forms of energy conservation publicity are used to encourage energy conservation in universities;
(d) What the likely effects of this publicity or information are upon attitudes and behaviour.

The answers to these points will help clarify and formulate more specific aims and hypotheses for later studies.

3.4.1 Study 1 - Energy Consumption at Surrey University

The aims of this study were:
(a) to show to what degree individual action can affect energy consumption in a given institution;
(b) to provide information and material to be used in later questionnaire studies, for example to identify periods of high energy consumption.

It is necessary to show clearly in this study that individuals' behaviour, when aggregated, can significantly affect energy consumption. This is necessary to show that people's attitudes are therefore likely to be of considerable importance, and hence publicity and information is also likely to be of considerable significance in energy saving.

3.4.2 Instruments and procedure

Data was obtained for the daily electrical Maximum Demand of the University (in kilowatts); daily electrical consumption for a student Court of Residence (in kilowatt-hours or Units of electricity); daily time of occurrence of Maximum Demand (M.D.) for the University; and daily temperature. Maximum Demand is the highest rate of use of electricity for any half hour period during the 24 hr. day. It is important because a surcharge is paid by the consumer on the highest M.D. figure during a month and this may add 10 - 15% to an institution's electricity bill.

3.4.3 Sampling

Heating in the University was by gas/oil-fired boilers and it was originally intended to obtain data on the heating input to sections of the campus. Unfortunately the necessary instrument had been damaged and could not be repaired in time for the study.

Due to the particular electrical circuit layout of the University it was only possible to isolate one group of buildings which served a common function - a student Court of Residence. The other circuits included buildings of various functions, e.g. teaching blocks, refectories, lecture theatres, etc. which may well have distorted patterns of energy use. It would have been technically difficult and expensive to isolate one
3.4.4 Analysis
Graphs were drawn of the following:

1. Annual cycle of average weekly M.D.
2. A graph showing the relationships between daily M.D.,
   daily temperature and daily electrical consumption for
   the University over the period December 1975 - March 1976;
3. Daily time of occurrence of M.D. for the winter period
   1974/5;
4. Daily time of occurrence of M.D. for winter 1975/6;
5. Daily time of occurrence of M.D. for winter 1975/6, separate
   weekday and weekend;

3.4.5 Results
The discussion of the results will fall into three categories:

(a) significance of Maximum Demand;
(b) long-period variations;
(c) short-period variations.

(a) Significance of Maximum Demand

(i) Graph I shows three important characteristics of M.D. in the
University.

GRAPH I

GRAPH OF AVERAGE WEEKLY MAXIMUM DEMAND (1975)
An annual trend is apparent with maximum values in December-January and minimum values in holiday periods, particularly over Easter Bank Holiday, Christmas and July/August.

Vacation and term-time differences. This is most clearly shown on the Graph around December-January, 1976. Peak values of M.D. are reached about mid-term, presumably because the maximum number of people are in the University and the most machinery and apparatus is in use.

Various minima on the plot have been indicated (A, B, C, D, E and F). C and F occur over the Easter and Christmas holiday period, when very few people are on site. D and E occur during the summer vacation, when staff take most annual leave and few students remain. It is difficult to pinpoint the cause of A and B, which occur during terms. They may relate to machinery being used or catering facilities.

Graph 2, comparing daily M.D. with daily temperature and electricity consumption in a student Court of Residence, again shows the effect of vacations on M.D. and electricity consumption in that both reach a minimum around Christmas.

Correlation between temperature and electricity demand was negligible and non-significant, even when calculated for term-time data only. However, one would not expect a very significant correlation because the electricity in the student residences is used for lights, ovens, record players, etc. and it would be unlikely that the use of these appliances would vary greatly with a change of even 10 or 15 degrees Fahrenheit in outside temperature.

There was no discernible effect on either M.D. or electricity consumption by pleas for greater conservation of energy made by the University authorities during this period.
From the Graphs it appears that M.D. is important in that it is responsive to the aggregated behaviour of individuals in the University. This suggests that the M.D. may be used as one measure of effectiveness of energy conservation publicity and information upon attitudes and behaviour.

(b) Long-Term Variations

It will be seen that the Graphs 3 and 4 are similar in so far as there is a pattern of times of occurrences of peak M.D. during the term, but that this pattern is broken during vacations. The term-time patterns show that on weekdays peak M.D. occurs usually between 12.30 and 13.30, but during the weekend peak time is more usually between 18.00 and 19.00. This seems to reveal a consistent pattern of use of electrical appliances. Between 12.30 and 13.30 on weekdays many ovens and warming cabinets used
by catering staff in the restaurants are operating, as well as many students cooking lunch in their residences. At the weekend, however, catering services are not operating, or only minimally, and it appears that students cooking in residences tend to cook a main meal in the evenings. This pattern breaks down during vacations, with a much larger range of times of occurrence of M.D. peaks, and weekend peak times are not invariable later than weekday peaks. This would seem to be accounted for by the much reduced facilities for catering offered during vacations and the fact that very few students remain to self-cater.

A comparison of Graphs 3 and 4 shows no obvious changes in the general timing of M.D. from winter 1974/5 to winter 1975/6.
(c) **Short-Term Variations**

Graph 5 clearly emphasises some of the characteristics described above. The distinction between term and vacation is obvious: during vacation the times of occurrence of M.D. show little distinction between weekends and weekdays, whereas during terms the distinction is very obvious.

In addition the half-term period when many students go home for a few days is clearly indicated on the graph at point A, where the weekend/weekday M.D. time is undifferentiated.
(v) Graph 6 shows M.D. readings at $\frac{1}{2}$ hr. intervals for a typical day, Tuesday, January 20th, 1976. From the above discussion of weekly patterns one would expect the time of occurrence of peak M.D. to be between 12.30 and 13.30, and in fact the peak does occur at 13.30. A smaller peak occurs at about 17.30 (presumably tea-time restaurant catering and self-catering by students). Minimum M.D. occurs in the early hours of the morning, around 03.30 to 06.30 when there are few lights and little apparatus in operation.
3.4.6 Conclusions

In summary, the study has shown that:

(a) Maximum Demand data could provide a sensitive measure of energy -
using behaviour by the individuals in the University with respect
to electrical appliances.

(b) Daily, weekly, termly and annual patterns were apparent in the
M.D. data.

(c) Term/vacation differences were shown in electricity consumption
data for a student Court of residence.

In particular the study has shown that a number of factors affect
electricity consumption and the occurrence of peak demand.

The most important of these was that the behaviour patterns of
people on the campus can be seen to have far-reaching consequences for
energy costs incurred by the University. Consequently it can be argued
that these people's attitudes towards energy conservation will be of
In addition:
(a) the presence or absence of students affected electricity consumption due to the degree of use of self-catering facilities;
(b) the number of people on site was also proportional to electricity consumption. Again this mainly related to numbers of students.

3.5 Study 11 - A survey of Energy Conservation in British Universities

3.5.1 Aims

The previous study concerned energy consumption in one university. Since it was important to develop a picture of energy conservation in universities generally in order to lay the basis for specific areas of research to be pursued in later studies in this thesis, the present study involved a survey of all British Universities.

The specific aims of this survey were:
(a) To find out how universities throughout Britain had tried to conserve energy;
(b) To discover what methods, if any, they had used to influence their personnel towards energy conservation.
(c) To ascertain whether they thought these methods were effective.
(d) Lastly, and perhaps most importantly, to discover whether the various methods used within universities bore any relation to each other. Is there some structure or sequence to their use or are they used randomly?

3.5.2 Instrument development and procedure

The basic instrument for this survey was in fact a letter outlining the nature of the project being undertaken and asking for relevant information and examples of material used in each university to encourage reductions in energy consumption.

The fifty British universities and university colleges were contacted in the autumn of 1975. A reminder letter was sent approximately
one month later to those universities which had not replied by that time. Letters were addressed to the Registrar of the particular university.

It was felt that such an open-ended approach would be of value in that respondents could use their own concepts in reply, and that, since this was primarily an exploratory study, better or more informative responses might result from minimal restraints put on the form of the responses.

3.5.3 Results

Over a period of about three months a response rate of 86% was achieved, which of itself indicated a high degree of interest on the part of the universities concerned. A number of respondents commented that the addressee should have been the relevant University Engineer or Vice-Chancellor, not the Registrar. This may have accounted for some delays, or for the lack of response from those few universities who did not eventually reply.

The ages and sizes of the universities were listed and the replies categorised along the lines described in the Note to this chapter. TABLE I below shows the categories that resulted from this process of content analysis (i.e. Central Measures, etc.).
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<td>1</td>
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<tr>
<td>Bangor</td>
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<tr>
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<td>1</td>
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<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
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</tr>
</tbody>
</table>

| TOT               | 37              | 31   | 22         | 14          | 13         | 4        | 2        |
|                   | 86              | 72   | 51         | 32          | 30         | 9        | 4.6      |
| Ext               | 4               | 8    | 14         | 9           | 7          | 3        | 1        |
|                   | 46              |      |            |             |            |          |          |
The frequencies of the categories are presented in FIGURES 1 and 2.

(a) Scaleability and Scale Scores

(i) Figure 2 above is of particular interest in that it shows a clear gradation of frequency of use of the various conservation measures by the universities. It indicates that the use of these measures may be structured rather than random.

A careful look at Table 1 suggests that universities tended to use category A measures first (Central Measures), then B, and so on, so that
when one considers universities that have appointed conservation officers.

(category 5) They have also carried out the other five categories as well. This suggests that there may be a cumulative element to the structure of use of the various conservation measures.

Table 1 does not include data relating to the relative importance of each set of conservation measures to the respondent universities. The presence or absence of these measures was simply recorded by a binary digit, 0 or 1. In other words, each category is given equal weighting.

On analysis, this binary distribution was found to conform to a Guttman Scale (see Appendix 2). (Coefficient of scaleability = 0.74, Coefficient of reproducibility = 0.85 - Guttman calls this a 'quasi-scale').

Hence it seems the case that these categories certainly exhibit a cumulative element in the structure of their use by universities. This cumulative element is not necessarily temporal, since a Guttman scale is only conceptually cumulative. In other words, there need be no regular temporal sequence.

The test for Guttman scaleability has therefore been used as a test of cumulativeness, a test of whether structure existed in the responses.

(ii) An energy conservation score

The scores in the last column of Table 1 represent a useful further classification of universities. They can perhaps be thought of as a cross-section of the state of energy conservation in universities at certain points in time. This recognises that the differences in scores between universities may have been due to the length of time that particular universities had been involved with energy conservation rather than to the degree of awareness of the necessity for conservation within the university.

(b) Summary of energy conservation strategy in universities

The Guttman scaling of the various energy conservation categories showed that there was a cumulative structure to their use.
From this knowledge, and from the detailed responses from universities, it was possible to construct a flow diagram for a general energy conservation strategy for universities. It should be noted that this is an idealized flow-diagram and need not represent the strategy of any one of the university respondents (Diagram 1).

Hence the organisational cumulative element demonstrated by the Guttman scale of conservation measures is here presented as an idealized logical conservation strategy: it is not a one to one derivation but the drawing of general implications of a scale.

It is possible that other Guttman scales of organisational activities might similarly be transformable into flow diagrams. Such a methodology could then have considerable implications in the analysis and improvement of organisational activity.
(c) **Correlation with other Measures**

The correlation of the Energy Conservation Score with age of universities was small \( (0.317) \) but significant at the 0.05 level of probability (Spearman's Rho). Since older universities would tend to have (a) a larger proportion of older buildings and (b) a much more dispersed and varied campus than newer universities, this may indicate that a major part of the energy conservation problem facing universities is one of the design of the buildings in use. In this situation older universities may score higher than younger ones because they are more highly motivated to contend with old and inefficient heating systems in poorly insulated and draughty buildings.

Also, it seems clear that since the proportion of variance accounted for by the university buildings is small, other factors must be operating here. It can be argued that some of these factors may well relate to the attitudes and behaviour of the personnel in the university, i.e. human factors.

(d) **Effectiveness**

For a university to sustain an energy conservation drive it is important to have some idea of the effectiveness of its efforts. However, a point which emerged quite strongly from the analysis of replies was that very few universities had much idea about the effectiveness of their measures.

One problem is what is meant by effectiveness. It could perhaps be broken down and considered in terms of;

1. Savings in costs of energy;
2. Greater awareness of energy conservation among personnel;
3. Savings in consumption of energy;
4. Changes in behaviour of personnel leading to greater conservation.

It is important to distinguish between (2) and (4) since it does
not necessarily follow that because people are more aware of energy waste and conservation practices that they will in fact change their behaviour accordingly.

It is equally important to distinguish between (1) and (3) - many factors may affect costs which have nothing to do with energy conservation practices or the lack of them (e.g. general fuel prices, the weather, patterns of usage of buildings, etc.) In some cases, such as at Surrey University, it was reported that although energy consumption had been reduced in 1974/5 from that in 1973/4, the total cost to the university had nevertheless increased quite substantially. This is something which perhaps provides continued motivation for universities to attempt to reduce energy consumption.

One problem, already described in the report of the energy consumption study in this chapter, was that of metering facilities. In some cases universities reported that only very gross readings were possible, such as the electricity consumption over several buildings, total gas or oil consumption for a given time. On the other hand, very often what was needed was a more detailed breakdown of particular buildings or parts of buildings over specific time periods since otherwise the precise effects of conservation measures may have been masked.

(c) The use of energy conservation measures

The order of popularity of the various types of conservation measures used and the percentage of universities using them is shown in Table 2 below:

<table>
<thead>
<tr>
<th>CATEGORY OF CONSERVATION MEASURE</th>
<th>% UNIVERSITIES USING MEASURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRAL MEASURES</td>
<td>86%</td>
</tr>
<tr>
<td>CENTRAL DIRECTIVES</td>
<td>72%</td>
</tr>
<tr>
<td>GENERAL PUBLICITY</td>
<td>51%</td>
</tr>
<tr>
<td>CONSERVATION COMMITTEE</td>
<td>32%</td>
</tr>
<tr>
<td>CAPITAL ALTERATIONS</td>
<td>30%</td>
</tr>
<tr>
<td>CONSERVATION OFFICER</td>
<td>9%</td>
</tr>
<tr>
<td>INTEREST IN ALTERNATIVE SOURCES</td>
<td>4.6%</td>
</tr>
</tbody>
</table>
It is suggested that universities tended to apply the following criteria, implicitly if not explicitly, to their choice of energy conservation measures;

(a) control over timing;
(b) degree of reference to university authority;
(c) cost;
(d) expectation of effectiveness.

