THE NATURE AND ORIGINS OF BOREDOM

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ABSTRACT

It has been assumed, stemming from the work of Hebb (1955, 1966) and Berlyne (1960, 1967), that boredom occurs when stimuli are physically monotonous. Further these authors argue that boredom is accompanied by an aversive state of physiological arousal. Others (Thackray et al, 1974, 1975; Bailey et al, 1976) have argued that boredom is more closely related to attentional processes than to arousal and thus is associated with an increase in heart rate variability. The purpose of the work reported was to examine these two notions.

A series of experiments using techniques derived from personal construct theory (Kelly, 1955) strongly suggested that physically monotonous stimulation is neither a necessary nor a sufficient condition for the occurrence of boredom. Reterospective studies using such techniques revealed that boring activities are instrumentally less satisfying of motivational needs, and are associated with a significantly higher degree of frustration, than disliked or interesting activities. Studies producing boredom in the 'here and now' using repertory grid techniques revealed that boredom is associated with subjective, rather than physical monotony.

Psychophysiological recording techniques were used to compare changes in the heart rate variability index of attention and the heart rate index of arousal during boredom produced by tasks imposing different mental loads. This study suggested that changes in such indices are task rather than boredom dependent.

A model of boredom is presented, on the basis of the experimental evidence, which distinguishes the cognitive and affective components of boredom. It is argued that when a person makes few instrumentally satisfying constructions of stimulation, that stimulation will be perceived as subjectively monotonous and consequently boring. The negative affect associated with boredom appears to be a function of a high degree of overall frustration.

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SECTION 1

INTRODUCTION AND A REVIEW OF THE LITERATURE ON BOREDOM

CHAPTER 1

INTRODUCTION

Boredom appears to be a particularly common experience for most people. At work, at school and at home many people complain that they frequently experience boredom, yet in view of its apparent prevalence there has been remarkably little research carried out into the nature and origins of boredom.

In the applied field, both educational and industrial researchers have largely been concerned with boredom in terms of its consequences. In the educational field, truancy, early leaving, disruptive behaviour and reduced effort have all been cited as consequences of boredom (Newsom, 1963; Crowther, 1959; Morton-Williams and Finch, 1968; Robinson, 1975; Weber and Motz, 1968). In the industrial field decreased production, absenteeism, high labour turnover, and job dissatisfaction have been attributed to boredom (Walker and Marriott, 1951; Walker and Guest, 1952; Wyatt et al, 1929, 1937; Wild and Hill, 1969; Kishida, 1973).

However, this applied research has been largely atheoretical, and theoretical work carried out in the experimental field seems to have been very sparse indeed. Much of this work stems from that of Hebb (1955, 1966) and Berlyne (1960) and has been concerned with the psychophysiological accompaniments of boredom. Surprisingly little research has been carried out into the causes of boredom, and, within the experimental field it seems almost universally assumed that monotonous stimulation is a necessary and sufficient condition for the occurrence of boredom. This assumption seems to derive from Hebb (1966) and Berlyne (1960), and whilst being eminently questionable, has never been seriously investigated.

Thus, whilst boredom is apparently very common and unpleasant in its consequences, there is, apart from the views of Hebb (1955, 1966) and Berlyne (1960, 1967), which will be reviewed critically in Chapter 2, no really satisfactory theory at the present time concerning the nature and origins of boredom. By taking a somewhat different approach to the question than has previously been adopted, the research reported here attempted to at least suggest a useful model of boredom.

CHAPTER 2

A REVIEW OF THE LITERATURE ON BOREDOM

INDUSTRIAL INVESTIGATIONS OF BOREDOM

For a long time industrial psychologists have been concerned with the consequences of the trend towards

> "... the sub-division of operations and ... consequent increase in the amount of repetition work." (Walker and Marriott, 1951)

The traditional view appears to be that such monotonous, repetitive jobs lead almost inevitably to boredom and job dissatisfaction. Walker and Guest (1952) argue that in the automobile industry

> "... job satisfaction was related to variety." (p52)

As the number of operations that the worker had to perform decreased, so did his interest. Similarly, Tiffin and McCormick (1952) argue that

> "... boredom is associated with jobs that are repetitive or relatively simple." (p467)

Kaufman (1965) argues that

> "... jobs, whose tasks are repetitive ... lead to worker boredom."(p62).

The consequences of such boredom have been shown to be decreased production, absenteeism, and higher labour turnover (Wyatt et al 1929, 1937; Wild and Hill, 1969; Kishida, 1973).

At first sight it may appear that repetition and monotonous work may be a sufficient cause of boredom, but evidence suggests that this is not the case. Few studies have found that more than about one third of workers performing repetitive jobs report experiencing boredom. For example, in their study of workers in two car factories and a rolling mill, Wyatt and Marriott (1956) found that 31.3% of workers reported boredom. Similarly, Smith (1942), who studied workers involved in filament winding, soap wrapping, chocolate packing and tobacco weighing, found that an average 26% of workers experienced considerable boredom. She argues that

> "It must not be assumed that all workers find repetitive processes boring. One worker will stigmatise a process as boring and another will find it interesting ..." (p143)

As early as 1913, Munsterberg described a woman who packed lamps in tissue paper. She wrapped 13,000 lamps per day and had been doing so for 12 years. As Munsterberg (1913) reports

"She assured me that she found the work really interesting ..." (p196).

Many other industrial studies have indicated that there may be individual differences in people's susceptibility to boredom in repetitive work. As Wyatt et al (1929) argue, boredom is

"... related both to the nature and conditions of the work, and also to the mentality and temperament of the individual worker." (p39).

It has been proposed that several individual difference factors may affect a person's susceptibility to boredom. These include intelligence, emotional lability, extraversion and age.

Several authors have argued that a relationship exists between intelligence and boredom. Wyatt et al (1929) found that workers

"... of inferior intelligence appeared to like the repetitive process and seldom suffered from boredom ..." (p31),

whereas those of superior intelligence suffered more boredom because they

"... had more intelligence than was needed for simple forms of repetition work ..." (p30).

Similarly, Wyatt and Langdon (1937) found that

"... the amount of boredom experienced by operatives employed on repetition work increases with their degree of intelligence." (p20).

Similar results have also been found by Wyatt (9129), Wyatt et al (1934), Wyatt and Marriott (1956) and Smith (1942). However, Thompson (1929) found that intelligence by itself was unrelated to boredom, but combined with other factors, it operated as a suppression variable in a multiple regression predictor. A similar result was found by Hill (1974), and Turner and Miclette (1962) found that

"... intrinsic interest in the work itself did not necessarily correlate with a relatively low intellegence level." (p216)

This apparent disagreement between the findings of various studies may be explicable in terms of the range of intellegence to be found in the various samples. If the range of intelligence were restricted, which seems likely, then a weak relationship or indeed, no relationship at all might be expected.

Another individual difference factor that has been shown to be related to boredom is emotional lability. Thompson (1929) found that

> "The most important factor in predicting susceptibility to uniformity was emotional instability ..." (p195).

Smith (1942) found that the more 'nervous' a person was, the more boredom they experienced, and both Hill (1974) and Rosseel (1974) found neuroticism to be related to boredom: boredom was more prevalent among the emotionally labile.