Central measures (see Note) would score highly on these criteria since the timing of their effects can be accurately specified, they are directly under the control of university authorities, they may well be low cost, e.g. removing light filaments, and they give a high expectation of significant reductions in energy consumption.

3.5.4 Recommendations

From the various responses a number of specific energy conservation recommendations can be made:

Heating -

(a) Short term - reduce room temperatures to about 65°F
- discourage use of electric space heaters
- check efficiency of burners, pumps, ducts, etc.
- optimise start-up and shut-down times of heating plant
- encourage people to keep doors and windows closed
- encourage people to wear warmer clothes at work

(b) Long term - install better heating control systems
- install better burners and boilers
- replace part or all of space heating with alternative sources of energy (solar, wind, heat pumps, district heating, etc.)
- negotiate best possible gas and oil contracts.
Lighting -

(a) Short term - remove lights where practicable and safe
   - encourage less use of lights
   - discourage late working, especially winter
   - arrange day rather than night cleaning of premises
   - encourage siting of desks near windows

(b) Long term - replace tungsten filament lights with fluorescent
   - replace ceiling lights with desk lights

Electricity in general - discourage use of electrical appliances,
   especially at peak consumption times;
   - stagger use times of heavy-demand equipment;
   - install adequate metering equipment

General Measures -

(a) Water - adjust floats in cisterns, install showers in residences,
   fit spray heads on taps, recycle waste water such as
   from computing units.

(b) Telephones - discourage use of telephones especially between
   9 a.m. and 1 p.m. when use 50% dearer than other times.

(c) Publicity - decide whether a publicity campaign is necessary
   and worthwhile.

(d) Insulation - proper insulation of buildings, cladding, cavity
   fill, double-glazing, roof insulation.

Finally it might be that setting up a national university energy
conservation co-ordinating or advisory committee would be a valuable
stimulant to further energy conservation.

3.5.5 General conclusions from the two studies

The important points from these two studies are summarised below:

(a) Individual users can have a large effect on energy consumption
   and costs within even a large institution like Surrey University
   and hence it is reasonable to suggest that the attitudes they
hold to the usage of energy are important.

(b) University authorities tended to adopt similar strategies for dealing with energy conservation, presumably reflecting similar evaluations of the energy situation. This would be expected from the discussion in Chapters 1 and 2 since the decision-making bodies and individuals in universities tend to have very similar titles and roles across universities.

(c) Publicity/information had been widely used in universities to encourage energy conservation, though with little idea of its effectiveness. No attempts had been made to systematically follow-up publicity and discover whether any attitude change did take place, or whether this bore any relation to energy-using behaviour.

(d) The pattern of intervention by universities with regard to energy conservation had a cumulative structure to it and the role of information can be seen as central to that.
Definitions of categories used

(a) Central Measures - procedures carried out by the university authorities on systems directly under their control (e.g. the heating system, lighting, etc.)

(b) Central Directives - information generally relating to fairly specific aspects of a university's energy situation directed at particular groups within the university (e.g. technicians, lecturers, Departmental Heads, etc.)

(c) General Publicity - posters, pamphlets, stickers, etc., which generally carry little information but which exhort people to save energy in one specific way or another. Usually displayed or distributed indiscriminately.

(d) Energy Conservation Committee - a body set up within the university specifically to consider aspects of energy use and savings.

(e) Capital Alterations - alterations to plant, buildings, etc. which involves capital outlay.

(f) Conservation Officers - person(s) appointed to monitor, promote, explore energy conservation in a university.

(g) Alternative Sources Interest - interest in possible use of alternative sources of energy. This category includes sponsorship of projects.
The Effects of Energy Conservation Publicity

4.1 Introduction

A paper by Seaver and Patterson (1976) indicated that commendation is a crucial factor in reducing private fuel-oil consumption. Clearly, the type of information given to subjects (i.e. simple feedback, commendation, suggestions for better saving, etc.) can be important to attitudes and ultimately to savings (Winett and Nietzel, 1975; Battalio and Kagel, 1976).

This raises the question, suggested at the end of the last chapter, of what kind(s) of propaganda/information would work in reducing energy consumption in an institution such as a university. As was noted in the universities survey, the question of the effectiveness of publicity was rarely discussed, yet such matters are of considerable importance to the role-based cognitive model outlined at the beginning of the thesis. A study of the effectiveness of publicity would need to consider not only the overall type, distribution and effectiveness of publicity intended to reduce energy consumption, but also whether these factors showed role-specificity.

Humphrey et al. (1977) published work suggesting that in the case of paper re-cycling, cognition and behaviour were strongly related in the short term, but over time the effects of satiation caused behaviour to diverge from expressed attitudes. It might be suggested that this would be the case with energy conservation publicity. Would awareness of the need to conserve energy diminish over time after the release of publicity?

Studies such as those of Arbuthnot (1977) and Fishbein (1967) suggest that behaviour is partially predictable from attitudes. This certainly accords with common sense. Yet the researcher should bear in mind that awareness, or attitude, and behaviour towards a given topic are conceptually quite distinct and that 'correct' behaviour does not
necessarily flow from having 'correct' attitudes.

The Study to be described in this chapter concentrates on information, awareness and attitudes rather than the behaviour of subjects. It examines the base level of awareness of energy conservation, on the grounds that it is necessary to be aware at some level of the need for certain behaviour before a person will change his behaviour patterns and carry it out. Behaviour, it is implied, is analysable largely in terms of motivation and awareness (attitudes) which develop within the milieu of the person's occupational and social roles.

4.2 Aims of the study

The aims of this study, Study 3, were to examine the effects of energy conservation publicity on the awareness and attitudes of various occupational role-groups. This is to be done by testing two main hypotheses. It was suggested in Chapter 1 that role would affect not only what information people were exposed to but also what effects the information would have on them. The first, general, hypothesis is therefore that:

II1: There will be occupational and social role differences with respect to the information read and the effects of that information on subjects' awareness and attitudes.

Secondly, studies have been cited above showing that information about energy conservation can affect both attitudes and energy consuming behaviour. In the context of this study of energy conservation publicity, the second hypothesis is therefore that:

II2: The greater the exposure to energy conservation publicity the more aware of energy conservation the person will be and the more favourable his or her attitudes.

4.3 Procedure

From interviews with Surrey University personnel concerned with energy conservation research or policy, and from the studies in Chapter 3, background information was obtained which enables the identification of
specific energy conservation topics important to Surrey University.

The University administration prepared three energy conservation publicity releases. These were:

(a) **Newsletter Special**

The University Public Relations Office was producing a weekly single-sheet Newsletter informing University personnel of matters of general interest, such as forthcoming events, visits by dignitaries, etc. This was distributed through the internal mailing system to departmental secretaries and then they distributed it to staff and student pigeon-holes. The distribution was usually rapid and efficient.

A "Newsletter Special" was released only when the University Authorities felt they had something of importance to inform personnel generally about. It carried a red heading rather than the normal blue one. The Newsletter Special (NIS) on energy conservation was released on 21.1.1976.

(b) **Bare Facts**

This was produced on Fridays during term only by the Students Union. It normally consisted of 8 - 12 pages of feature articles mainly of interest to students, as well as advertisements, a crossword, reports of Union meetings, etc. In the week ending 22.1.1976 a large article supplied by the University authorities on energy conservation in the University was published. Bare Facts was usually left in busy places for people to pick up, and distributed to the various departments.

(c) **Pro Vice-Chancellor's Memo**

A memo from the Pro Vice-Chancellor, dealing specifically with the University's energy problems, was released on 9.3.1976. This was intended to filter down through the University hierarchy, for example to Heads of Departments, Senior Technicians, etc.
Each of the publicity releases pointed out the financial problems of the University and urged Departments and individuals to conserve energy as much as possible. Suggestions included keeping doors and windows closed, turning off unwanted lights, etc.

The general energy situation at Surrey University, in common with other universities, was described in the last chapter. In particular this was a time of some financial crisis for Surrey University, so that the release of these forms of publicity, coupled with other energy-saving initiatives (changes in boiler firing regime, removals of electric lights in many places) can be seen as part of a general response to the financial situation.

The procedure for the study involved the follow-up of the release of these three publicity measures and a study of their effects on people's attitudes and awareness.

The strength of this approach was that on-going measures of awareness and the impact of the publicity could be measured. Another strength was that the effects of three different kinds of publicity could be followed, since they were released on differing dates. Readership patterns, in terms of occupational groups, could also be examined.

A short questionnaire was developed to be used in a semi-structured interview situation with individual subjects (see NOTE at the end of this chapter). One weakness of the procedure, in this case, was that the questionnaire had to be ready for the release of the publicity by the University authorities. This gave insufficient time between the analysis of the two survey studies reported in the last chapter and the release date of the first publicity (21st January), to carry out a pilot study using the questionnaire. However, since the questionnaire was more a guide to interviewing than a closely structured instrument, this was probably not too serious a flaw.

The questions asked in the interview/questionnaire referred mainly to what subjects had read, when they had read it, and what they remembered
of it, i.e. what suggestions.

Over a period of 2½ months, from 16th January, to 1st April, 1976, a total of 115 people were interviewed. Subjects were selected on a random basis, that is the interviewer knocked on doors and waited in corridors for people to come by.

Subjects were taken in six departments of the University, ranging from physical science departments to languages and social sciences. Only three people refused to be interviewed.

The only selection of interviewees was to ascertain that they fall into one of the four main occupational groups in the University (secretaries, technicians, lecturers, students). These were found to be the main occupational groupings from inspection of the University's personnel list.

Interviews normally took between 10 and 20 minutes each.

4.4 Analysis

The interview data was content analysed and coded into categories. Some of the responses were simple dichotomous categories (e.g. YES, the subject had read the NLS, or NO, he had not), while other items required several categories to do justice to the range of responses given by interviewees.

Data was punched on to computer cards and analysis by computer programme carried out (e.g. frequencies, cross-tabulation, etc.)

4.5 Results

4.5.1 Publicity readership

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<th>DATE</th>
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<th>19/1</th>
<th>20/1</th>
<th>21/1</th>
<th>22/1</th>
<th>23/1</th>
<th>26/1</th>
<th>27/1</th>
<th>28/1</th>
<th>30/1</th>
<th>31/1</th>
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<td>2</td>
<td>9</td>
<td>13</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>3</td>
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<td>0</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>N.READ B F</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<td>2</td>
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<tr>
<td>N.READ MEMO</td>
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<td>0</td>
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<td>0</td>
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</tbody>
</table>

Continued over page
The figures show clearly that Newsletter Special was most widely read of the three publicity releases. It was read by 60% of all interviewees, and 74.4% of all interviewees after its release date (21st January). The daily proportion of interviewees reading NLS after 21st January varied from about 17% on the 21st itself to 100% on ten of the remaining interviewing days (see FIGURE 3).

The issue of Bare Facts carrying the short article on energy conservation was released on 22nd January and was much less often reported as being read than NLS. Only a total of eleven interviewees reported reading this.

Only five interviewees (about 4% of the total) reported having read the Pro Vice-Chancellor's memo on energy conservation.

TABLE 2 - OCCUPATION OF SUBJECTS WHO REPORTED READING THE VARIOUS FORMS OF PUBLICITY (AFTER 21st JANUARY)

<table>
<thead>
<tr>
<th>PUBLICITY</th>
<th>TECHNICIANS</th>
<th>LECTURERS</th>
<th>SECRETARIES</th>
<th>STUDENTS</th>
<th>TOTAL</th>
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<tr>
<td>NLS</td>
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<td>11</td>
<td>25</td>
<td>13</td>
<td>70</td>
</tr>
<tr>
<td>BF</td>
<td>2</td>
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<td>11</td>
</tr>
<tr>
<td>MEMO</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24</td>
<td>13</td>
<td>31</td>
<td>18</td>
<td>86</td>
</tr>
</tbody>
</table>

(NOTE: MEMO released six weeks after NLS).

The distribution of NLS and BF, although fewer people reported reading the latter, was obviously very effective. The percentage of interviewees reading at least some of the publicity are shown in FIGURE 3.
4.5.2 Other interview items

The other main items of the questionnaire have their responses summarised in TABLE 5.
TABLE 5 - SUMMARY TABLE OF RESPONSES TO INTERVIEW ITEMS EXCEPT READERSHIP

CONSERVATION INFORMATION

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>ANSWER A</th>
<th>ANSWER B</th>
<th>ANSWER C</th>
<th>DON'T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of University fuel bill</td>
<td>High guess - 0%</td>
<td>Low guess - 94%</td>
<td>Correct - 6%</td>
<td></td>
</tr>
<tr>
<td>Knowledge of Maximum Demand rate</td>
<td>High guess - 0%</td>
<td>Low guess - 12%</td>
<td>Correct - 2.5%</td>
<td>85%</td>
</tr>
<tr>
<td>Perceived responsibility for energy conservation in University</td>
<td>With Univ. - 27%</td>
<td>Indvs. - 44%</td>
<td>Heads of Depts. - 21%</td>
<td>Other 8%</td>
</tr>
<tr>
<td>Perception of University Energy problem</td>
<td>Exaggerated by University - 15%</td>
<td>Not - 69%</td>
<td></td>
<td>16%</td>
</tr>
<tr>
<td>Any suggestions for conserving energy</td>
<td>At least one - 71%</td>
<td>None - 29%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

None of these results supported the two hypotheses presented in the earlier sections of the Chapter, in other words no significant differences were found across sex, occupation or readership of publicity for any of the items in TABLE 5. This is unsurprising for some items since the responses were considerably skewed, e.g. 94% of interviewees made low guesses for the University's fuel bill. Nonetheless, this is an interesting point in itself, prompting the speculation as to whether many people within the University had conceptualised the magnitude of the University's energy usage and costs.
4.5.3 Awareness Index

An awareness index was compiled by assigning scores for certain items of the interview schedule as follows:

**TABLE 6 - INDEX OF AWARENESS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>VARIABLE</th>
<th>SCORE ASSIGNED</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>NUMBER OF ENERGY CONSERVATION SUGGESTIONS REMEMBERED</td>
<td>SCORE = N</td>
</tr>
<tr>
<td>9</td>
<td>UNDERSTANDING OF M.D. SYSTEM</td>
<td>CORRECT = 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PARTLY CORRECT = 1</td>
</tr>
<tr>
<td>18</td>
<td>HOW MANY ENERGY CONSERVATION SUGGESTIONS MADE</td>
<td>SCORE = N</td>
</tr>
</tbody>
</table>

When comparing all interviewees the Awareness Index shows a sharp rise after the release of NLS with a peak on 23.1, but this drops rapidly and fluctuates until the end of interviewing on 1.4.

If it could be shown that occupational groups showed statistically significant differences in awareness in relation to readership of publicity, then this would clearly support Hypothesis 1.

**FIGURE 4** compares Awareness Index score against date for three occupational groups. Whereas the scores for both teaching and non-teaching staff fluctuate considerably and quite clearly illustrate the gradual extinction process described above, the scores for students are much more consistent over time. Indeed the plot implies that the release of NLS on January 21st had very little effect on student Awareness Index scores.
At first sight this is hard to explain from readership figures for occupational groups. Although a lower proportion of students had read NLS than secretaries (60% against 70%) more students than lecturers had read it (54% lecturers). On the other hand if the proportions who had read something (i.e. NLS, or IE, or MEMO) are considered, the situation is different. The Table following shows proportions of interviewees who reported reading publicity of some kind in the University concerning energy conservation. In seven cases this referred to releases by the University authorities of other Newsletters or memoranda other than those specifically followed up in this study.
TABLE 7

<table>
<thead>
<tr>
<th>OCCUPATIONAL GROUP</th>
<th>PROPORTION READING SOME PUBLICITY</th>
<th>PROPORTION READING NONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TECHNICIANS</td>
<td>93%</td>
<td>7%</td>
</tr>
<tr>
<td>LECTURERS</td>
<td>95%</td>
<td>5%</td>
</tr>
<tr>
<td>SECRETARIES</td>
<td>95%</td>
<td>5%</td>
</tr>
<tr>
<td>STUDENTS</td>
<td>67%</td>
<td>33%</td>
</tr>
</tbody>
</table>

The proportion for students is significantly less than for other occupational groups ($\chi^2$ sig. 0.05 - calculated from raw frequencies).

Students seemed more remote from energy conservation information in general and it is suggested that this is the reason for their tendency to score lower on the Awareness Index. This result clearly seems to support Hypothesis 1 in that the results show occupational differences in readership patterns and consequent differences in awareness of energy conservation.

4.5.4 Multidimensional Scalogram Analysis

Given the generally low overall impact of the publicity Hypothesis 1 can be further tested using a method known as Multidimensional Scalogram Analysis (MSA - Guttman and Guttman, 1974). This also allows an analysis of the relationship between social role (sex) and occupational role for these interviewees.

MSA is a process through which coded data is analysed by a computer program and printed out as a series of plots. Each point on the plot represents a subject. The coded data for each subject is analysed by the program to establish how alike or unlike the data for other subjects it is. Those subjects with similar sets of data (responses) appear close together on the map or plot, while those with very different sets appear far apart. In addition the program establishes contiguous regions, which
can be marked by boundaries, such that those subjects falling within a
given boundary have a high degree of similarity in their responses.
The coefficient of contiguity measures the goodness of fit of the body
of data to this partitioning process, and should be high for there to
be confidence in the results (maximum 1.0.) A specific coefficient of
contiguity may be set on the MSA program (generally set at 0.5 minimum)
and iterations only cease when this is reached.

For a given set of data the MSA program produces a 'master plot'
summarising the coded data for all variables for each subject (summarised
in terms of a position on the map). It also produces maps for individual
variables. It is therefore possible to compare the format of contiguous
regions for two or more variables, by overlaying them. The degree of
overlap of the regions denotes the degree of relationship between the
variables.

MSA is a powerful and flexible tool of analysis for the behavioural
sciences because it makes no assumptions about the level of measurement of
data to be analysed (i.e. whether ordinal, interval, etc.), so that
qualitative, unordered data is sufficient. Through its operation on the
categories of responses it does not mask much of the individual information
by the calculation of averages or explorations of differences in variance.
Each item is given equal weight in these calculations, just as they were
for the Guttman scaling in Chapter 3.

Guttman and Guttman (1974) have characterised MSA as having four
major elements:

1. Nonmetric rather than vectorial,
2. Appropriate for qualitative data,
3. No similarity coefficients needed,
4. The role of each locus is made explicit for
   partitioning the space.
At present the MSA program can handle up to 100 subjects (types), with 50 variables each, of 20 categories for each variable.

Because MSA makes no assumptions about levels of measurement and does not aggregate data, conventional tests for significant probability levels of differences between means, etc. are not applicable. However, Shalit (1977) describes two measures of the efficiency of zoning on MSA maps or plots which he suggests can be considered to some extent as substitutes. These measure how well a given map can be divided into regions.

1. **Selectivity** (Exclusivity of a partitioned zone for a given category)
   \[ = \frac{N'}{N} \] (No. of target cases/total No. cases in zone)

2. **Sensitivity** (Efficiency of the partitioning)
   \[ = \frac{n'}{n} \] (No. of cases of target category in zone/total No. cases of target category on map)

MAP1 (at the end of this chapter) illustrates how the zoning process operates in practice with a sample map from an MSA program. Wherever possible in the thesis conclusions drawn from MSA map analysis have been backed by independent testing of the data, e.g. by Chi² tests.

Due to its minimal demands upon the data base MSA is a very flexible technique. It has for example been used for the analysis of genetic relationships among inbred mice strains (Guttman and Guttman, 1974); in an analysis of structural ambiguity and limits to coping (Shalit, 1977); to analyze "skid row" men's behaviour (Nuedeling and Bahr, 1976); and in examining the conditions underlying race riots in the USA (Bloombaum, 1968).

**Procedure**

Due to limits imposed on the MSA program regarding the amount of data it can handle, every fifth subject was removed from the data base. In addition those subjects who had missing data were also removed. This left 83 subjects. The MSA program then found that three of these subjects had identical responses so that 80 types were left. In other words, three of the types in the analysis referred to two subjects each.
maps (plots) contain 80 separate points.

The questionnaire (the Note to this Chapter) generated seven major variables as listed below:

<table>
<thead>
<tr>
<th>VARIABLE NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCC</td>
<td>Occupation of Subject</td>
</tr>
<tr>
<td>SEX</td>
<td>Sex of Subject</td>
</tr>
<tr>
<td>PUBL</td>
<td>Publication Read</td>
</tr>
<tr>
<td>FUELBILL</td>
<td>Knowledge of University's Fuel Bill</td>
</tr>
<tr>
<td>N03UGG</td>
<td>Number of Energy Conservation Suggestions remembered from Publicity</td>
</tr>
<tr>
<td>MDEMSYS</td>
<td>Knowledge of Maximum Demand System</td>
</tr>
<tr>
<td>SOLERESP</td>
<td>Who responsible for Energy Conservation in University</td>
</tr>
</tbody>
</table>

Results

A glance at MAP 1, the master plot for this MSA analysis, shows that subjects fell into two fairly loose groups.

To discover which, if any particular one, of the individual variables contributed most to this division, the plots for individual variables (e.g. sex, occupation) were examined in relation to the master plot.

If the master plot and the plot for the variable 'sex' are directly compared, for example by a tracing of MAP2 (SEX) being placed over MAP1, it is clear that the two groups are completely separable according to sex. (Selectivity and Sensitivity both = 1.0). None of the other variables are so clearly related.

MAP 5, the plot for the variable FUELBILL, is included as an example of one variable plot which does not show clear category regions,
no clear partitioning with respect to any other variable, and hence no apparent relationship with any of the other variables.

It is clear therefore that the variable SEX partitions the space across all items, in other words that while no one item in the questionnaire clearly partitions subjects by sex, the responses by subjects across all items do show a sex-linked pattern.

This is a rather subtle point in that it points to a generalised effect of sex-role, something which the sensitivity of the MSA program can pick up but which is lost in conventional tests of significance due to the necessary aggregation of the data.

Clearly this lends support to the overall argument in this thesis that role has wide-reaching but possibly very subtle effects on attitudes and information appraisal, and hence verbal responses.

The next step was to ascertain whether Sex and any other variables were related. MAP 3 shows the MSA plot for the variable OCCUPATION.

A comparison of these two plots shows that they were related. All the secretaries and female students were clearly partitioned from the technicians and lecturers (mainly male). Only one female lecturer appeared among the 83 subjects. This person and the three female technicians in the sample were clearly distanced from the male technicians, in other words, their sex seemed more important as a variable than their occupation in terms of partitioning the space.

In the MSA program the computer indicated boundary conditions on a plot by a hyphen or negative sign before the type ('subject') number (on the master plot) or the coded category number (on the variable plots). Regions within the boundary conditions on MAP 3 (see key at the bottom of MAP 3) show that only one occupational group (secretaries) was clearly partitioned from the rest. All of these were female.

Lecturers and students seemed quite well separated (i.e. small overlap of boundaries) but the technicians as a group overlapped both these
Comparing lecturers and students only:

For lecturer group:  
Selectivity = 0.65  
Sensitivity = 1.0

For student group:  
Selectivity = 0.84  
Sensitivity = 1.0

This indicates that these two groups were quite well distinguished from each other. But how much of this was due to sex? The Table below shows that sex was probably the main cause of this separation of the groups.

**TABLE 8 - Distribution of males and females in occupational groups**

<table>
<thead>
<tr>
<th>OCCUPATION</th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>LECTURERS</td>
<td>19</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>STUDENTS</td>
<td>16</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>TOTALS</td>
<td>35</td>
<td>9</td>
<td>44</td>
</tr>
</tbody>
</table>

(Chi^2 sig. 0.05)

In other words these two groups were significantly different with respect to the proportions of sexes within them.

None of the other variables seemed to relate to sex or occupation, except the item asking interviewees to describe the nature of the Maximum Demand system (which had been described in NLS and BF). Comparing MAP 2 and MAP 4 it will be seen that while the P (partly correct) and ? (don't know) groups are well distinguished from each other and the c (correct) group, they are composed of approximately equal numbers of each sex (P group - 58% male, ? group - 59% male).

**TABLE 9**

<table>
<thead>
<tr>
<th></th>
<th>MALE</th>
<th>%</th>
<th>FEMALE</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTLY CORRECT</td>
<td>14</td>
<td>50</td>
<td>10</td>
<td>42</td>
</tr>
<tr>
<td>DON'T KNOW</td>
<td>19</td>
<td>59</td>
<td>13</td>
<td>43</td>
</tr>
<tr>
<td>CORRECT</td>
<td>11</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>44</td>
<td>23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Chi^2 sig. at 0.05 level)
Occupation was not significantly related to any of the groups for this item; in fact the 'correct' group comprised lecturers, technicians and students, as a comparison of MAP 3 and 4 will show.

4.5.5 Reported effects: Hypothesis 2

A large proportion (almost 57% of interviewees) said they felt that the conservation information had some effect on them. 35% denied it had and the rest either did not know or gave no response.

Responses to the item asking what effect the information had were categorised with the following results:

**TABLE 10 - Effects of Energy Conservation Publicity (self-reports)**

No. of interviewees = 56

<table>
<thead>
<tr>
<th>CATEGORY OF SELF-REPORT</th>
<th>% OF RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater awareness</td>
<td>11.1</td>
</tr>
<tr>
<td>Changes in behaviour towards greater conservation</td>
<td>58.3</td>
</tr>
<tr>
<td>Only strengthened existing awareness</td>
<td>26.5</td>
</tr>
<tr>
<td>Strengthened attitude against University</td>
<td>2.2</td>
</tr>
<tr>
<td>No response</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

To avoid becoming overly optimistic about the effects of the information, it should be borne in mind that the 58.3% who claimed behavioural changes was a proportion of the 56.9% who said the information had some effect on them, which was in turn a proportion of the 86.5% of interviewees who had read at least some of the information. Hence the actual number who claimed behavioural changes (34 - about 29% of the total sample) was smaller than at first might appear. Also as had been pointed out earlier, behavioural intentions and self-reports of behaviour are not the same things as the behaviour itself.
It was recognised during the construction of the interview schedule that to try and test people's memories or awareness of the information they had read by asking them to remember actual figures might well be misleading, since awareness and consequent behaviour change may well rest with a general understanding of a situation rather than knowing exactly what the consumption figures are. Some items in the interview were intended to give such an indication of the interviewee's understanding of principles behind the University's energy situation. One of these asked the interviewee to make suggestions for conserving energy.

The results showed that both those reading some of the publicity, and those specifically reading NLS, made significantly more suggestions than those people who had not been exposed to the publicity. (\(\chi^2 0.01\) in both cases).

It therefore seemed that the publicity/information had a clearly discernible effect on the interviewee's general understanding of the University's energy situation.

Further support for Hypothesis 2 can be drawn from the fact that a significant difference existed between NLS-readers and non NLS-readers in terms of their knowledge of the MD system, that is, their ability to explain how the system operates. The operation of this system was briefly explained in the NLS. **Table 11** presents the differences found:

**Table 11 -- Interviewee's Knowledge of Maximum Demand (MD) System**

<table>
<thead>
<tr>
<th></th>
<th>% Correct</th>
<th>% Partly Correct</th>
<th>% Incorrect</th>
<th>% Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read NLS</td>
<td>12.3</td>
<td>42.5</td>
<td>9.6</td>
<td>35.6</td>
</tr>
<tr>
<td>Not Read NLS</td>
<td>4.4</td>
<td>22.2</td>
<td>22.2</td>
<td>68.9</td>
</tr>
</tbody>
</table>

(\(\chi^2 0.01\))

Hence a much larger proportion of people didn't know, and fewer got the answer correct, in the 'non read-NLS' group than in the other group.
4.5.6  *Interpretations from the findings*

a) The study has shown that there were occupational differences in energy conservation awareness. These differences seemed due to:

1) Differential exposure to publicity,

2) What was remembered from the publicity (number of suggestions),

3) What was understood from the publicity (Knowledge of MD system).

b) The sex of the subjects seemed to be the major variable, showing that occupations in the University were strongly sex-linked.

c) Exposure to energy conservation publicity:

a) did not help in remembering specific figures and facts,

b) did promote a general awareness of energy conservation,

c) this awareness showed a gradual extinction process over time.
Do you remember reading anything about the University's energy situation?

If so, can you remember exactly when?

Do you know how much the University may have to spend on heating and electricity this year?

Do you remember any suggestions made to individuals to cut down energy consumption?

Do you remember reading any information other than a Newsletter?

If so, what?

When?

Do you know what the "Maximum Demand charge" is for January?

Do you know what the "Maximum Demand charge" is?

Do you think the information you have read has had any effect on your attitudes to energy conservation?

If so, what?

Do you think there should have been anything included in the information which was not there?

If so, what?

Do you feel that the University authorities should take sole responsibility for energy conservation within the University?

Why?

Do you believe the University's energy problems have been exaggerated?

Is there anything you would like to see done here to conserve energy which is not being done?