It may be thought on theoretical grounds that extraverts experience more boredom with monotonous tasks than introverts. Hebb (1966) and Fiske and Maddi (1958) argue that boredom is associated with a decrease in arousal. Hill (1974) argues that, as Eysenck (1967) showed that extraverts are characterised by chronically lower levels of arousal in the ARAS, they need relatively more sensory stimulation to maintain an optimal arousal level. However, unless stimulation is varied, habituation will occur (Sharpless and Jasper, 1956). Consequently, levels of arousal should be lower, and boredom greater for extraverts performing repetitive tasks with little variation. Thompson (1929) found

> "... a very slight tendency for the extravert to be more susceptible than the introvert ..." (p187)

to boredom. Similarly, Smith (1942), Wyatt (1929) and Wyatt and Langdon (1937) have found extraverts to be more bored by factory repetition work than introverts. On the other hand Hill (1974) found no relationship between extraversion and boredom.

There would appear to be two possible explanations for the disagreement between these findings. The work of Hill (1975) suggests one possible explanation. He showed that extraverts built more variety into their performance on a repetitive task than did introverts and it may be the case that in certain tasks it is more possible for extraverts to build in variety than in other tasks. Consequently, one may expect a relationship between extraversion and boredom only in tasks which limit the amount of variety that the extravert can build into his performance.

Another possible explanation of the boredom/extraversion findings may be suggested by the work of Rosseel (1974). He found that in a solitary situation

extraversion explained most of the variance in boredom. Thackray et al (1974) found that increases in heart rate variability (HRV) were associated with boredom, and that these increases were more pronounced for extraverts than introverts. However, they also found that this increase in HRV was significantly related to the sociability NOT the impulsivity dimension of extraversion. Thus in the light of Rosseel's (1974) finding, it may be the case that extraverts will only experience more boredom in solitary situations. When they are able to communicate with others boredom may be alleviated and no extraversion/boredom relationship would be expected. Thus it may be that features of the work situation, whether it permits variety in performance or communication between employees (both of which are likely to increase non-specific arousal), determine whether or not extraverts will experience more boredom with repetitive work than introverts.

Lastly, several studies have shown that older workers may experience less boredom with repetitive work than younger workers (Hill, 1974; Wild and Hill, 1969; Wyatt and Marriott, 1956). Stagner (1975) also found that a greater proportion of older workers experienced satisfaction with their work than younger workers. Again there would appear to be two possible explanations for these findings. Firstly, it seems likely that people who find repetitive production-line jobs very boring would leave such employment, if the labour market permits. Stagner (1975) has shown that there are fewer older workers engaged in such jobs than younger workers, and it would seem likely that alternative employment could be found in the period in which these studies were conducted.

On the other hand, it may be the case that younger workers have higher job expectations as a result of longer more extensive education, and that this is responsible for their greater boredom. There is no direct evidence for this, but Cattell (1971) has shown that crystallised intelligence has increased during the period of these studies and the reason given for this is that education has become more sophisticated and widespread. Additionally, Porter (1969) has emphasised the importance of expectations in determining individuals responses to tasks.

It would thus appear that, as several individual difference factors have been shown to affect a person's susceptibility to boredom, repetitious work does not constitute a sufficient condition for the occurrence of boredom. In addition,

many studies have revealed both extrinsic and intrinsic sources of satisfaction in repetitive work. Several studies have shown that diversionary activities such as talking and day-dreaming, alleviate boredom (Wyatt et al, 1929, 1934; Wyatt and Langdon, 1937). As Rosseel (1974) pointed out, boredom occurs when a person is unable to involve himself in some alternative activity in the work situation. Kishida (1973) has found that work situations which offer less opportunity for such diversionary activities lead to more boredom being experienced by the workers. It would appear that constraint plays an important role in this context. When diversionary activities are not possible because the worker's attention is constrained to the task, boredom is more likely to occur. Several authors have emphasised the importance of constraint in the production of boredom, for example, Stagner (1975), Hebb (1955), Berlyne (1960).

Probably the most important extrinsic factor is money. Wyatt (1934) argues that the inducement to perform repetition work is

> "... dependent on external or derived incentives ..." (p49)

of which the most important is the weekly wage. He shows that a system of payment by results may make work less boring because it

> "... appeals to the desire for personal gain and provides an additional interest ..." (p49).

Wyatt (1934) goes on to argue that

> "... repetition work in itself is generally incapable of promoting interest ..." (p48).

However, several studies have shown that there are indeed intrinsic sources of satisfaction in repetitive work. Baldamus (1951) argued that it is possible to achieve some satisfaction in repetitive work as a result of the feeling of being 'pulled along' by the inertia inherent in a particular operation. He argues that this is a pleasant experience and may relieve tedium. Turner and Miclette (1962) also found that

> "Apparently it was possible to achieve considerable satisfaction from the job itself ... provided that distractions and difficulties did not interrupt the pleasing kind of "working mood" in which one was pulled along from one operation to the next by the minor challenge of the job itself ..." (p217).

This feeling of being 'pulled along' Baldamus (1951) called 'traction', and he identified several sorts of traction in a work situation. It appears that what he is emphasising is the relationship between conditions of work and the worker's motivation.

Turner and Miclette (1962) also found three other factors to be important sources of satisfaction in repetitive work: firstly, if the product was attractive and thought to be important by the workers, then they developed

> "... a sincere interest in the product and ... pride in its quality." (p217)

Similarly, Walker and Marriott (1951) found

> "... there was a desire for jobs to have a significance apart from ... providing a living ... their own work should be useful to the consumer and the country." (p188-9).

Wyatt and Marriott (1956) found that workers experienced

> "... satisfaction from the knowledge that they were contributing to the final product ..." (p28).

Secondly, Turner and Miclette (1962), point to pride in being

> "... able to do something which, it was believed, most other people would not be able to do." (p219)

as a source of satisfaction in monotonous work. This pride in skill was also found to be an important factor by Walker and Marriott (1951) and Wyatt and Marriott (1956), and related to this the idea of pride in achievement has also been identified as a source of satisfaction by Wernimont (1966) and Wyatt and Marriott (1956).

Lastly, Turner and Miclette (1962) argue that the

> "... feeling that she had put her personal touch into the job ..." (p221)

was a source of satisfaction. Similarly Wernimont (1966) argues that responsibility is also an important factor in determining satisfaction at work.

Several researchers have also found that the familiarity and simplicity of the work were themselves sources of satisfaction for some workers (Wyatt and Marriott 1956; Walker and Marriott, 1951). Some people said they were satisfied with their work, not bored by it, precisely because it was easy and

straightforward and carried no responsibility.

Taken together, these studies of intrinsic sources of satisfaction in repetitive work would seem strongly to indicate that it is NOT the simple repetitive work itself that produces boredom. Rather, what would seem to be important is how that work is perceived by the operatives. If a person sees his work as important and takes a pride in the skill it involves, then he is unlikely to experience boredom even if the work is repetitive. Further evidence on this point comes from the work of Blood and Hulin (1967) and Walker and Marriott (1951). Blood and Hulin (1967) argue that the

> "... worker assesses his present status by referring to the alternative positions which are available to him." (p289)

and if there are few alternatives in the worker's view, or if the alternatives are not particularly attractive, then the

> "... worker's present job will be seen as relatively more satisfying." (p289)

Similarly, Walker and Marriott (1951) argue that

> "Satisfaction with the operation was often partly dependent on comparisons with other workers and jobs and with previous experience." (p190).

Clearly, these kind of comparisons do not alter the actual nature of the job that the person is performing, but rather they alter his perceptions of it, and it would appear that it is this that determines his satisfaction/boredom.

If the perception of the job rather than the actual job itself is the important factor, then as perception is a process in which meaning is accorded to experiences, those who perceive a job as boring may not be able to attribute much meaning to it. Certainly this notion of the meaningfulness of work for the worker has been cited by several authors as an important factor in the production of boredom:

Boredom occurs in industrial work

> "... that is meaningless to the worker ..." (Brown, 1954, p207)
>
> "Simplification brought disadvantages along with its hoped-for advantages: it brought boredom, meaninglessness; it removed challenge and any sense of individual committment." (Sorcher, 1968), p21)
>
> "... an individual will prefer or desire a job to have large amounts of such characteristics as autonomy, variety, challenge and meaningfulness."

(Wanous, 1974, p621)

It would seem likely that a person will experience boredom when he perceives his work as relatively meaningless to him and factors such as a sense of achievement, pride, skill and importance of product would all seem to be features of the meaning of the work for the individual. Diversionary activities such as talking and day-dreaming, whilst increasing the variety, may also have a more important effect of increasing the meaning that a person is able to extract from the worksituation, as may his weekly wage.

Overall then, the industrial literature would appear to suggest that repetitive work itself does not inevitably lead to boredom. Rather, the experience of boredom would appear to be associated with individual difference characteristics and a plausible hypothesis seems to be that boredom results when a person is unable to extract appreciable meaning for himself from the work situation.

EDUCATIONAL INVESTIGATIONS OF BOREDOM

There appear to have been remarkably few investigations of educational boredom. This is surprising in view of the reported prevalence and consequences of boredom at school. The Newsom Report (1963) found that

> "Too many pupils appear to be bored and apathetic at school ... Too many at present sit through lessons with information and exhortation washing over them and leaving very little deposit." (p14).

Truancy and early leaving have both been cited as consequences of such boredom (Newsom, 1963; Crowther, 1959; Morton-Williams and Finch, 1968). As Robinson (1975) argues

> "... truancy is one intermittant way of avoiding boredom, while leaving school as soon as possible finalises escape." (p144).

Weber and Motz (1968) investigated how school was perceived by those who had 'dropped-out' of it. They found, by interviewing such drop-outs, that many regarded school as an indifferent and punitive establishment. They attributed their leaving to boredom which resulted from the monotony, and their lack of understanding, of the subjects taught in school. Typical comments include such things as

> "They taught the same thing over and over again ..." (p131)

and

> "They always just jump over the part you don't understand ..." (p131).

Other consequences of boredom that have been reported are disruptive behaviour (Robinson, 1975), and reduced effort at school (Robinson, 1975; Morton-Williams and Finch, 1968; Newsom, 1963). Despite this, there appear to have been only four studies which have been concerned with which children get bored and why.

Firstly, concerning why children get bored at school, Morton-Williams and Finch (1968) in their report on young school leavers, found that such people reported four major reasons for finding school subjects boring:

1) Lack of Understanding: approximately half of the 15 year old school leavers said of boring subjects that

> "... they did not understand the subjects, they were not explained enough and they were not good at them." (p65)

2) Repetitiveness: again, half of the interviewees said that they were

> "... bored by the monotony and repetitiveness of subjects. They felt

that they were doing the same thing all the time ..." (p66)

It should be noted here that no evidence was presented as to whether the subjects were actually repetitive, therefore these reports of monotony are essentially of perceived or subjective monotony.

3) Passivity: many of the ex-pupils said that they were bored by subjects in whose lessons they were not able to take an active part.

4) Perceived Uselessness: this study revealed that

" 'Usefulness' is a significant factor in determining a pupil's response to a subject and it would seem that 'interest' is often a logical extension of 'usefulness'. (p245).

In particular subjects were perceived as boring when they were thought to be of no relevance to the jobs that the pupils hoped to get. It is interesting to note that it was found that once pupils were convinced of the importance or usefulness of mastering a subject they would

"... tolerate and even welcome repetition." (p66)

This would suggest that monotony does not necessarily imply that a pupil will be bored at school. This idea of 'perceived usefulness' would appear to be closely allied to that of the perceived importance of a product that has been found to be important in determining satisfaction/boredom in an industrial setting (see page 8).

Robinson (1975) conducted a re-analysis of the data in the Morton-Williams and Finch (1968) survey, in order to try to specify some possible antecedents and consequences of boredom. He found that the most important antecedents of boredom were the experienced regularity, and perceived uselessness, of the subjects taught. The immediate consequences of boredom he found to be diversionary activities, such as withdrawal into self or aggression. It should be noted that diversionary activities have also been found to be an important consequence of boredom in industry (see page 7), where it was suggested they might alleviate boredom by increasing the meaning that a person was able to extract from his work situation (see page 10). It would seem possible that such diversionary activities may perform a similar function in the school situation. Alternatively, aggression may be a response to frustration which, it has been argued, accompanies boredom, and indeed may be an integral part of the experience of boredom.

Another consequence of boredom identified by Robinson (1975) was reduced

effort in learning, sometimes manifesting itself as truancy. The industrial parallel of this would appear to be the decreased output and absenteeism that have been suggested as consequences of industrial boredom (see page 3). Robinson (1975) concluded that

> "We can prevent boredom by showing pupils that what is being taught is valuable and useful - and by changing the structure and content if it is not." (p151).

What Robinson appears to be suggesting is that boredom may be alleviated by changing the pupils' cognitive appraisal of their school subjects. Again it may be the case that industrial absenteeism and educational truancy are examples of 'leaving the field' prompted by frustration accompanying boredom.

Turning to the question of the characteristics of those pupils who experience boredom, Fogelman (1976) found relationships between leisure activities, ability and attainment, social class, and the frequency of reported boredom in 11 year old children. He found that children who reported themselves as 'often bored' showed a

> "... less varied pattern of leisure activities ... and less use of what play facilities are available." (p210)

than other children.

Using the Registrar General's Classification of social class, Fogelman (1976) found a higher incidence of children reporting themselves as 'often bored' in lower social classes. However, of particular interest in this study was the relationship found between ability, attainment and boredom. Both verbal and non-verbal measures of ability and attainment were used together with results from comprehension and arithmetic tests. The children who said that they were 'often bored' obtained the lowest mean scores on all these tests. If, as seems likely, these children are less likely to understand their school subjects, this result is compatible with the findings of Morton-Williams and Finch (1968), who found that lack of understanding was an important factor in boredom. However, particularly in the case of the attainment findings, the direction of causality may have been opposite to that suggested by this: rather than lack of attainment and ability leading to boredom, children may have failed to achieve high levels of attainment precisely because they were bored.