If so, what?
MSA MAP 1
MULTIDIMENSIONAL SCALOGRAM ANALYSIS.
DISTRIBUTION OF 80 TYPES (INDIV. SUBJECTS WITH SAME SCORES)

MASTER PLOT

MSA MAP 2
DISTRIBUTION OF SUBJECTS BY VARIABLE 'SEX'.
(SEE P. 61)
DISTRIBUTION OF SUBJECTS BY VARIABLE 'OCCUPATION'.

(SEE P. 62)

DISTRIBUTION OF SUBJECTS BY VARIABLE 'KNOWLEDGE OF MD SYSTEM'.

(SEE P. 63)
KEY

1 = CORRECT
2 = INCORRECT
3 = DON'T KNOW

MTS MAP 5 - DISTRIBUTION OF SUBJECTS BY VARIABLE
'KNOWLEDGE OF UNIVERSITY FUEL BILL'.
Chapter 5

A Questionnaire Study of Occupational and Social Role Differences of Attitudes and Knowledge of Energy Conservation

5.1. Introduction

Chapter 4 indicated that contact with publicity or information about energy conservation seemed to raise the awareness of interviewees, as desired by those putting out the publicity. Yet this awareness, in terms of the subjects' ability to make energy conservation suggestions and explain how the Maximum Demand system operated, diminished over time.

A limitation of the study in Chapter 4 was that its duration was relatively short, so that most interviewees had been interviewed within three or four weeks of the release of the information. The question arises as to whether informational effects would be detectable over a longer period of time.

Secondly, the last study dealt with questions related to specific informational points in the publicity. It was not intended as a systematic appraisal of attitudes or concern with energy conservation and how these related to occupational and social role of the interviewees.

The intention of the study reported in this Chapter was precisely to investigate these two points: (a) to test for further effects of awareness of energy conservation publicity, (b) to investigate general attitudes or concern for energy conservation and (c) to investigate how these two were related to sex role or occupational role of the subjects.

5.2 Questionnaire design

Fishbein's (1972) intention/behaviour model (discussed earlier) distinguishes between the person's overt behaviour and behavioural intentions. Behavioural intention, according to Fishbein, is composed of three elements: attitude towards the act; normative beliefs about the act; and motivation to comply.

It has been pointed out in this thesis that the studies have been
eliciting behavioural self-reports or behavioural intentions rather than being concerned with behaviour itself. It is suggested that the elements proposed by Fishbein may be important in more fully describing behavioural intentions. Accordingly, the questionnaire to be described in this study is based upon Fishbein's conception. A factor analysis of the resulting data should then indicate whether the identification of such elements was justified.

The questionnaire was therefore designed to have four main parts. The first part concerned purely biographical information, such as age, sex and occupation of the respondent.

The second part referred to attitudes. Triandis (1971) has argued that an attitude may have several components or content areas. One of these components may be the degree of concern for a certain topic. Swan (1970) for example, found that lower socio-economic status subjects showed less concern for environmental pollution than subjects of higher socio-economic status. It appeared to be lower on their order of priorities even though they may have believed the same things about it or have known as much or as little about it.

There therefore seemed some basis for the inclusion of items designed to measure concern about energy conservation.

Fishbein's work seems to suggest conceptual distinctions between attitudes, beliefs (normative factors), and knowledge (in relation to 'motivation to comply'). Hence knowledge, in Fishbein's model, appears to have a similar function as O'Riordan (1977) suggested the way that commitment to socially desirable environmental behaviour seemed to involve search for relevant information, or greater knowledge.

For this reason the last part of the questionnaire, Part 4, was a test of the respondent's knowledge about energy conservation. If this could be shown to be statistically related to attitudes towards energy conservation, then this could lend support to a Fishbein-type model of
attitudes and behaviour. If knowledge could also be related to respondent's occupation or sex role, this would also provide evidence to support the role-based attitude approach of this thesis.

As noted above, Fishbein also distinguishes between attitudes and beliefs. However, as Rokeach (1975) has pointed out, such a distinction is difficult to maintain in practice (i.e., in terms of presenting subjects with 'attitudinal' and 'belief' items) and the two types of item seem to shade into one another. Generally, though, it was felt that a practical distinction is usually made by saying that attitudes involve affective elements, or feelings about a class of objects, whereas beliefs do not.

The central section of the questionnaire, between the biographical Part 1 and the knowledge test of Part 4, was divided into an Attitudes section (Part 2) and a Beliefs section (Part 3). The items in each of these sections were differentiated according to the following definitions: an attitude might be defined as "a favourable or unfavourable disposition held by a person towards an object or class of objects which is relatively enduring over time", whereas a belief might be defined as "the acceptance or rejection by a person that a characteristic of an object or class of objects is true," (i.e., a belief need not accord with fact).

In summary, then, the questionnaire was presented to respondents in four sections, Part 1 (biographical), Part 2 (Attitudes), Part 3 (Beliefs), and Part 4 (Knowledge). The attitudinal and belief items comprised not only items specifically involving concern, as described above, but also items involving specific energy conservation methods, organisational and administrative factors, and alternative sources of energy. These were randomly distributed within Parts 2 and 3.

The items themselves were derived from background information obtained from interviews with key University personnel, from the earlier exploratory studies described in this thesis, and from generally available information on energy conservation.
Each Part of the questionnaire was preceded by a short instruction paragraph. In Parts 2 and 3 respondents were asked to indicate their preference for an item on a five-point scale (from "strongly believe" through "don't know" to "strongly disbelieve or disagree"). Knowledge items were presented in a multi-choice format, with six choices per item arranged so that the smallest value was always in position one, and through gradations to the largest value at position six.

'Favourable' and 'unfavourable' items were intermixed, this being taken into account when the responses were coded.

The questionnaire took approximately 15 - 20 minutes to complete. A copy of the questionnaire is included as APPENDIX A to this Chapter.

5.3 Procedure

Since the study was intended to investigate the longer term effects of energy conservation publicity than could be accomplished by the study reported in Chapter 4, it was timed to take place 3 - 4 months after the majority of interviews had taken place for the earlier study.

Two groups of subjects were selected (each group N = 40). One group had previously had no contact with the earlier studies, and would act as a control group. The second group was drawn from those who had been interviewed for the Publicity study. In this case every third subject was selected and sent or taken a questionnaire with a request to fill it in. The control group was dubbed the 'naive' group; the other group was called the 'experienced' group. It needs to be borne in mind that the nature of the experience for the experienced group was that they had been interviewed and not that they alone had seen or read the publicity.

Questionnaires were distributed to subjects from the same occupational groups as in the Publicity study: lecturers, technicians, students and secretaries.

5.4 Hypotheses

In view of the strong sex differences that emerged from the knowledge
of Maximum Demand system in the Publicity study, it might be expected that males would score higher on the knowledge section of the questionnaire than females.

Since reading of information/publicity was shown to increase general awareness and knowledge of the MD system, it would also be expected that the experienced group would score higher on the knowledge section. These two points can be summarised in the Table below:

<table>
<thead>
<tr>
<th>TABLE 12 - PREDICTED RELATIONSHIPS BETWEEN SUBJECT GROUPS FOR KNOWLEDGE SCORES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJECTS</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>NAIVE</td>
</tr>
<tr>
<td>EXPERIENCED</td>
</tr>
</tbody>
</table>

HYPOTHESIS 1 is therefore that:

There will be occupational and social role differences in attitudes, beliefs and knowledge of energy conservation.

From discussion in Chapter 1 and from Fishbein's model discussed above the second hypothesis can be derived:

HYPOTHESIS 2:

That attitudes and beliefs concerning energy conservation will be significantly and directly related.

Lastly we would also expect that:

HYPOTHESIS 3:

Attitudes and knowledge of energy conservation will be significantly and directly related.

5.5 Analysis

Three main methods were used to analyse the data generated from the questionnaire.

(a) Responses were coded and the items in Parts 2 and 3 were factor-analysed to ascertain whether the responses corresponded to the
elements discussed above, i.e. attitudes, beliefs, concern, and whether any other factors were identifiable.

(b) Secondly, attitudinal and belief items were selected from this factor analysis which were highly loaded on two or more factors and a Multidimensional Scalogram Analysis carried out on these plus the biographical variables.

(c) Thirdly, individual responses and their relationship to major variables such as sex and occupation were analysed using chi-square programs, especially with regard to Hypothesis 1.

5.6 Results

(a) Factor analysis is a widely-used method for reducing data and identifying underlying factors. The process helps to identify patterns in the response data.

In the case of this study the intention in using factor analysis was to check whether the a priori item types (attitudes, beliefs, concern, alternatives, etc.) could be identified in the data as relatively consistent groups across all subjects. In other words, if all or some of the items in a given section contributed strongly to a given factor this would provide empirical justification for the sectionalisation of the questionnaire items.

One problem, apparent throughout this study, was the low N (total N = 46). Low N can lead to distortion and considerably reduces the confidence in results.

Items factor analysed (using punched card data with SPSS package) included the whole of the attitudinal, belief and knowledge sections of the questionnaire, for all subjects.

No strong factors emerged, however, and using orthogonal (Varimax) rotation only seven factors were found with Eigenvalues greater than 3.0. Factor 1 only accounted for 14.9% of the variance.

Because of this it was felt necessary to work from the item factor loadings themselves. Factor loadings for the items in the seven factors were examined and their relationships to the various questionnaire sections considered. A list of the high-loaded items is given in Table 13.
**TABLE 13 - LIST OF FACTOR LOADINGS FOR FIRST SEVEN FACTORS**

*Note:* For the purpose of factor analysis the questionnaire items were given continuous numbers, not sectional numbering as in the questionnaire itself, i.e. item 2 of Part 3 became Item 22, etc.

<table>
<thead>
<tr>
<th>FACTOR NUMBER</th>
<th>ITEM NUMBER</th>
<th>FACTOR LOADING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>66</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>65</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>68</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>62</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>59</td>
<td>0.54</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>42</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>0.50</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>0.51</td>
</tr>
<tr>
<td>4</td>
<td>57</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>53</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>0.50</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>0.64</td>
</tr>
<tr>
<td>6</td>
<td>17</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>0.64</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>47</td>
<td>0.83</td>
</tr>
</tbody>
</table>
These particular items were then examined for their content and each factor given a label on the basis of this examination. This is summarised in Table 14 below.

**Table 14 - Table of Factor Labels**

<table>
<thead>
<tr>
<th>Factor No.</th>
<th>% of Variance</th>
<th>Factor Label</th>
<th>No. of Items with Factor Loading &gt; 0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14.9%</td>
<td>General energy conservation knowledge</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>9.3%</td>
<td>General energy conservation beliefs</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>7.9%</td>
<td>Attitudes/beliefs about the University and energy</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>7.4%</td>
<td>Specific University energy knowledge</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6.2%</td>
<td>Attitudes - Measures</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>6.0%</td>
<td>Attitudes - Alternatives</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>4.7%</td>
<td>Attitudes - Organisational</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>56.4%</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The low proportions of variance accounted for by these factors suggests that even though some of the items seemed to suggest that some of the factors did refer to the sections in the questionnaire (knowledge, beliefs, etc.), it may be that these were not specific to the topic of energy conservation, this tending to make the relationships between the various elements more diffuse. A further problem was the effect of low N, in that this also could have been a cause of more diffuse relationships and hence less well-defined factors.

On the other hand the factor analysis did allow the identification of the most pertinent items in the questionnaire, and therefore acted as
a method of data reduction prior to further analysis.

(b) Multidimensional Scalogram Analysis

The items identified in Table 17 plus biographical variables were then subjected to an MSA analysis.

Due to missing data for some subjects, a total of 41 subjects' data out of 46 were input into the MSA program.

Results presented earlier in this study suggested that sex of subjects was an important variable and occupational role less so. The results from the present MSA indeed show that sex was an important variable. Consideration of MSA MAP1 (Factor Plot) and MAP2 for sex at the end of this chapter shows that the sexes are completely partitioned by the boundary conditions. MAP3, for occupational role however, shows no clear relationship to sex or any of the other variables. Only the student group seemed to have a fairly well-defined boundary, and the only exception to this lack of relationships was that the proportion of students paying fuel bills was much lower than for the other occupational groups (Chi² significance > 0.01).

Comparison of MAPS 1 and 2 confirm that there was no significant relationship between sex and whether subjects were part of the naive or experienced group. In other words, sex did not seem a determining factor in whether subjects completed the questionnaire or not.

(c) Response Rates and Individual Responses

The overall response rate (the number of completed questionnaires returned from the total N = 80 subjects) was 57.5%. However, the naive and experienced groups showed a marked difference in response:

naive group = 42.4%

experienced group = 72.5% (Chi² of raw frequencies, sig. > 0.01)

When the response rates for naive and experienced groups were broken down according to the sex of the respondents the results were:
Apparently the respondents' sex did not affect whether they completed the questionnaire or not, and the overriding influence seemed to be whether the subject was experienced or naive.

Did sex (social role) have any effect on responses? TABLE 12 and HYPOTHESIS 1 in Section 5.4 predicted that 'Naive females' would score lowest on the Knowledge Section and 'experienced males' highest. TABLE 16 shows the actual results:

**TABLE 16 - MEAN RESULTS ON KNOWLEDGE SECTION**

<table>
<thead>
<tr>
<th></th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAIVE</td>
<td>4.73</td>
<td>3.0</td>
</tr>
<tr>
<td>EXPERIENCED</td>
<td>6.2</td>
<td>5.33</td>
</tr>
</tbody>
</table>

**TABLE 17** is a significance matrix calculated from these results:

**TABLE 17 - CHI² SIGNIFICANCE MATRIX FOR MEAN RESULTS (KNOWLEDGE)**

These results are therefore in accordance with the predictions made. Naive females scored lowest and experienced males highest, with the other two groups intermediate. Indeed, the difference between the highest and lowest scoring groups was found to be highly significant. The difference
between naive and experienced females was also significant, though not that between males. Naive males and females were also significantly different (0.05 level), though not experienced males and females.

The above summarises sex role differences yet HYPOTHESIS 1 also suggested there would be occupational role differences. TABLE 16 breaks down the scores for the Knowledge section by respondents' occupations:

**TABLE 16 - AVERAGE KNOWLEDGE SCORES BY OCCUPATION OF SUBJECTS**

<table>
<thead>
<tr>
<th>OCCUPATION</th>
<th>NAIVE</th>
<th>EXPERIENCED</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LECTURERS</td>
<td>6.0</td>
<td>6.3</td>
<td>(LOW N)</td>
</tr>
<tr>
<td>STUDENTS</td>
<td>4.5</td>
<td>5.73</td>
<td>SIG 0.05</td>
</tr>
<tr>
<td>TECHNICIANS</td>
<td>3.83</td>
<td>6.3</td>
<td>SIG 0.01</td>
</tr>
<tr>
<td>SECRETARIES</td>
<td>2.0</td>
<td>5.4</td>
<td>(LOW N)</td>
</tr>
</tbody>
</table>

Low N's made calculation of significances impractical for the lecturer and secretary groups, but for the student and technician groups those who were experienced scored significantly higher (using t-tests of significance). Interestingly the technicians' scores showed a higher significant difference whereas the students were barely significant. This result accords well with the results of the Awareness Index described in Chapter 4 where students showed far less change in awareness as a result of the publicity than other occupational groups.