If, however, it is the case that the less able, less successful pupils were bored because they failed to understand their subjects, then one may expect that those children who scored most highly on these tests should experience least boredom. But, this was not the case. Fogelman (1976) found that such children described themselves as 'sometimes bored'. Those who experienced least boredom showed intermediate test scores. This seems likely to have occured because, for the more able children, much of what is taught may be easily understood, and hence some of the lesson time may seem repetitive and unnecessary, and consequently, boring. The children who experienced least boredom seem to be those for whom school work is most challenging. This idea is takenup in the work of Gjesme (1977)

Gjesme (1977) carried out a study relating boredom and satisfaction at school to achievement motivation and ability. He hypothesised that school subjects would be most challenging for moderate ability boys (MAB) and high ability girls (HAG). He proposes this discrepancy between boys and girls because girls generally perceive themselves to have a lower ability to succeeed than boys. Because their school subjects offer a challenge MAB and HAG will have their motives, especially their achievement motives, most highly aroused. If, for such boys and girls, their achievement motivation - their motivation to succeed - generally outweighs their fear of failure, then they will experience greatest satisfaction at school. Conversley, Gjesme (1977) argues, that for HAG and MAB whose fear of failure greatly outweighs their achievement motivation, boredom will be experienced. Such children perceive themselves as having only a moderate ability to avoid the failure that they so strongly need to avoid. Consequently, the classroom situation would be extremely threatening to them and they are likely to experience frustration.

The results that Gjesme (1977) presents largely support this hypothesis. It appears that satisfaction is principally associated with a moderate expectation of success combined with a strong motivation to succeed. Conversley, boredom is associated with a moderate expectation of success coupled with a strong need to avoid failure. Thus it would seem reasonable to conclude that the ability to cope cognitively with the task interacts with motivation to determine the affective impact school will have on the individual. Consequently, Gjesme (1977) implicates a new variable in the development of boredom - that of motivation.

Thus from the literature on educational boredom, it seems that understanding and perceived usefulness of school subjects are major factors in determining whether or not boredom will be experienced (Morton-Williams and Finch, 1968; Robinson, 1975). These two factors would appear to carry connotations for what the work means to the child. Thus it may be proposed that boredom with school subjects, as was proposed with boredom at work, results from the child perceiving his subjects as relatively meaningless to him. The meaning that a task holds for a person seems likely to be related to his underlying motives, in particular, possibly his achievement motivation (Gjesme, 1977).

This proposed relationship between boredom and meaning/motivation may gain support from the finding of a relationship between social class and boredom (Fogelman, 1976) and the finding of Robinson (1975) of a relationship between parental attitude and boredom. Children whose parents showed little interest in their education said they were bored with a substantial proportion of their school subjects. Such parental attitudes would seem likely to affect a child's motivation to succeed in school and his perception of the meaningfulness or relevance of his subjects for him. It is hypothesised that it is this perception of the meaning or relevance of school subjects that is the important factor in determining whether or not a person will be bored at school.

EXPERIMENTAL INVESTIGATIONS OF BOREDOM

Much of the experimental research into boredom has originated from the two major theories concerning the nature and origins of boredom put forward by Hebb (1955, 1966) and Berlyne (1960, 1967). Both argue that the antecedent condition for boredom is monotony. Hebb (1966) argues that

> "... a varied environment is fundamental ..." (p252)

and without it, when stimulation is relatively unvarying, boredom occurs, and mental function deteriorates. Similarly Berlyne (1960) argues that boredom results when

> "... external stimuli are excessively scarce or excessively monotonous." (p187)

In both of these conditions arousal potential will be exceptionally low as

> "... monotony means lack of novelty, surprisingness, uncertainty and complexity." (p187)

Berlyne (1960) argues that, in information theory terms, both lack of novelty and surprisingness will lead to a low influx of information

> "... in the one case because signals are lacking and in the other case because signals are highly predictable." (p187)

Thus Berlyne characterises monotony in terms of the 'collative variables' (novelty, uncertainty etc.) which all depend on

> "... the collation, or comparison of information from different sources." (Berlyne, 1963, p290)

Consequently, both Hebb and Berlyne see the antecedent of boredom as monotony, and by this they clearly mean the physical monotony of the stimulation. Berlyne (1960) in his use of information theory considers only measures of the sensory variety of a signal, not any conception of the meaning of that signal for the perceiver. However, whilst agreeing on the antecedent conditions Berlyne (1960) and Hebb (1966), at first glance, appear to disagree on the effect that these conditions have.

Hebb (1955) argues that any sensory event has two functions: a cue function and an arousal function. Without the foundation of arousal, the cue function cannot exist. He argues that there is an optimal level of arousal for effective behaviour and that when arousal is too low or too high this is aversive to the individual and performance will be impaired. Later, Hebb (1966) argues that boredom is

associated with a decrease in cortical arousal.

> "Boredom is a state in which the subject seeks a higher level of excitement..." (p250)

Thus the negative effects of boredom, both in terms of performance and hedonic tone are attributed to a low level of cortical arousal. This state has drive properties: people try to upgrade their level of arousal. They will do

> "... anything to break the monotony." (p252)

If they are successful in doing this, then cortical arousal will be increased and boredom will be alleviated. However, as, for example, Geiwitz (1966) has shown, constraint may be a very important factor in the development of boredom. That is, if the person is unable because of constraints to break the monotony, then his cortical arousal, according to Hebb (1966) remains low.

In support of his position, Hebb (1966) cites the sensory deprivation studies summarised by Heron (1957). These studies found that a decline in performance on a variety of tests, hallucinations and an increase in slow EEG waves, resulted from isolation in monotonous environment. Heron (1957) argues that these results support the view that

> "... sensory stimuli have the general function of maintaining ... arousal, and they rapidly lose their power to do so if they are restricted to the monotonously repeated stimulation of an unchanging environment." (p56)

This position is also supported by the animal studies of Sharpless and Jasper (1956) who found a habituation of the arousal response in a sleeping cat in response to unvaried stimulation.

In apparent contrast to Hebb's position, Berlyne (1960) argues that, whilst there is an optimum level of arousal for effective behaviour,

> "... boredom works through a rise in arousal." (p189)

He argues that inhibitory impulses from the cortex serve to reduce arousal but the inactivation of the cortex that results from monotonous stimulation release the reticular activating system (RAS) from this restraint and

> "... allows arousal to flare up again." (p189)

Thus Berlyne (1960) attributes the negative effects associated with boredom to high autonomic arousal. He argues that bored people show

> "... restlessness, agitation and emotional upset ..." (p189)

and that these coincide with high arousal rather than the low arousal that Hebb (1966) hypothesised. Berlyne, too, emphasised the importance of constraint in boredom:

> "When attempts to escape from the sit uation are thwarted by social pressure or other obstacles, conflict and frustration can be expected to push arousal still higher." (Berlyne, 1960, p191)

Whereas Hebb would argue that constraint prevents an increase in arousal, Berlyne sees it as pushing arousal still higher, though Berlyne is of course referring to autonomic rather than cortical arousal.

With respect to the sensory deprivation studies summarised by Heron (1957), Berlyne points out that Heron reports that although subjects went to sleep fairly soon

> "... after waking they showed increasing signs of restlessness."

and that

> "... the subjects became markedly irritable as time went on ..." (Heron 1957, p54)

Berlyne (1960) argued that the situation only became aversive when

> "... internal factors cause a rise in arousal and the lack of stimulation renders the cortex incapable of keeping arousal within bounds." (p190)

These two hypotheses, that of Hebb and that of Berlyne, at first sight appear incompatible - one arguing that boredom is associated with an increase, the other a decrease, in arousal. However, as Berlyne (1967) argues:

> "... I would still contend that the discomfort of boredom is more likely to come from inordinately high arousal than from inordinately low arousal ... When external stimulation is lacking or monotonous, it seems that cortical arousal sinks to a low level, as shown by the predominance of slow EEG waves, while brain stem mechanisms are released from restraint as shown by a rise in autonomic and muscular indexes of arousal." (p30)

Thus Berlyne (1967) is arguing that monotonous stimulation leads to decreased cortical arousal, as Hebb (1966) argued, and increased autonomic arousal, and that these physiological states characterise boredom. Thus the disagreement between Hebb and Berlyne appears to centre upon which of these produces the aversiveness of boredom. That is, whether it is the decrease in cortical arousal

that is aversive, or the increase in autonomic arousal.

The work of Hebb (1955, 1966) and Berlyne (1960, 1967) has lead to a considerable amount of research into the psychophysiological accompaniments of boredom. However, it may still be questioned whether or not physical monotony is a necessary and sufficient condition for the occurrence of boredom. It is with these two areas that the next two sections of this review are concerned.

THE PSYCHOPHYSIOLOGICAL ACCOMPANIMENTS OF BOREDOM

Both Hebb (1955, 1966) and Berlyne (1960, 1967) have stressed the importance of physically monotonous stimulation as the antecedent of boredom. If one accepts this then it is reasonable to look to experiments involving such monotonous stimulation for evidence of psychophysiological changes that may accompany boredom. Such experiments may be found in the extensive work on vigilance tasks summarised by Mackworth (1969).

Vigilance tasks are intended to simulate the type of watch-keeping carried out by, for example, radar operators. All such tasks require a subject to detect 'signals', which are slight changes in a series of background events. It has been found that during such tasks a decrement in performance occurs, and that this decrement is related to time spent on the task.

During vigilance tasks several investigators have found that basal skin conductance (SC) decreases (Andreassi, 1966; Davies and Krkovic, 1965; Stern, 1966). Levels of SC are taken to be indicators of the level of autonomic arousal (Duffy, 1962) and are lowest during sleep. These decreases in SC during vigilance tasks may be taken to indicate decreases in autonomic arousal, which, if such tasks produce boredom, would not seem to support Berlyne's (1960, 1967) view that autonomic arousal increases with boredom. However, Stern (1966) found that vigilance tasks in which the subject was receiving frequent signals, were associated with a lower level of arousal (as indicated by decreases in SC) than tasks in which signals were infrequent. This finding would seem to lend some support to Berlyne's hypothesis if the subjects receiving infrequent signals were more bored than those receiving frequent ones. However, there was nothing in this study to indicate whether or not this was the case.

This is the major problem with using the findings from such vigilance studies as evidence of the relationship between boredom and arousal. Boredom has rarely, if ever, been invoked as an intervening variable, and no evidence can be found in such studies as to whether or not the subjects were bored. In addition, researchers have generally not compared arousal levels whilst subjects were performing monotonous vigilance tasks with those in comparable non-monotonous tasks. Consequently, it is not clear, firstly, whether the decreases in arousal

co-vary with the experience of boredom, or secondly, whether arousal would have declined less had the subjects been performing a non-monotonous task.

London, Schubert and Washburn (1972) argued that citing sensory deprivation and vigilance studies as evidence of the relationship between boredom and arousal is unsatisfactory. As far as the sensory deprivation studies are concerned, they argue that

> "... the subjective state induced by sensory deprivation is too unpleasant to be rated as ordinary boredom." (p29)

With respect to the vigilance studies they point out the absence of information as to whether subjects were bored or not. In an attempt to assess the relationship between boredom and autonomic arousal, they carried out two experiments.

In their first experiment, London et al (1972) used galvanic skin potential (GSP) as an index of arousal, which was measured whilst subjects performed either a vigilance task (which they rated as boring) or a story writing task (which they rated as interesting). They found a decrease in GSP for both groups, but a signigicantly greater decrease for the interested group. The authors argue that

> "These findings suggest that boredom increases autonomic arousal." (p31)

However, it would be more accurate to say that boredom produces a relatively smaller decrease in autonomic arousal.

In a second experiment reported in the same paper, London et al (1972) compared each subject's performance on two tasks: a task rated as boring (writing the letters cd repeatedly) and a story writing task rated as interesting, using a split-half design. Each task lasted 30 minutes. This time they used skin conductance (SC) and heart rate (HR) as indices of arousal.

They found no significant differences in SC between the two tasks, but the HR findings tended to support Berlyne's (1960, 1967) contention that boredom is associated with an increase in autonomic arousal. Although HR was found to decrease significantly from the first to the second task (irrespective of whether the boring or the interesting task was performed first), the mean HR of subjects performing the boring task was significantly higher than that of subjects performing the interesting task for the first 30 minutes.

The authors conclude from this that the boring task produced greater autonomic arousal. They argue that, because of the redundancy of monotonous stimulation, there is a low flow of information, and that in order to continue focusing on the task, the subjects required 'focusing energy' which manifested itself as autonomic arousal. However, this explanation of the HR findings seems questionable in the light of the work of Lacey and Lacey (1963, 1974). They performed a series of experiments which showed that HR decreases when a person directs his attention outwards, and increases when he directs his attention inwards. If London et al's (1972) subjects were trying to continue focusing on the task, then presumably they were directing their attention outwards towards the task. Thus on the basis of Lacey and Lacey's (1963, 1974) findings, their HR should have decreased rather than increased.

In a further attempt to investigate the relationship between boredom and arousal, Bailey et al (1976) carried out an experiment using tasks varying in visual complexity. One group of subjects performed a simple vigilance task whilst another group performed a high visual complexity task involving reading and answering questions about magazine advertisements. In both cases, the tasks lasted for two hours and were perceived as boring by the subjects. They found that, from the first to the second hour, there was a significant decrease in SC, HR, and systolic blood pressure, and a significant increase in heart rate variability (HRV) and bodily movement. It should be noted that these SC results differ from those of London et al (1972), as do the HR results, which are, however, consistent with the findings of Lacey and Lacey (1963, 1974).

Taking the results of both the experiments of London et al (1972) and Bailey et al (1976), it would seem fair to argue that they fail to provide conclusive evidence of a relationship between boredom and arousal. Indeed, it may be the case that the arousal findings are task, rather than boredom, dependent.

Of particular interest in Bailey et al's (1976) results is the finding that HRV increased. Thackray et al (1975) also found this. The task that they used was a simulated air traffic control one, and they compared subjects who rated themselves as very bored with the task, with those who rated themselves low on boredom. It was found that the high boredom group showed increases in strain, HRV and response times over the hour long task, and a decrease in attentiveness. On the other hand

the low boredom group showed a decrease in HRV and response times.

There would appear to be evidence available to support the suggestion by Thackray et at (1974) that HRV may be a

"... sensitive physiological index of attention." (p351)

Kagan and Rosman (1964) in a study of 55 6-7 year old children, found significant differences in both HR and HRV between periods of rest and periods of attention. During periods when children were attending to a task both HR and HRV decreased from their resting levels. Ettema and Zeilhuis (1971) found that HRV increased with a reduction in the mental load or attentional requirements of the task. Similarly, Thackray et al (1974) found that, in a 40 minute long serial reaction task, HRV increased and showed a significant relationship with performance decrement. However, unlike Kagan and Rosman (1964), they found that HR showed only a slight, non-signigicant decrease.