It might have been expected that with their apparently greater knowledge of energy conservation as measured by the knowledge items of the questionnaire the 'experienced' group would score higher on the 'concern' items. In fact they scored significantly lower (T-test significance 0.05).

HYPOTHESIS 2 predicted that attitudes and beliefs would be significantly positively correlated. This was found to be the case (level
of significance 0.05 from Pearson correlation coefficients).

However, while HYPOTHESIS 3 predicted that attitudes and knowledge would be positively related, in fact they were found to be non-significantly negatively correlated.

Item plots

An analysis of all the item plots revealed that a number of them showed similarities in their plots, in terms of the partitioning of the space. None of those apparent relationships could be shown to be statistically interrelated through Chi² tests, although several approached significance at the 0.05 level of significance.

5.7 Conclusions

A major problem with this Study has been the low numbers of subjects. However, the results described above are consistent with those of earlier studies in the thesis and have shown that:

(a) experienced subjects (those 'exposed' or 'sensitised' to energy conservation information at Surrey University) seemed better motivated to respond to the questionnaire and more knowledgeable than 'naive' subjects.

(b) once again social (sex) role accounted for greater variance in the results than occupational role, especially with respect to knowledge scores, but;

(c) some occupational role differences did emerge, for example students seemed less affected by 'experience', a result consistent with what would be expected from the Awareness Index described in Chapter 4;

(d) some evidence was found that attitudes and beliefs, and elements of these such as 'concern', 'alternatives', etc., can be empirically distinguished one from another, suggesting that 'an attitude' in fact involves a complex of attitudinal elements.
The Environmental Psychology Group is conducting a project investigating people's attitudes to energy conservation in the University. As part of this we would be grateful if you could spare some time to complete the following questionnaire, which is a general survey of attitudes to various aspects of the energy situation, and return it in the envelope provided.

We feel that the results from this will be of value in the current debate about energy and costs both in terms of the University situation and more widely. All details will be kept strictly confidential (in fact we have not asked your name) and if there are any problems in completing the questionnaire please either call at Hut 2 or ring Ext. 728. If possible the whole questionnaire should be completed at one sitting.

H. J. MILES - RESEARCH OFFICER

PART 1

1. What is your age? .......... Sex? ..........
2. What is your job title? ...........................................
3. Please give a brief description of your work (principal duties, etc.) ......................................................
4. To whom are you directly responsible? ......................
5. How many people are responsible to you? ...................
6. Are you a member of any university committees? .......... Which ones? .....................................................
7. Do you contribute directly to any fuel bills (e.g. at home)? .........................................................
In this section we are interested in your opinions, so that there are no right or wrong answers. For convenience we have expressed a number of beliefs in the form of statements, and we would like you to indicate the extent to which you believe or disbelieve these statements by ticking the box in the column below the expression which you feel is most appropriate for a particular statement. If you really feel that you can neither believe nor disbelieve a statement then tick the "don't know" box.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Don't believe this at all</th>
<th>Do not really believe this</th>
<th>Don't know</th>
<th>Believe this to some extent</th>
<th>Believe this strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;The University is in a serious position with regard to energy costs&quot;</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>&quot;The only way to persuade people to conserve energy is by making it more expensive&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;New sources of energy will soon replace conventional sources&quot;</td>
<td></td>
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<tr>
<td>&quot;The University administration should take the responsibility for energy conservation measures&quot;</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;It is vitally important that mankind conserves all types of energy resources&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>&quot;Appeals to people to conserve energy only have effect for a short time&quot;</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>&quot;Britain has coped with crises in the past and will cope with the energy crisis also&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;More energy conserved means less pollution&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Few alternative sources of energy are economically viable in this country&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;The success of energy conservation measures depends upon individual's attitudes to energy conservation&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;The international energy crisis is not as serious as it is generally made out&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Heads of departments and units play a vital role in University energy conservation&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Environmental factors like cleanliness may well outweigh adverse economic factors where alternative energy sources are concerned&quot;</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>&quot;Much of the present need to conserve energy has arisen because buildings in the past were built poorly insulated&quot;</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>&quot;Everyone in the University who uses lights and electrical appliances should bear the responsibility for conserving electricity&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;People in this country are used to wanting large amounts of energy&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>&quot;The widespread use of solar collectors and wind electric generators is not yet technologically feasible&quot;</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>&quot;If we really want to conserve energy we must spend money properly insulating buildings&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>&quot;It is not for the administrative staff to decide where conservation measures should be applied in particular departments&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;New sources of energy must be developed because conventional sources will soon become too expensive&quot;</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
In this section, also, we are interested in your opinions. We have expressed a number of attitudes in the form of statements and we would like you to indicate the extent to which you agree or disagree with these statements by ticking the appropriate box, as in the previous section. Again, if you really don't know whether you agree or disagree with a particular statement, tick the "don't know" box.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Agree to some extent</th>
<th>Don't know</th>
<th>Disagree to some extent</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everyone in the University should make a great effort to save electricity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students should be discouraged from cooking in K.U.B's. at midday so that electricity cost can be reduced</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar collectors could be used as energy sources for the University</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>University personnel should wear warmer clothes rather than ask that the heating be turne</td>
<td></td>
<td></td>
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<tr>
<td>The University should investigate the use of alternative sources of energy</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Meeting the cost of energy poses a serious difficulty for the University</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>The importance of saving energy is not appreciated generally in the University</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The library should close before dark to save on lighting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light levels in many University rooms and corridors are too low</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Saving energy by lowering light levels and room temperatures in the University is wrong because money is wasted in other ways</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>As a technological university we should be doing more to study new sources of energy</td>
<td></td>
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</tr>
<tr>
<td>The University should spend money to better insulate its buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People should work only daylight hours so that energy costs can be reduced</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Many people find it uncomfortably cold working at the University</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Solar collection and windpower would never be able to supply all the University's energy needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>Agree to some extent</td>
<td>Don't know</td>
<td>Strongly disagree</td>
<td></td>
</tr>
<tr>
<td>---</td>
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<td>---------------------</td>
<td>------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>&quot;Heavy load machines using a lot of electricity should not be used at times of peak demand&quot;</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>17.</td>
<td>&quot;We in the University should use telephones as little as possible&quot;</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>18.</td>
<td>&quot;It is the large number of personnel which is causing the University's financial problems&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>&quot;Solar collectors could provide a significant proportion of the University's energy needs&quot;</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>20.</td>
<td>&quot;The last person out of a room should always switch the lights off&quot;</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>21.</td>
<td>&quot;Energy conservation is more important than letting people use apparatus and appliances as they like&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>&quot;Waste heat recovery would save the University a considerable amount of money&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>&quot;Talk of 'alternative sources of energy' for the University is unrealistic&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>&quot;The University's energy problems have been exaggerated&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>&quot;Wind generated electricity could partly replace conventional energy supply at the University&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>&quot;If other universities are experimenting with dwellings self-sufficient in energy, there is no reason why this university cannot&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>&quot;It is up to the University authorities rather than individuals to set about reducing energy expenditure&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>&quot;Solar collectors and windmills on campus would make Stag Hill unattractive&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>&quot;The University should close at weekends to save energy&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>&quot;If the University got into real financial difficulties with fuel costs the government would be forced to help&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Please tick the answer you believe to be correct in the following questions. In each case one of the six alternatives is correct.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answers</th>
<th>Ticks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is cheaper to make a trunk telephone call:</td>
<td>a. before 10 a.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. between 9 a.m. and 1 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. between 12 a.m. and 3 p.m.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>d. after 1 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. after 5 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. after 9 p.m.</td>
<td></td>
</tr>
<tr>
<td>2. The legal minimum temperature for University buildings is:</td>
<td>a. 55.0°F.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>b. 60.8°F.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. 62.0°F.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. 62.5°F.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. 63.2°F.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. 75.0°F.</td>
<td></td>
</tr>
<tr>
<td>3. The University's expenditure on electricity in the last financial year was:</td>
<td>a. £5,600.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. £14,000.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>c. £97,000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. £127,000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. £275,000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. £1,081,000.</td>
<td></td>
</tr>
<tr>
<td>4. The increase in cost of fuel oil to the University since early 1973 has been:</td>
<td>a. 15%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. 65%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. 75%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. 95%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. 150%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. 400%</td>
<td>✓</td>
</tr>
<tr>
<td>5. In theory it is possible to make a reduction in the University's energy consumption (by using conservation measures like reducing room temperatures, removing lights, etc.) of approximately:</td>
<td>a. 12%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. 30%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. 40%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. 50%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. 70%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. 90%</td>
<td></td>
</tr>
</tbody>
</table>
6. The peak electrical load for the University normally occurs:
   a. from 9 a.m. to 10 a.m. .................................................................
   b. from 11 a.m. to 11.30 a.m. .........................................................
   c. from 12 a.m. to 2 p.m. ............................................................... ...
   d. from 1.30 p.m. to 3.30 p.m. .........................................................
   e. from 4 p.m. to 5.30 p.m. ............................................................... ...
   f. from 6 p.m. to 7 p.m. ................................................................. ...

7. The University's expenditure on heating for the last financial year was:
   a. £3,900 ............................................................................................ ...
   b. £15,000 ...........................................................................................
   c. £35,000 ...........................................................................................
   d. £72,000 ...........................................................................................
   e. £105,000 ...........................................................................................
   f. £1,745,000 ...........................................................................................

8. A 40w fluorescent tube uses 1 unit of electricity in:
   a. 15 mins .................................................................
   b. ¾ hr ........................................................................
   c. 2½ hrs ........................................................................
   d. 10 hrs ........................................................................
   e. 12 hrs ........................................................................
   f. 25 hrs .................................................................

9. The Maximum Demand charge per unit of electricity for the University in January is:
   a. £0.09 ........................................................................
   b. £0.65 ........................................................................
   c. £1.55 ........................................................................
   d. £2.00 ........................................................................
   e. £2.65 ........................................................................
   f. £11.85 ........................................................................

10. The difference in wasted heat between a well-insulated and a poorly-insulated building of standard design is generally considered to be about:
    a. 5% ........................................................................
    b. 15% ........................................................................
    c. 40% ........................................................................
    d. 55% ........................................................................
    e. 75% ........................................................................
    f. 95% ........................................................................
11. Most of the University’s heating comes directly from:

- a. gas ........................................ (✓)
- b. natural hot water ..................
- c. electricity ...............................  
- d. oil ........................................
- e. fluorescent lights ...................
- f. the sun .................................  

12. For every 1000 gallons of water the University pays:

- a. 0.5p ......................................  
- b. 5p ................................. (✓)  
- c. 35p .....................................  
- d. £1.60 ...........................  
- e. £3.97 ..........................  
- f. £8.00 ................................  

13. In an average centrally heated (poorly insulated) building the greatest proportion of heat loss occurs through:

- a. draughts ..................................  
- b. windows ................................  
- c. floors ...................................  
- d. roof ......................................  
- e. doors ..................................  
- f. walls .................................... (✓)  

14. Britain obtains most of her energy requirements from:

- a. oil ................................. (✓)  
- b. coal ....................................  
- c. hydro-electric power .............  
- d. gas .....................................  
- e. nuclear power .....................  
- f. solar collectors .....................  

15. Double glazing can reduce the heat loss through a window by:

- a. 5% ........................................  
- b. 15% ......................................  
- c. 40% .................................  
- d. 85% .................................... (✓)  
- e. 90% .................................  
- f. 99% .................................  

Tick Answer (✓)
### Most solar collectors for hot water have an annual overall efficiency of the order:

<table>
<thead>
<tr>
<th>a. 12%</th>
<th>b. 27%</th>
<th>c. 33%</th>
<th>d. 42%</th>
<th>e. 75%</th>
<th>f. 92%</th>
</tr>
</thead>
</table>

Tick Answer: **(✓)**

### Considering a unit thickness of the following materials the best thermal insulator is:

<table>
<thead>
<tr>
<th>a. aluminium</th>
<th>b. glass</th>
<th>c. wood</th>
<th>d. concrete</th>
<th>e. fiberglass</th>
<th>f. expanded polystyrene</th>
</tr>
</thead>
</table>

Tick Answer: **(✓)**

### Most oil-fired electricity generators have an overall efficiency of the order:

<table>
<thead>
<tr>
<th>a. 12%</th>
<th>b. 27%</th>
<th>c. 33%</th>
<th>d. 42%</th>
<th>e. 75%</th>
<th>f. 92%</th>
</tr>
</thead>
</table>

Tick Answer: **(✓)**

Thank you for your co-operation. Please return the completed questionnaire in the envelope provided.

Finally, do you have any criticisms, suggestions, comments, etc. on this questionnaire?
MASTER PLOT
MSA MAP 5

MULTIDIMENSIONAL SCALOGRAM ANALYSIS.

DISTRIBUTION OF 41 SUBJECTS BY MSA 1 PROGRAM.

(SEE P. 79)

MAP 6

DISTRIBUTION OF SUBJECTS BY VARIABLE 'SEX', SHOWING CLEAR DEMARCATION BETWEEN MALES AND FEMALES.

(SEE P. 79)
MAP 7
DISTRIBUTION OF VARIABLE 'NAIVE OR EXPERIENCED' BY SUBJECT.
(SEE P. 79)

MAP 8
DISTRIBUTION OF VARIABLE 'OCCUPATION' BY SUBJECT.
Chapter 6
The Effects of Occupational and Social Role on Attitudes and Beliefs about Energy Conservation.

6.1 Introduction

The previous Chapter showed once again that exposure to certain information can have significant effects upon motivation and knowledge. It also suggested that attitudes and beliefs seemed multi-faceted, or composed of more than one element. Occupational and social role differences were again found, with social role differences predominating.

(a) These occupational and social role differences have been found through analysis of data between occupations or roles. One point which should be noted here is that the relevant items have not required subjects to compare themselves with other occupational groups or the opposite sex. In other words the responses given do not indicate how particular occupational groups or a particular sex sees itself in relation to other groups. It could be that most subjects would not perceive their attitudes or beliefs as differing from those of other occupational groups or the other sex. However, research by various workers (Sewell, 1971; Canter, 1972; Barker, 1974; Canter and Walker, 1978) seems to suggest that occupational differences in responses to the environment arise through the internalisation of occupationally specific norms, or role-rule sets as described earlier in this thesis. One aim of the study reported in this Chapter will be to consider this point.