In view of these results, and their own findings of an increase in HRV with boredom Thackray et al (1975) speculate that boredom may be more closely related to attentional processes than to arousal. However, it may again be the case that HRV is task, rather than boredom dependent. Evidence in support of this speculation comes from the work of Karlsbeek and Ettema (1963) who found that when subjects performed a simple binary choice reaction task, the variations in their heart rate were gradually suppressed as the task difficulty was increased. They proposed from this that HRV could possibly be used for measuring mental load. A further study was carried out by Ettema and Zielhuis (1971). They again used a simple binary choice task to induce mental load: subjects were required to press two different foot pedals in response to high or low tones. The number of signals per minute was varied between 20 and 50. They found that HR, blood pressure and breathing rate increased with the increases in mental load and that HRV decreased. Other experimenters have also found a decrease in HRV with increased mental load (Rohment et al, 1973; Mulder et al, 1973). Lacey and Lacey (1974), whilst looking at the effects of different tasks on HR, asked subjects to rate various tasks as either easy, moderate or difficult. They found that HRV decreased more for the task perceived as difficult.

In the light of this evidence it may be argued that the findings of a

relationship between HRV and boredom could be an artifact of the type of tasks used to produce the boredom. It would seem possible to argue that both of the tasks used by Bailey et al (1976) — the simple vigilance task requiring subjects to respond to infrequent signals and the task involving magazine advertisements in which the subjects were required to answer questions — were imposing a low mental load.

With respect to the study of Thackray et al(1975), it may be the case that the subjects rating themselves as low on boredom found the task more difficult than those rating themselves as high in boredom. If this were the case then the task may have been inducing a highermental load on the low boredom group. There is unfortunately, no direct evidence available to support this speculation as no evidence was offered by Thackray et al (1975) on the perceived difficulty of the task. However, it cannot be argued that the low and high boredom groups perceived the task as they did because the high boredom group was more susceptible to boredom. There were no differences between the groups on Zuckerman's Boredom Susceptability Scale. Hence it may be possible to explain these HRV findings in terms of mental load rather than boredom, and it would seem unwise to take HRV increases as a criterion measure of boredom. Indeed it may be hypothesised that if boredom is produced by a task involving high mental load, then HRV would decrease, rather than increase with boredom.

Thus it may be the case that changes in indices of attention and arousal that it has been suggested accompany boredom may be a function of the type of task used to produce that boredom. It has usually been assumed that physically monotonous stimulation is a necessary and sufficient condition for the occurence of boredom. However, there would appear to be grounds for questioning this assumption which will be discussed in the next part of this literature review. If physically monotonous stimulation is not a necessary and sufficient condition for the occurence of boredom, then it may be the case that the changes in attention and arousal indices that have been found are a function of physically monotonous stimulation and not boredom. In particular, the mental load imposed by the task may be an important factor to consider.

THE ANTECEDENT CONDITIONS OF BOREDOM

Both Hebb (1966) and Berlyne (1960, 1967) have argued that the antecedent of boredom is monotony, that is the physical monotony of the stimulation. Indeed the suggestion that physical monotony is a necessary and sufficient condition for the occurrence of boredom has been taken as an 'article of faith' by most researchers (for example, London et al, 1972; Bailey et al, 1976; Thackray et al 1974, 1975). It has been assumed that physical monotony leads to boredom, therefore boredom has been produced by presenting physically monotonous stimulation. Rarely, if ever, has the relationship between physical monotony and boredom been seriously questioned. However, there would appear to be grounds for challenging this view. It would seem to be questionable whether low intensity, relatively unvarying stimulation constitutes either a necessary or a sufficient condition for the occurrence of boredom.

Firstly, is sensory monotony a sufficient condition for boredom to occur? The answer would appear to be no, as several studies in the industrial field have revealed a number of individual difference factors that affect a person's susceptability to boredom. For example, age has been found to be one such factor. It has been found that boredom is reported more frequently amongst younger workers engaged in monotonous work than amongst older workers (Smith, 1955; Hill, 1975; Stagner, 1975). Monotonous work has also been found to lead to boredom more frequently in the case of those people who are emotionally labile (Hill, 1975; Rosseel, 1975), those who are dissatisfied with their domestic and personal lives (Smith, 1955), and possibly in those who are more intelligent (see pages 4 - 6).

In addition it may be argued that there are grounds for supposing that extraverts should become more bored with monotonous tasks than introverts (see page 5). However, several studies have failed to find any such relationship (Thackray et al, 1974, 1975; Hill 1975). This null finding, together with the other individual difference findings suggest that physical monotony does not constitute a sufficient cause of boredom.

The next question to be asked is does physical monotony constitute a necessary condition for the occurrence of boredom? Anecdotal evidence would suggest that the answer to this question is no: it is possible to get bored at a lively

party or in a lecture when there is a considerable amount of varied stimulation. There is not a great deal of experimental evidence on this point, however, there is some that would suggest that indeed physical monotony is not a necessary condition for the occurrence of boredom.

In the experiment carried out by Bailey et al (1976) two tasks were used: a low visual complexity vigilance task and a high visual complexity task involving reading magazine advertisements and answering questions on them. The latter task would not appear to be physically monotonous (in Berlyne's (1960) 'collative' variable terms) and indeed it seemed clear that the authors expected it to be more interesting than the former. However, there were no differences between the two tasks in terms of the subjects' ratings of them. Both tasks were rated as boring.

Landon and Suedfeld (1969) studied information and meaningfulness needs during sensory deprivation. They allowed groups of subjects access to either English proberbs (P), proverbs with randomised word orders (W) or proverbs with word and letter order randomised (L), during a sensory deprivation experiment. In Berlyne's (1960) information theory terms L contained a greater degree of uncertainty than either W or P. Stimulus uncertainty increases the level of arousal (Berlyne, 1960), and consequently it would be predicted that this should provide the lowest boredom ratings if physical monotony causes boredom. However, subjects reported being significantly less bored in condition W than in the other two conditions. It is interesting here to note the authors' explanation of this finding. They argue that this condition produced least boredom because it was

> "... the most capable of being cognitively manipulated for a meaningful outcome." (p248)

Thus they introduce the notion of the meaning of a stimulus, or rather the lack of it, as a determinant of boredom.

This notion of 'meaningfulness' may also explain the results obtained by Locke and Bryan (1967) which again are not wholly consistent with the idea that physical monotony is a necessary condition for the occurrence of boredom. They conducted a series of experiments in order to determine the relationship of performance goals to level of performance and degree of interest or boredom in a variety of tasks (eg simple addition, perceptual speed and psychomotor co-ordination

tasks). In each task some subjects were given specific goals to achieve, whilst others were simply told to 'do their best'. They found that, with all the tasks, subjects with specific performance goals exhibited

> "... enhanced interest in the task as compared with no specific goals." (p 129)

Subjects with no specific goals found the tasks boring. They argue that

> "... setting specific goals can function as an antidote to boredom." (p129)

As it can be seen in these experiments, the physical monotony/variety of the stimulation was the same for both groups of subjects. This being the case, if physical monotony were a necessary condition for the occurance of boredom, both groups should have got bored (or remained interested). However, this was not the case, boredom was alleviated by changing the subject's perception of the task - by providing him with a specific goal to achieve. It would seem reasonable to argue that the effect of introducing a performance goal increased the meaningfulness of the task for the subject. Whether or not this was the case these experiments seem to suggest that physically monotonous stimulation is neither a necessary, nor indeed a sufficient condition for the occurrence of boredom. In addition they would suggest that the meaningfulness of stimulation is an important determinant of boredom.