(b) In this thesis the organisation of the person's belief system, how it is governed by role-rule sets, has been argued as denoting differing attitudes towards a given topic. Rokeach (1975) was cited as one researcher who seemed to accept this view of the organisation of the person's belief system. A major dimension he pointed to was the centrality of the given belief within the system, the criterion being that the more central the
belief the more difficult it would be for a given piece of contradictory information to change that belief. This chapter will set out to explore this concept.

(c) The thesis has been concerned to a considerable extent with the effects of energy conservation publicity or information. In earlier chapters it has been shown that exposure to such information does indeed tend to affect the person's awareness of energy conservation. One question raised by this which requires an empirical answer concerns the degree of generalisation of this awareness. In other words, do specific pieces of information get 'carried over' in the person's belief system to result in a heightened general social responsibility towards energy conservation?

6.2 Development of Hypotheses

Developing further the argument in section (a) above, if people have beliefs or attitudes in common with others of their occupational group then it is likely that these derive from certain explicit or implicit group norms (Fishbein and Ajzen, 1974) or role-rule sets (Harré and Secord, 1972). If this were the case then one would expect these people (probably implicitly) to apply role-rule criteria to any assessment of the probable beliefs and attitudes of other occupational groups. Such a phenomenon quite clearly exists for a whole range of topics. One has only to think of racial stereotyping, or sexual stereotyping, to realise its relevance. When applied to occupational groups it can be termed occupational stereotyping.

The first Hypothesis to be tested in this study will be:

HYPOTHESIS 1: that subjects will tend to evaluate other occupational groups (a) in role-specific ways and
(b) in ways indicating that an object-person's attitudes may be classified according to that person's occupational group, i.e. indicating the existence of occupational stereotyping.
Secondly, Rokeach (1975) hypothesised five degrees of importance or centrality of beliefs, chosen a priori but largely confirmed by his experimental evidence, i.e. by asking subjects themselves to classify beliefs. If such a peripheral-central dimension exists it should be applicable to the topic of energy conservation.

Someone who is concerned with changing attitudes, e.g. with respect to energy conservation, is concerned with promoting pro-conservation beliefs and demoting anti-conservation beliefs. Hence the question of the centrality of the beliefs becomes an important one. If the centrality of beliefs is an important factor in the organisation of the person's belief system then we should expect to be able to show that centrality is unidimensional, in other words, that it varies along an axis from 'more central' to 'less central' and hence that beliefs can be classified along such a dimension.

If centrality is unidimensional it should be possible to test endorsements made of energy conservation beliefs of varying centrality for goodness of fit to a Guttman scale, of which unidimensionality and scalability are prime criteria (see Chapter 3). Therefore the second hypothesis is:

HYPOTHESIS 2: that responses to energy conservation belief statements will reflect a central-peripheral dimension.

Thirdly (cf. O'Riordan, 1977) is the relationship between social responsibility and exposure to relevant information. Social responsibility in this case means more specifically energy conservation responsibility. One measure of this might be the number of sources of information that the interviewee recalls being exposed to. The relationship between energy conservation responsibility and exposure to information would be expected to be a direct one, i.e.

HYPOTHESIS 3: that those subjects who score higher on energy conservation responsibility will tend to have been exposed to more energy conservation information sources.
6.3 Development of the experimental measures - general

The study took place in the University of Surrey once again. Broadly the experimental design involved the development of an interview schedule comprising biographical items and items relating to the above hypotheses.

To maximise the motivation to respond on the part of the interviewees it was felt that the interviews should be relatively short (15 - 20 minutes). This would also maximise the number of interviews within a given interviewing period.

A check-off system of recording responses was used to facilitate coding and minimise interview times.

Occupation was fixed as the independent variable rather than sex because sex distribution among the various main occupations in the University was very uneven -- secretaries were exclusively female whereas lecturers and technicians were overwhelmingly male. On the other hand, and since this study was to a considerable extent concerned with occupational stereotypy rather than sexual stereotypy, it was a straightforward process to select interviewees into three approximately equal sized occupational groups. After consideration of job descriptions to find out which occupational groups appeared most dissimilar, the three occupational groups selected were:-- students, technical staff and secretaries. The most dissimilar job descriptions were selected because it was felt that there might be difficulties otherwise in demonstrating the existence of occupational stereotypy for occupational groups operating in one institution or milieu, i.e. Surrey University. By maximising the apparent differences in occupational role between the groups this problem might be minimised.

A total of 96 people from the three occupational groups were interviewed in the winter/spring of 1977/78. Note that this was approximately the same time of year as the Publicity and Questionnaire studies were carried out, so that broadly similar objective conditions could be said to exist.
6.4 Development of Measures — Specific

6.4.1 Occupational Stereotypy

It will be recalled that occupational stereotypy refers to the supposed categorisation by role-incumbents of the attitudes of other role-incumbents. What was therefore necessary in this study was to get interviewees to carry out such a categorisation process and then analyse the responses for any significant patterns. The item used in the interview schedule was as follows:

(a) "I want to get an idea of what you think about various groups of University personnel. Please arrange these groups of University personnel in the order which you think best represents the degree to which they are informed about University energy conservation. There are no 'right' or 'wrong' answers; it is a matter of personal opinion."

(Interviewee given set of cards, one for each of the following:
1. University Technical Staff; 2. Academic Staff

Responses noted by interviewer:

MOST INFORMED —

2nd MOST INFORMED —

3rd MOST INFORMED —

LEAST INFORMED —

(b) "In the same way as you have just done, please arrange the groups of University personnel in the order which you think best represents the degree to which they practice energy conservation in the University."

(Interviewee again given the card set, and responses noted).

(c) "Considering each of these groups again, can you arrange them in the order that you think they would be favourable towards energy conservation."

(Interviewee again given card set, and responses noted).
These rankings could then be analysed for similarities or differences between occupational groups of those doing the ranking.

6.4.2 Centrality of Beliefs

Rokeach (1975) claimed to identify five levels of centrality of belief, varying from inconsequential or peripheral beliefs to those highly central beliefs held with 'absolute certainty'.

Designing statements to conform with such qualitative criteria might prove difficult or empirically ill-founded, therefore a relative categorisation was carried out on ten belief statements. All except one of these directly concerned energy. The ten statements were judged 1 - 10 by three judges using the criterion 'how difficult it would be to change the belief'. The questionnaire item itself asked interviewees how strongly they agreed or disagreed with the statements in turn (1 - 5 scale, 3 being neutral).

Analysis of responses would then be able to indicate whether these statements were perceived as evenly spaced on a centrality dimension, and whether 'centrality', as defined by Rokeach, actually corresponded to 'strength of belief' as expressed by interviewees.

The statements themselves (presented to interviewees on separate cards) were as follows, in order of centrality decided by the judges. Cards were shuffled for each interviewee.

CENTRALITY

3. 'Without energy our civilization will be destroyed.'
4. 'Fossil fuels are a limited resource.'
2. 'The sun is the ultimate source of energy.'
5. 'We in the West tend to waste energy.'
9. 'I think nuclear power should provide our energy needs.'
6. 'Insulation cuts fuel bills.'
7. 'Unconventional energy sources like wind and solar energy can only ever provide a small proportion of our energy in Britain.'
10. 'Americans are more wasteful with energy than Europeans.'

1. 'Death is inevitable.'

8. 'I prefer gas cooking to electricity.'

6.4.3 Energy Conservation Responsibility

This was a score arrived at by the summation of endorsements to self-report behaviour items, i.e. below:

"Do you do, or have you ever done, any of the following, either at University or at home?"

a) Switch off unwanted lights?
b) Adjust your use of appliances to off-peak periods?
c) Reduce your central heating temperatures to save energy?
d) Close doors and windows to exclude draughts?
e) Wear more clothes at work to reduce heating requirements?
f) Fitted draught excluders to your house?
g) Fitted an alternative energy source to your house?
h) Signed a petition calling for energy saving?
i) Joined an organisation dedicated to fighting energy waste?
j) Distributed energy conservation literature?
k) Attended meetings to discuss energy conservation?
l) Criticised other people's lack of energy conservation?

SCORE: Not Applicable = 1; No = 2; Yes = 3.

Sum of scores on each item = Energy Conservation Score.

Also included in the questionnaire was a 'general favourability' item intended to complement the above score:

"Would you say you were generally favourable to the idea of energy conservation?" (Yes, No or Don't Know)

"How strongly do you feel about this? ... very strongly 5 4 3 2 1 not at all strongly"
It will be recalled that one of the hypotheses predicts a direct relationship between social (energy conservation) responsibility and exposure to energy conservation literature and publicity. An item was included to ascertain the interviewees degree of exposure (self-reported) to such information:

"Have you heard or read anything about energy conservation?"
(Yes, No or Don’t Know/Remember)

"If you have, how did you hear about it?"
Newspapers T.V. Other (specify)......
Magazines Books
Technical Reports Other people
Leaflets Radio

This then allows a direct comparison to be made between energy conservation responsibility score and information exposure score.

6.5 Results

6.5.1 HYPOTHESIS 1

That subjects will tend to evaluate other occupational groups
(a) in ways characteristic of their own occupational group
and (b) in ways indicating that an object-person’s attitudes
may be classified according to that person’s occupational
group, i.e. indicating the existence of occupational stereotypy.

As described above, interviewees were asked to score each of four occupational groups on each of three criteria (‘how well informed’ about energy conservation; ‘how favourable towards’; ‘how well they carried out energy conservation’). A Multidimensional Scalogram Analysis of the resulting 12 variables was analysed for any occupational or social role differences.

MAP 1 at the end of this chapter illustrates how groups 1 and 2 (in this case students and technicians) clearly differed in the way they rated their own and other occupational groups as far as practicing energy conservation was concerned.
The 'technician' group clearly rated themselves high and other groups low in fact ($\chi^2$ significance 0.05) though this is not obvious from the Map itself. All the Map shows is that there were clear differences in ratings.

There were also differences in the degree to which subjects believed other occupational groups were informed about energy conservation. Secretaries rated 'academics' as high in terms of being informed about energy conservation, and other groups, including themselves, lower or less informed. ($\chi^2$ sig. 0.01).

As far as being favourable to energy conservation was concerned, technicians rated themselves highly favourable towards energy conservation, and other groups lower ($\chi^2$ sig. 0.05).

What is of particular interest in the results is that interviewees were apparently able to apply the three differing evaluative criteria to the four 'target' occupational groups. The response patterns for each criterion for a given occupational group were markedly different, for example students were consistently rated low on all three criteria by all three of the ranking groups while the ratings for the 'admin' target group varied across criteria and depended upon the occupational group doing the rating.

Results also indicated that the occupational groups rated their own groups with considerable variation. To summarise this self-rating:

a) None of the occupational groups considered themselves well informed about energy conservation (indeed secretaries and students rated themselves particularly low on this criterion).

b) Technicians felt that they were the group which best practised energy conservation and they felt, the most favourable towards it.

c) On the other hand, secretaries felt that they practised energy conservation better than the other groups.
d) Students rated themselves lowest on all three criteria.

It should be remembered that these results summarise self- and other group evaluation and do not necessarily correspond to the real state of affairs, e.g. whether one group was actually better at practising energy conservation than another.

These results therefore clearly lend considerable support to Hypothesis 1, indicating the importance of occupational role in the various evaluations made by subjects.

6.5.2. HYPOTHESIS 2

that responses to energy conservation belief statements will reflect a central-peripheral dimension.'

Responses to the belief statements in Section 6.4.2 above were ranked, tabulated and their goodness of fit to a Guttman scale tested, as described in Chapter 2 and Appendix 11 at the end of this Thesis.

Results were:

Coefficient of reproducibility = 0.84
Coefficient of scalability = 0.72

The coefficient of scalability reaches the Guttman criterion (0.6) but the coefficient of reproducibility falls short of the criterion for a full scale (0.9) and approaches the criterion for a 'quasi-scale' (0.85).

It would therefore not be fully correct to claim that the items constituted a full Guttman scale, although they meet the scalability criterion. Nevertheless, the fact that they do meet this criterion and approach the reproducibility criterion means that a reasonably high degree of confidence can be placed on the cumulativeness (i.e. interviewees tended to respond to the items in a cumulative manner) and unidimensionality of responses. This dimension can be called the 'centrality' dimension.

While items were distributed along this centrality dimension from one end to the other, three distinct groupings of items could also be distinguished in the results.
As stated above, if we hypothesise (cf. Rokeach) that centrality is an important concept in the organisation of the person's belief system, then we would expect to find unidimensional variations in the centrality of various beliefs. Rokeach asked his subjects to classify various beliefs in relation to one another depending on how readily they would be prepared to give these beliefs up. His resulting classification included five sets of beliefs, from highly central to peripheral (i.e. easily altered or changed).

Since the Guttman scale necessarily involves an element of unidimensionality, it can be used as a test of unidimensionality for a given set of responses to belief items. The Guttman scale was used in this way earlier in this thesis.

The three groupings of responses which emerged from the Guttman scaling on the surface merely refer to the degree of endorsement of items by subjects. In other words, these were highly-endorsed statements, medium-endorsed, and low-endorsed. However, the statement items themselves had been judged by three judges on the criterion of 'how difficult it would be to change the belief'. The average rate of endorsement for each item corresponded with the rank given to each statement by the judges on this criterion (see Section 6.4.2). It therefore seems reasonable to suggest that when asked how strongly they agreed or disagreed with a given statement, subjects were effectively using the same criterion as the judges, i.e. 'how difficult it would be to change the belief'.

Item analysis indicated that high centrality items could be characterised as those referring to what 'everybody knows or takes for granted'; medium centrality items were those fairly commonly accepted in our society, though not of the 'taken for granted' calibre; and low centrality items were those which could be characterised as equivocal or controversial, such as the questions of nuclear power and alternative sources of energy. In terms of the person's belief systems these would be peripheral items.
The three categories of centrality corresponded quite well with Types A, C and D of Rokeach’s five-belief typology (basic truths, or 100% consensus; authority beliefs; and derived beliefs respectively) (Rokeach 1975).

The reasonable success of the Guttman scaling exercise indicates a certain validity to Rokeach’s typology. There were, however, no significant differences between occupational groups for these items, indicating that for this set of statements concerning energy use and conservation, the broad pattern of shared beliefs in this institution was similar across occupations.

In the process of the scaling exercise it was possible to identify individual interviewees who were at either end of a scale, from those who endorsed all items to those who endorsed a minimum. Two groups of interviewees, at either end of this scale, (N=17 and N=20) could be conveniently identified and labelled as ‘high centrality’ and ‘low centrality’ respectively. It was felt that these groups might show differences in their degree of reported social responsibility, and this in fact proved to be the case (sig. at 0.05 level).

The low centrality group scored significantly higher on social responsibility. Content analysis of the items showed that this seemed to reflect an ‘anti-nuclear power/pro alternative energy sources’ bias.

A Sign Test also showed that the high centrality group was mainly female (p>0.05) whereas the low centrality individuals were almost evenly matched.

6.5.3 **HYPOTHESIS 3**

‘that those subjects who score higher on energy conservation responsibility will tend to have been exposed to more energy conservation information sources.’

Analysis of responses showed that half the items described in Section 6.4.3 (Energy Conservation Responsibility) were poorly discriminating – an
examination of the frequencies of responses showed in those cases that a high proportion of interviewees endorsed one particular response. This may be interesting in itself, e.g., that the majority of interviewees claimed to wear extra clothes to work to save heating energy and closed doors to save heat (98% and 86% of interviewees respectively), but being poorly discriminating they could not be shown to vary with any other factors.

Perhaps for this reason the cumulative score of 'energy conservation responsibility' described in Section 6.4.3 did not vary significantly with the number of information sources the interviewees reported. However, two individual social responsibility items did vary significantly with this variable. Results showed that those people who reported more sources of energy conservation information were (a) more likely to report going to meetings where energy conservation was discussed (Chi² p 0.01) and (b) to be more critical of other people for their lack of energy conservation (Chi² p 0.05).

On the other hand, the summated energy conservation responsibility score was significantly related (Chi² p 0.05) to the person's energy attitude, i.e., those with higher energy conservation responsibility scores tended to define energy conservation in terms of 'energy use' rather than a question of 'resources'.

6.5.4 Conclusions

The results deriving from this study have considerably built upon the conclusions drawn from earlier studies in this Thesis.

Specifically the empirical evidence has lent support for each of the three hypotheses advanced at the beginning of this Chapter. The results indicated (a) the existence of occupational stereotypy as defined in Section 6.2; (b) that the concept of a dimension of centrality in beliefs (i.e., within the person's belief system) seemed empirically justified; (c) that once again the effects of information or publicity was evident not merely with respect to attitudes or beliefs but also
(self reported) behaviour. This provides further confidence for the
conclusions drawn about the effects of information on awareness of energy
conservation in earlier studies in the thesis.

The major aspects of this study, however, have been with respect
to occupational stereotypy and centrality of beliefs because these results,
it is suggested, are clearly in accordance with the role-based attitude
model which has underpinned this thesis and the various studies within
it. Unlike the previous two studies (Chapters 4 and 5) this study has
shown the importance of occupation rather than social or sex role in the
evaluation of other people, by demonstrating what has been termed
'occupational stereotypy'.

The next Chapter, the final one in this thesis, will review the
conclusions from each study, consider to what extent they support or
reject the theoretical views outlined early in the thesis, discuss the
shortcomings in experimental method, etc., and tentatively suggest further
research to clarify key aspects of this area.
Chapter 7

Concluding Remarks and some Proposals for Further Research.

7.1 **Aims of the Chapter**

The empirical data for the Thesis has now been presented and each Chapter has presented interim conclusions. In this final Chapter the aim will be to draw together the main threads of the results presented, to assess how these results affect the theoretical discussions of the role-based approach to attitude change and attitudes, to present some of the shortcomings of the work presented here and to propose further research aimed at developing this area of psychology.

7.2 **An overview of the research results**

The Role/Attitude model was presented as one relating beliefs, attitudes and roles. The person's roles were argued to be the determiners of the organisation of that person's belief system which in turn affects how the person responds to events in the world.

Beliefs themselves were seen as being of varying centrality in the belief system, and this denoted their importance to the person.

When discussing attitude change it was proposed that "information" (in the most general sense) was a prerequisite for attitude change to take place and that this change actually involved the rearrangement of beliefs in relation to one another within the belief system.

Three main themes seem to have emerged from the results of the various studies (excluding the two early exploratory ones). The first concerns the effects of information/publicity. In particular Study 3 - the Publicity study - was clearly able to show the effects of exposure to energy conservation publicity in terms of subjects' scores on the Awareness Index. The last study, Chapter 6, also indicated that exposure to energy conservation publicity tended to increase the degree of energy conservation responsibility reported by interviewees. Some of the effects of the information seemed to be transient. For example, the Awareness Index
scores showed a clear extinction process over time. Qualitative information rather than facts and figures seemed to be more easily recalled by subjects, suggesting that this kind of information, or more accurately, information presented in this way, would have more effect upon attitudes and beliefs than quantitative information.

On the other hand some of the information effects seemed to have much longer duration. The Questionnaire study reported in Chapter 5 showed the effect of previous information (i.e. exposure to the energy conservation project - the 'experienced' subjects) through greater knowledge scores, higher response rates, and (interestingly) lower concern with the issue. The reason for this last, as discussed in Chapter 5, seemed to be the reverse of a 'novelty' effect of the issue for the subjects concerned.

These results seem to indicate quite clearly that information is a major variable in attitude change. Other factors which have been suggested in recent literature are 'blame targets' for the energy crisis, i.e. who the person sees as being responsible (Hummel et al, 1978); the effect of political liberalism/conservatism on environmental concern (Buttel and Flinn, 1978) as distinct from Party affiliation as such, though this has been suggested (Harrington et al, 1969; Munten and Brady, 1970; Tognacci et al, 1972); and also the effect of the confidence with which an attitude is held (Fazio, 1978).

It should be noted that the above comments concern attitude change rather than attitude formation, following the distinction made between these two processes in Chapter 2.

The questionnaire study in Chapter 5 also indicated a number of role-differentiated responses, but sex role seemed to account for more of the variance in these results than occupational roles, although occupational role differences were found, for example students seemed relatively unaffected by previous exposure to the energy conservation project unlike secretaries and technicians.
The last study, in Chapter 6, was probably the most important in terms of occupational role in this thesis, although the latter part of this Chapter will point out a number of inadequacies and shortcomings in the study, some of which occurred in other studies.

This study (The Effects of Occupational and Social Role on Attitudes and Beliefs about Energy Conservation) found some evidence for what was labelled in the Introduction as 'occupational stereotypy', or the hypothesised tendency to evaluate one's own and other groups in role-specific ways. Some evidence was also found for the existence of a dimension of centrality in the belief system, as well as more evidence of the effects of information, not only on expressed attitudes but also in terms of behavioural self-reports such as that subjects who had been more exposed to energy conservation information tended to report greater general compliance with individual energy-saving behaviour.

7.3 The Thesis

The core of the thesis proposed here has been the primacy of role in the development of the person's attitudes and behaviour. The matter of the link between attitudes and behaviour has not been the subject of the research and the candidate feels he has been careful to point out this fact throughout the thesis.

The main thrust of the thesis has therefore been twofold - to attempt to show that information has both short- and long-term effects upon attitudes; and to try and show that role is a major factor, if not the major factor, in the ways this information affects attitudes, both to a given topic and towards groups of subjects in various occupations. While it is suggested that empirical results presented in the main body of the thesis seem to go at least some of the way to realising these two aims there are inevitably large gaps in the logical fabric of the thesis, gaps which only further research could elucidate. For example, only dissemination and passive uptake of information by subjects was considered,
Nonetheless it is suggested that the results as presented do allow a degree of confidence to be placed in the basic validity of the Role/Attitude model, hence recognising the primacy of occupational and social roles in attitude formation and change.

**7.4 Methodology**

Because the studies in this thesis were concerned with general relationships between attitudes and knowledge and in some cases were clearly exploratory in nature as pointed out above, it was felt that structured and semi-structured interviews or questionnaires were appropriate research instruments.

They have the advantage of obtaining large amounts of easily coded data (if planned correctly) which can be obtained in a relaxed and informal situation at the respondent's convenience. They are also appropriate for attitudinal data rather than direct behavioural measures.

Data analysis made considerable use of computer programs designed for social science research, in particular cross tabulation and $\chi^2$ tests.

Also by its use in this thesis it is suggested that the Multidimensional Scalogram Analysis program (MSA 1) proved to be an appropriately flexible and sensitive tool of analysis for this kind of data.

Similarly it is felt that the application of Guttman scaling in both the Universities Survey and the final study in Chapter 6, as a test for unidimensionality with respect to centrality of beliefs in a belief system, indicated useful approaches to the measurement of unidimensionality in general, an approach which could perhaps be applied in many other circumstances.

The Conservation Strategy flow diagram from the Universities Survey in Chapter 3 (page 44) seemed a useful way to summarise and stimulate energy conservation procedures applicable to all kinds of institutions. Both cases constituted a methodological development in the Universities Survey as a means of converting a cumulative scale into a flow diagram,
which may well have implications for other aspects of organisational activity.

Finally, but by no means of least importance, was the use of the Awareness Index. This showed a clear and classic extinction process over time indicating one way of measuring the impact of propaganda and information, in this case by taking independent time samples of respondents rather than a longitudinal assessment. An analysis of such an index in a given setting would give valuable indications of the ongoing effects of information. It could therefore act as a form of continuous feedback, although it would clearly also need to be related to behavioural measures since, as has been pointed out in this thesis, greater awareness of energy use and conservation is no guarantee of appropriate behavioural changes.

7.5 Some shortcomings

One characteristic of the studies, apart from the Universities Survey, was that they were all carried out in one institution. This means that the results obtained may have been specific to that one institution, although it might be suggested that this is unlikely. Indeed, the other side of the coin is that the relatively restricted social milieu may actually have made it less likely that occupational differences in attitudes would be found. This would certainly follow from the Attitude/Behaviour model in that in one relatively well-defined institution such as a university, where one could suggest that many of the goals and assumptions concerning the nature and function of the establishment would be shared by different occupational groups, this would tend towards a sharing of certain attitudes by these different occupational groups.

Nevertheless, it would clearly be advantageous to have data from different institutions since at the very least this would allow an estimation of what degree of effect the shared institutional milieu does have upon the attitudes of subjects from various occupational role-groups. For example,
it might be suggested that Surrey was an atypical university in being mainly technical.

A major shortcoming in the studies reported was the relatively small number of subjects. The publicity study had most subjects (118) but this represented only a 3.5% sample of University personnel. The Questionnaire study in particular (Chapter 5) suffered from low numbers of subjects. In one or two instances this meant that the significance of differences between various sub-groups could not be calculated. Clearly this is an unfortunate state of affairs, caused partly by the low response rate from 'naive' subjects in this study, but which in future studies would need to be rectified. It was felt however that numbers of subjects were large enough for the major results in the affected studies to be held with a reasonable degree of confidence.

Studies prior to the last, in Chapter 6, seemed to indicate that social (sex) role accounted for more variance than occupational role. This was complicated by the fact that the major occupations at Surrey University were sex-linked to quite a considerable extent, as they are in society as a whole. In other words, all the secretaries were female, about 90% of lecturers were male, and even students were only about 35% female. It was not until the last study, in relation to occupational stereotypy, that occupational differences appeared to be unequivocal, although it must be admitted that this rests on the assumption that subjects were evaluating other occupational groups in occupational terms rather than sexual, i.e. treating secretaries as secretaries and not as ‘an occupational group of women’. The only way to solve the issues raised here would be to carry out further studies using matched samples of occupations.

A further shortcoming was that mentioned above, the lack of direct behaviour observation in the studies reported in this thesis due to lack of co-operation from technicians and technical difficulties.
Before proposing some specific directions for studies based on this thesis it would be worthwhile presenting a short review of the most recent literature concerned with role and attitude change.

Some of the findings from the Publicity study (Chapter 4) indicating changes in awareness as a result of exposure to publicity or propaganda are in accordance with behavioural changes examined in a recent study by Delprato (1977). In this he used propaganda posters to influence electric light using behaviour in toilets in a university, with a degree of success.

Delprato argued that his study was a successful application of behavioural techniques to energy conservation behaviour. It could be argued, however, that this behaviourist interpretation of the data suffers from (a) not considering the meaning of the propaganda or prompting techniques to the subjects and (b) from the general behaviourist limitations to a model of man. Specifically this involves a lack of concern with self-monitoring processes, for example how the person wants to appear to others, the sorts of beliefs and attitudes he or she thinks they ought to have.

This is a main concern of impression-management theory which maintains that subjects in typical dissonance experiments change their self-reports of attitudes in order to appear consistent and mentally healthy to the experimenter. Contrary to 'intra-psychic' processes of attitude change postulated by dissonance theory, impression-management theory asserts that creating the appearance of attitude change and cognitive consistency is an interpersonal tactic determined by social rules and norms. Whereas the concern of self-perception theory is whether an actor perceives his or her own behaviour as non-coerced, impression-management theory concerns itself with whether an actor believes that an observer perceives that the actor's behaviour is non-coerced.

Kahle (1978) discussed these theories and carried out his own experiment into attitude change which he concluded showed that both
dissonance theory and impression-management theory accounted for some variance in the data, but neither accounted for all. He felt that shortcomings in all three approaches to attitude change had emerged but that each could generate useful predictions. This, he suggested, pointed to a complementary relationship between all three of them. Though he is not specific here, what he seems to be suggesting is that they may operate in different situations. What is being suggested in this thesis in terms of the social rules and norms associated with occupational role would seem to accord with the process of attitude change suggested by impression-management theory.

To pursue this line of research would require the designing of experiments intended to analyse the degree of attitude change caused by changes in social rules and norms, perhaps by longitudinal studies of subjects entering certain occupations (see papers by Barker, 1974 and Sewell, 1971 discussed in Chapters 1 and 2 of this thesis).

Some equivocal results were obtained by Horsley (1977) in a study of the effects of social learning techniques on attitudes and behaviour towards energy conservation. Whereas his subjects' attitudes changed little (subjects were college students in a role-playing situation) post-test behaviour showed significant changes towards greater energy conservation. While once again posing the problem of the attitude-behaviour link, this result is actually the reverse of what common sense might expect, since behaviour seemed to change but attitudes did not. Horsley explained this lack of attitude change as being due to a 'ceiling' effect for his already energy-aware students. This could be the case but perhaps a better explanation for the apparent closure of attitudes and behaviour would be that the role-playing itself had the effect of raising the motivation of his subjects, since pro-conservation attitudes were apparently present in the pre-test situation. This accords well with the increased response rate of the 'experienced' group in Chapter 5, in that previous exposure to
the energy project seemed to motivate them to respond to the request to fill out the questionnaire. Hence Horsley's results seem explicable within a cognitive paradigm and need not rely on the 'social reinforcement of desired behaviour' approach which is the social learning paradigm which Horsley prefers.