This notion of a relationship between the meaningfulness of stimulation and boredom has been taken up in both the educational and industrial fields (see pages 9 & 15) and by other theorists. Existentialists, for example, seem to view boredom in these terms (for example, O'Conner, 1967). As Sirois (1974) argues, boredom is

> "... existence vide de sens ..." (p61)

Other theorists, within the mainstream of psychology, have also pointed to meaningfulness as a possible determinant of boredom. Fiske and Maddi (1961) argue that boredom is associated with a low level of activation in the central nervous system. This level of activation, they argue, is determined by the 'impact' of the stimulation, and this impact is

> "... determined by the variation, intensity and meaningfulness of stimulation ..." (p30).

The first two of these are essentially sensory aspects of the stimulation as discussed

by Hebb (1966) and Berlyne (1960, 1967). However, the third, meaningfulness, is rather different - it is clearly cognitive in nature. But as Kelly (1955) has pointed out, the meaning of a stimulus lies not in the stimulus itself, but in the perceiver. People extract meaning from their experience of stimulation.

Thus, on the basis of Fiske and Maddi's (1961) hypothesis, it would seem possible to argue that, for any level of intensity and variety of stimulation, boredom would be more likely to occur if the individual is relatively unable to extract meaning or relevance for himself from that stimulation.

If the inability to extract appreciable meaning from stimulation is taken to be the important determinant of boredom, this would explain the lecture/party phenomenon mentioned earlier. It could equally be argued that people became bored by Bailey et al's (1976) high visual complexity task, and indeed the low visual complexity task, because they perceived the task as meaningless or irrelevant to them. Similarly, it may be argued that the subjects of London et al (1972) and Thackray et al (1974, 1975) were unable to extract appreciable meaning from the monotonous tasks with which they were presented. Thus it is possible that it was lack of meaning, rather than the physical monotony per se, that was the cause of their boredom.

It may be further hypothesised that an individual who is unable to extract appreciable meaning from stimulation is in a state of low cognitive arousal. Physiological arousal may be high or low depending on other parameters of the stimulus, (for example, intensity and variety). It could be that as a result of this low level of cognitive arousal the person has created for himself subjective monotony, that is a feeling of sameness. Physical monotony may be high or low, but the person has ceased to perceive the physical variety that may be present in the stimulation as a result of its meaninglessness to him.

Geiwitz (1966) provides some evidence that low cognitive arousal may be associated with states of boredom. He manipulated four variables by hypnotic suggestion. These variables were arousal, subjective repetitiveness, constraint, and feelings of unpleasantness. When dealing with arousal he excluded

"... any sensorimotor emphasis ..."

and stressed

"... the purely cognitive aspects." (p593)

In addition his variable of repetition was essentially concerned with feelings of sameness, subjective repetition. Consequently, this experiment was dealing with cognitive, not physiological arousal, and subjective, not sensory repetition. He found that all four variables were involved in producing boredom, but that cognitive arousal and constraint were the most important.

It would appear, therefore, that there are considerable grounds for supposing that physical monotony is neither a necessary, nor a sufficient condition for the occurrence of boredom. Rather, it would seem likely that the perceived meaning of the stimulus is the important variable to consider. A consideration of the possible role of meaning may involve monotony as a cause of boredom, but subjective rather than physical monotony. In particular subjective monotony resulting from a person's inability to extract appreciable meaning from stimulation.

FRUSTRATION AND BOREDOM

Several authors have noted that boredom may be associated with irritation and restlessness. Heron (1957), in his review of sensory deprivation studies, reported that

> "... the subjects became markedly irritable as time went on and often expressed their irritation ... they showed increasing signs of restlessness." (p54).

Berlyne (1960) argues that the bored person will show

> "... restlessness, agitation and emotional upset ..." (p187).

These, he argues, are characteristics of a person in the state of high autonomic arousal which in his view is associated with boredom. The Freudian theorists, Weinburger and Muller (1974) argue that

> "... boredom is characterised by simultaneous feelings of emptiness and tension ..." (p585).

It seems probable that such irritation and restlessness results from frustration. Indeed several researchers have stressed the association between frustration and boredom. Zweig (1953), for example, in his study of industrial "monotony", argued that there were three dimensions of monotony: a lack of interest and attention, contempt for the job and a dislike from the job and a sense of frustration. Other authors have also related boredom and frustration, for example, Barmack (1937), Stagner (1975), Baldamus (1951).

There would, however, appear to be little formal evidence as to whether o r not boredom is associated with frustration. London, Schubert and Washburn (1972) asked their subjects to rate the degree of frustration that they felt whilst performing a boring or an interesting task. From these ratings, they found no significant differences between the tasks in terms of the degree of frustration they produced. However, it would seem reasonable to argue that this use of a single scale rating is not a wholly satisfactory method of assessing the degree of frustration that a person experiences whilst performing a task. It would seem more useful to explore the frustration/satisfaction of motives relevant to the task being performed. Such an approach is indicated on the basis of Gjesme's work in the educational field, in which he found that the satisfaction/frustration of the achievement need was important in the production of boredom for certain ability groups. Outside the

educational field it seems likely that there are other underlying motives whose frustration/satisfaction may be associated with boredom.

Further evidence of the relationship between boredom and frustration may be implied by work on constraint and boredom. Both Hebb (1966) and Berlyne (1960) emphasise the importance of constraint in the production of boredom. The former argues that constraint prevents the subject performing activities that will increase his level of cortical arousal and hence alleviate boredom. The latter argues that when attempts to leave the situation are thwarted, autonomic arousal can be expected to increase still further as a result of the conflict and frustration produced. Geiwitz (1966) has shown that constraint is one of the two most important determinants of boredom (the other being 'cognitive' arousal).

It may be assumed that if a person is not constrained to continue performing a task which does not interest him, then he will cease to perform that task and, when he leaves the field, boredom will not be experienced. There is certainly evidence that withdrawal from the field does occur to some extent. In the industrial field high labour turnover and absenteeism have been shown to be consequences of boredom (Wyatt et al, 1929, 1937; Wild and Hill, 1969; Kishida, 1973). Similarly, in education, boredom may result in early leaving and truancy (Newsom, 1963; Crowther, 1959; Morton-Williams and Finch, 1968; Robinson, 1975). If, however, the person is constrained to continue with the task, then presumably he is being made to do something that he does not want to do, and hence he will experience frustration.

In view of this evidence, it would seem possible, if not likely, that boredom will be associated with frustration, in particular the frustration of needs relevant to the task being performed.

INDICES OF BOREDOM

One of the problems facing research into boredom is how boredom might be measured; what indices can be used to assess whether or not a person is bored. Several such indices have been proposed, though, none would appear to be wholly satisfactory.

It might appear to follow from the work of Hebb (1966) and Berlyne (1960, 1967) that various physiological measures of arousal could be used as indices of boredom. These might include skin conductance, galvanic skin potential and heart rate. However, as has been argued earlier (p22) there is remarkably little consistency in the findings of the studies employing such measures, and it appears that they may be stimulus rather than boredom dependent. In addition it would seem likely that there are mental states other than boredom that produce similar changes in these arousal measures.

Another physiological measure that has been proposed as an index of boredom is heart rate variability (HRV) (Thackray et al, 1974, 1975). From the studies that have been carried out, it appears that HRV increases when a task is boring for a person. However, as has been argued previously (pp 22 - 24), the mental load imposed by the task may be a more important determinant of HRV than boredom. Consequently, it may again be the case that HRV is task, not boredom, dependent. In view of the problems that may be associated with these physiological measures it would seem unwise to use them as indices of boredom.