This is also in line with a recent critical study of the behaviourist approach in general by Borden et al. (1976). They compared affective, physiological and attitudinal responses from subjects in an audience situation. They concluded that:

"Apparently, subjects' attitudinal responses were mediated more by competing feelings and cognitions, noncompliance tendencies and response moderation than by mechanisms of drive or arousal."

A recent study by Cantor and Walker (1978), deriving from Canter's theory of Place, (Canter, 1977), hypothesised that as a result of a person's role-defined environmental interactions, a person will build up over time a conceptualization of a given environment which differs from the conceptualization of other role-figures associated with the environment. They predicted that those individuals with broadly similar environmental roles would be likely to have broadly similar conceptualizations and so evaluations of the environment. Their results indicated that the variations in criteria used to evaluate housing quality were directly related to their subjects' mode of interaction with the housing, their environmental roles (e.g. caretaker, administrator, councillor).

This provides further evidence that the role-based approach to attitude formation and change could prove very fruitful.

Based upon the preceding discussion in this final Chapter, specific research now needs to be suggested.

(a) A study on attitudes and attitude change between institutions, i.e. secretaries, technicians or maintenance workers could be compared
within and between institutions to analyse the effect of a common formal social milieu on attitudes.

(b) Studies on the effects of information on attitudes and behaviour. How closely linked are attitudes and behaviour? Does information affect both equally? What other factors for given occupations are important?

(c) The effects of information on attitudes to energy conservation or a given topic can be carried out using matched samples from different occupations to determine the effect of sex-role more clearly.

(d) The organisation of the person's belief system could be more closely studied by examining changes in beliefs and the relative importance of beliefs when the person's objective social conditions change, e.g. the person becomes a professional or seeks to adopt some other well-defined role. This might best be accomplished by content-analysis of directed interviews.

From the experience of this thesis it is important that any of these studies undertaken need sufficient numbers of subjects so that subgroup comparisons can be readily made. The successful use of MSA in this thesis indicates that its continued use in this context may well prove very fruitful.

7.7 Psychological Recommendations

From this thesis information emerges as a central element in attitude formation and change.

(a) There is clearly a need for regular, interesting information to maintain awareness.

(b) The information needs to be easily understandable and to clearly suggest ways of conserving energy.

(c) The information should be role-specific, i.e. to describe how particular occupational categories can best conserve energy.

(d) People need regular feedback on their efforts.
There is a need to explain why energy conservation is important - attempts should be made to link this explanation to people's central or 'core' beliefs, about survival, happiness and well-being, etc.

Other ways of keeping conservation in the public eye are necessary, such as campaigns, advertisements, features, and so on.
The choice of energy conservation as a topic

Since the 1973/4 oil crisis energy conservation had become by 1975 (when this set of studies was begun) a topic of considerable importance nationally and to those running local institutions, especially large ones like universities.

As part of its own drive for greater efficiency in the use of energy, the University of Surrey authorities were planning to release a good deal of publicity on the campus. This provided a convenient milieu for an investigation of attitude change, requiring in the first place merely an adequate liaison between researchers and the relevant University authorities.

The general situation

Energy conservation is a topic allowing a multitude of approaches, varying from specific technical or technological improvements in plant and buildings through to large-scale managerial or organisational drives to increase efficiency. It is a topic where the attitudes of individuals living and/or working in specific environments, e.g. a university, can make substantial differences to the amounts of energy used or the patterns of that energy use.

It is also a topic which involves more global considerations than the attitudes and roles of individuals or groups in institutions. It involves social policy and administration and the perceptions (by planners, politicians, administrators) of social consensus, or probably more realistically, the perception of powerful sectional interests. Energy conservation is seen by many as a possible solution to many of the world's most chronic problems and so it assumes an international political significance.
The present viability of the industrialised world rests on the relatively easy availability of fossil fuels (coal and gas, but primarily oil). A glance at TABLE A below indicates just how dependent Western societies and the industrialised Eastern bloc are on oil:

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<tbody>
<tr>
<td>USA</td>
<td>725</td>
<td>995</td>
<td>1440</td>
<td>2175</td>
<td>2650</td>
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<tr>
<td>EEC</td>
<td>315</td>
<td>435</td>
<td>700</td>
<td>1075</td>
<td>1340</td>
</tr>
<tr>
<td>JAPAN</td>
<td>30</td>
<td>70</td>
<td>240</td>
<td>460</td>
<td>635</td>
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<tr>
<td>TOTAL</td>
<td>1070</td>
<td>1500</td>
<td>2380</td>
<td>3710</td>
<td>4625</td>
</tr>
</tbody>
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i.e. over 400% increase (in millions of tonnes of oil) by major industrial countries from 1950 - 1985 (Est). (From 'The Times', April 9th 1973). Even allowing that the present oil-crisis (1979) may depress the estimates in the TABLE above, the trend is still obvious. An article in 'The Times' of April 24th 1973, pointed out that world oil requirements have doubled approximately every ten years since the turn of the century.

Throughout the above period (1973/4) the media were liberally scattered with speculation on crisis and forebodings of doom. Yet the so-called 'oil crisis' in itself was a result of certain price rises instituted by a group of oil-producing countries (OPEC) which led to the price of oil to the consumers being increased by a factor of 5 in Britain over a period of little more than a year. It was largely this which set off the public discussion about oil resources in particular and then the wider field of alternative sources of energy, as well as energy conservation, which formerly had been the almost exclusive province of 'fringe' ecologists and economists.

It was not very long before a 12-point plan was produced in Britain which included the following comment:

"Energy saving throughout the world is largely the responsibility of
the individual."

In this report by the National Economic Development Office (NEEDO, 1974) a range of energy conservation possibilities was discussed. Yet these possibilities were mainly technical. The striking thing about this report and the various comments made by many prominent people at the time is their apparent lack of interest in the social and psychological factors involved in energy conservation.

Vague reference is made to 'education and propaganda' as it is to 'environmental issues', but the research envisaged is technological and economic in nature. For example, another report on energy conservation (by the Central Policy Review Staff), seems to lean heavily on the market mechanism without seriously questioning whether this is the best way to bring about greater conservation in general:

"Energy consumers in industry and the public at large are unlikely to take the action required unless they appreciate the likelihood of future rises in the price of energy relative to other goods and services, are aware of the uncertainties which surround the availability of future energy supplies, and realise the benefits which could accrue from energy conservation."

Others see even more drastic and far-reaching consequences of the over-rapid exploitation of such fuels as oil. In "A Blueprint for Survival", Goldsmith et al write:

"In a world of fast diminishing resources, we shall quickly come to the point when very great numbers of people will be thrown out of work, when the material compensations of urban life are no longer available or prohibitively expensive, and consequently when whole sections of society will find good cause to express their considerable discontent in ways likely to be anything but pleasant for their fellows."

The line most often pursued seems to boil down not to how to get people to reduce energy consumption, even less to try and understand what
energy conservation means to people, but why (in explicit or implicit economic terms) it is necessary that 'we' should conserve energy.

For example, J.G. Myers (1975) argues against a common suggestion that energy conservation and economic growth are incompatible. What is crucial is the 'energy/GNP' ratio, he writes, and most people who oppose economic growth on the grounds of ever increasing energy consumption ignore the fact that the technological advances have reduced the energy consumed per unit of product. In other words, technological improvement tends to increase the productivity of energy. However, we should note that this is a prime example of the 'technical fix' approach and says nothing about the long-term availability of energy resources, or about the desirability of producing the sort of goods that make up the GNP (Gross National Product). It also assumes that pricing mechanisms and developing technology will affect consumption without considering what the social and psychological effects of the drive for increasing productivity of energy may have (e.g. in terms of unemployment, distribution of wealth, etc.). Such an approach ties in very well with the sort of experiments criticised in the literature survey in Chapter 2.

Lovins (1976), in a paper on large scale energy strategy argues that there are only two options facing the world as far as energy supply is concerned.

He characterises these as the 'hard' (nuclear) or 'soft' (alternatives) technologies. These, he contends, are mutually exclusive. He recognises drawbacks in both the nuclear road and the inadequacies of technical fixes of the sort Myers seems to pin his hopes on. He argues that many social, psychological and cultural benefits would accrue from taking the 'soft' road, in terms of employment, living standards, reduction in pollutants, etc., but he seems to feel that this option will come about through a process of rational debate and argument and the use of pressure groups (he is a leading member of Friends of the Earth). The road he suggests
would be far easier if this were so but the fact is that many governments and institutions have invested huge sums of money in 'hard' technology, in nuclear power, and have powerful lobbies in both national and international political circles.

These papers only really provide a general background within which to consider the work on energy conservation and perhaps how attitudes may be changed. Individuals and the meanings that energy conservation has for them, how they regard energy conservation information for example, is largely ignored in such papers in favour of an abstracted 'social consensus' approach which may or may not have a basis in reality.
Guttman scaling is a technique for rendering qualitative data in a quantitative form. This is done by using a dichotomous classification, that is, a score of '1' or '0' can be designated according to whether a particular variable, event, condition, etc. is present or not. In the case of the survey of energy conservation practices in British Universities (Chapter 3) a score of '1' was given when a particular category of conservation measure was present and '0' when absent. The total score (Energy Conservation Score) for each university was simply a summation of '1's.

The criteria important in a consideration of Guttman scaling are those of unidimensionality and scalability. Unidimensionality means that the classification system is applicable over the range of measures, that different dimensions of categories are not included in the same scoring system. Scalability refers to whether or not the categories are scalable in their relationships to one another. One consequence of this Guttman scaling is that the scale, if viable, has a cumulative nature. In other words, in this case, most universities used central measures first, then the next most popular method, central directives, and so on to the least popular.

Two important mathematical concepts relating to the above criteria are the coefficient of reproducibility and the coefficient of scalability. As an indication of a valid Guttman scale these should be greater than 0.9 for the former and 0.6 for the latter.

They are calculated in the following way:

1. Coefficient of reproducibility = \(1 - \frac{\text{error}}{\text{responses}}\)

2. Minimum Marginal reproducibility = \(\frac{\text{maximum marginals}}{\text{responses}}\)

3. % improvement = \(\frac{\text{coefficient of reproducibility} - \text{minimum marginal reproducibility}}{\text{coefficient of reproducibility}}\)
(4) Coefficient of scalability = $\% \text{ improvement}$

\[
(1 - \text{minimum marginal reproducibility})
\]

In neither case in this Thesis where Guttman scaling has been used did the data satisfy both the above criteria of a valid scale. However, in both cases (the survey of energy conservation in British universities, and the last study described in Chapter 6) the criterion of scalability was reached and the coefficient of reproducibility came very close to the criterion, indicating a 'quasi-scale'.
Since this thesis is primarily concerned with information and role and their effects upon attitudes rather than behaviour, it is necessary to argue that there is a conceptual and logical link between attitudes and behaviour in order to appreciate the relevance of the studies reported later. Ultimately the degree of energy conservation achieved in an institution will be related to the behaviour of the people in that institution. The following section considers some of the literature relevant to this attitude-behaviour link.

Wicker (1969) in a review of the attitude literature concluded that attitude accounted for ten percent of the variability in predicting behaviour. Deutscher (1966, 1973) has argued that there is no theoretical reason to expect congruence of words and deeds. Yet this seems to fly in the face not only of 'common sense' but of numerous examples where certain expressed attitudes and behavioural intentions do have a high degree of predictive value, for example in many election polls. Also Albrecht and Carpenter (1976) point out that most of the literature that these workers drew their conclusions from did not recognize situational factors.

Albrecht and Carpenter went on to consider two approaches to the relationship between attitudes and overt behaviour, those of Defleur and Fishbein (Defleur and Westie, 1958; Warner and Defleur, 1969; Fishbein, 1967; Ajzen and Fishbein, 1972).

Albrecht and Carpenter concluded that both approaches recognize the complexity of the situation and both recognize the continued importance of attitude in a multivariate relationship.

Acock and Defleur (1972) suggest that perceived norms of family and peers, combined with attitude, offers a high level of prediction (in their case of marijuana-related behaviour in a laboratory setting).

Fishbein has integrated a set of predictive variables in a single conceptual framework. Fishbein and Ajzen (1974) point out that attempts
to explain away the poor correlations between attitudes and specific behaviour towards an object have been broadly of two types. Either it has been argued that attitudes are multidimensional and involve cognitive, affective and conative aspects (e.g. Rosenberg and Hovland, 1960; Triandis, 1971), or that behaviour towards an object is influenced only partly by attitudes towards the object and that other factors, such as social norms, situational factors and so on must be taken account of (e.g. Wicker, 1969).

Fishbein and Ajzen's attitude/behaviour theory differs from both of the above explanations. Their attempt to understand the relationship between attitude and behaviour relies upon the notion of 'behavioural intention', which is the intention to behave in a certain way towards an object which immediately precedes the behaviour itself. It is the intention/behaviour link which is of immediate empirical interest, they contend, and attitude towards the object is only one of the factors contributing to the behavioural intention. The other two general factors are the expectations of relevant other people, and the individual's motivation to behave in a certain way (see FIGURE 1 below).

**FIGURE 1: Fishbein's Intention/Behaviour Model**

The explanation that Fishbein puts forward for the poor empirical relationship noted earlier between attitudes and behaviour depends on showing that (a) researchers have been measuring the wrong things, (i.e. attitudes instead of behavioural intentions as the antecedents of behaviour), and (b) that in many cases it is not sufficient to judge the
attitude/behaviour relationship on the basis of single-act criteria of
behaviour, and that where researchers have used multiple-act behavioural
criteria the relationships have been much stronger. Fishbein and Ajzen
provide empirical evidence of their own which supports these contentions.

Nevertheless, argue Albrecht and Carpenter, Fishbein's model is
still faced with the problem of generalizability from specific behavioural
intentions, and that Fishbein is concerned with behavioural intentions
rather than the behaviour itself.

Albrecht and Carpenter found experimentally that a general measure
of attitudes did equally well in predicting behaviour as the more specific
behaviour intention. The inclusion of normative beliefs in their experi­
mental conditions did not greatly improve the prediction of either behaviour
or behavioural intentions, in the laboratory or in the field, over that
obtained by the attitude measure alone. They did point out, however, that
the opposite could be argued, i.e. that there could be an underlying link
between normative attitudes and behavioural intentions. From the argument
in this thesis, such an underlying link could be role, we might suggest.
Indeed, in their study Albrecht and Carpenter found that personal attitudes
and normative beliefs were high intercorrelated, which could explain why
they added little predictive power to the behavioural intention.
REFERENCES