Several investigations of industrial boredom have suggested that the experience of boredom may be accompanied by changes in rate of output (for example, Wyatt et al 1929, 1937). Such studies have argued that boredom is accompanied by a depression in the curve of output, and have suggested that such changes in the rate of output may be used as an index of the worker's boredom. However, as Smith (1952) points out, these studies assessed the experience of boredom by asking questions, many of which inquired about the slowing of work and boredom at particular times of the day. Consequently she asserts that it is not surprising that such investigators found

> "... fairly good agreement between boredom and shape of output curves." (p70).

In her own study, Smith (1952), eliminated such questions in assessing experienced boredom and found that

"... the production curve criteria proved not only unreliable ... but invalid as well." (p73).

It was found that boredom was not necessarily accompanied by a depression in the curve of output, nor was a sag necessarily accompanied by feelings of boredom. She argues that whilst workers do tend to slow down when they are bored, many other factors can affect output, and consequently work curves are not a useful index of boredom.

Another finding from the industrial literature is that

"... the bored individual ... is inclined to overestimate the duration of time." (Wyatt, 1929, p169).

As Geiwitz (1964) has argued

"A common introspective experience is the apparently slow passage of time associated with boredom." (p277)

There are problems with investigating the relationship between subjective time experience and boredom, as it is difficult to manipulate degrees of boredom. Geiwitz (1964) got round this problem by using post-hypnotic cues in order to trigger four degrees of boredom in a person in a waking state. His results were remarkably consistent and showed that indeed the degree of boredom was related to subjective time:

"... the higher the boredom, the longer the subjective duration." (p277).

Similarly, London and Monello (1974) tested the effects of cognitions about time passages on feelings of boredom. Subjects were led, by the use of a rigged clock, to believe that a task lasting 20 minutes actually lasted 10 or 30 minutes. They predicted that subjects in the '10 minutes' condition would become more bored because from their point of view time would pass more slowly than it would for those in the '30 minutes' condition. This prediction was confirmed by subjects' ratings of their degree of boredom on a post-experimental questionaire.

As a result of such studies it has been proposed that subjective time estimates may be used as an index of boredom. Indeed, London et al (1972) used such time estimates as one of the indices of boredom in their experiments.

However, again, there may be problems with using subjective time passage estimates as an index of boredom. Kerr and Keil (1963) argued that a person judges the amount of time that has passed on the basis of how many occasions within the period 'significant psychological events' have occured:

> "... when a subject's perceptual time is interrupted by attention demanding events, such time will be judged as greater if the equivalent time is not so interrupted." (Kerr and Keil, 1963, p7).

Thus they hypothesise that, as repetitive work has few 'significant psychological markers' it will pass faster not slower as has been argued. In a factory experiment they found that time drag was greater in varied than in monotonous jobs and that subjects reports of boredom/interest were unrelated to time drag. Thus again, it would appear that a person's estimate of time passage, may depend not upon whether he is bored, but on the task which he is performing.

It would thus appear that none of these proposed indices of boredom are particularly useful. The proposed indices are all based on features which are supposed to accompany boredom (for example, decreased performance and over-estimation of time duration). However, most of the studies using such indices assume that boredom results from physically monotonous stimulation. It was argued earlier that there are grounds for supposing that physically monotonous stimulation is neither a necessary, nor a sufficient, condition for the occurrence of boredom. If this is the case then changes in these indices of boredom may be a function of the type of task used and not boredom. For example, overestimation of time duration may accompany performance of a physically monotonous task, and if this task also produces boredom, then overestimation of time will also accompany boredom. However, if another, non-physically monotonous, task also produces boredom, then it may not be accompanied by time overestimation.

In effect, therefore, such indices of boredom, may define boredom as the result of physically monotonous stimulation. Consequently, the use of such indices may serve to conceal important factors in the nature and origins of boredom.

However, as Robinson (1975) point out

> "We have a means of diagnosing boredom. We can simply ask pupils whether or not they were bored." (p151).

Indeed, it is to this method of assessing boredom that most studies have resorted: in various ways they have asked subjects whether or not they were bored. There may be problems with this method. For example, it may be the case that people describe many experiences that they simply dislike as 'boring'. One way of avoiding this problem may be to ask people to distinguish between activities which they dislike, but do not find boring and those which they find boring. In view of the problems associated with the other indices, this will be the method adopted here.

SUMMARY AND CONCLUSIONS FROM THE REVIEW OF LITERATURE ON BOREDOM

The literature concerning boredom appears to raise three questions. Firstly is boredom associated with frustration, and are there particular needs whose frustration is related to boredom. Secondly, under what conditions is boredom likely to be experienced. That is, what are the antecedent conditions necessary for the occurrence of boredom. Finally, is boredom associated with particular psychophysiological changes. The research presented here will seek to provide answers to these three questions.

The first part of this report will deal with the first of these questions. That is, the relationship between boredom and frustration will be examined. It has been suggested by several researchers that boredom is accompanied by feelings of frustration (pp 30 - 31). Both experimental and industrial researchers have stressed the importance o f constraint in the production of boredom (p 31) and it has been suggested that if a person is constrained to continue performing a task which does not interest him he will experience frustration (p31). Nevertheless, the only experimental study carried out that actually asked subjects to rate their degree of frustration whilst bored, (London et al, 1972; see pages 30 - 31) failed to find a relationship between frustration and boredom. However, as was argued earlier (p 30) the method used for ascertaining degree of frustration was not wholly satisfactory, and it was suggested that it may be useful to explore the satisfaction/ frustration of motives that are relevant to the task being performed.

This would seem reasonable on the basis of some of the findings of both the educational and industrial research. In industry Baldamus (1951) seems to suggest that the relationship between a workers motivation and the conditions of work may be important. Similarly researchers such as Turner and Miclette (1962) have found that there are certain intrinsic sources of satisfaction in monotonous work such as pride in achievement/skill, responsibility and perceived importance of the work (pp 7 - 9). These would all seem to relate to the extent to which the work satisfies/frustrates the workers needs/motives. It may be the case that if the work is satisfying the person's motivational needs (for example his need for achievement) then he will not experience boredom, even if the task is repetitive. This argument gains some support from the work of Gjesme (1977) in the educational field (p 14), who has shown that satisfaction/boredom at school may be related to a

person's achievement motivation and ability. Thus it could be the case that the frustration of an individual's motivational needs is an important factor in the development of boredom.

The second part of this report will deal with the second question. That is it will be concerned with the antecedent conditions necessary for the occurrence of boredom. Most experimental research and traditional industrial research, has tended to assume that physically monotonous stimulation is both a necessary and a sufficient condition for the occurrence of boredom. However, it has been argued (pp 25 - 29) that this may not be the case: sensory monotony may constitute neither a necessary nor a sufficient prerequisite of boredom. It would not appear to be a sufficient condition in view of the industrial studies which have revealed several individual difference factors that affect a person's susceptibility to boredom, for example emotional lability (pp 4 - 6). It may also be the case that physically monotonous stimulation is not a necessary condition for the occurrence of boredom (pp 25 - 27). It has thus been argued (pp 27-29) that boredom may be a function of the way in which stimulation is perceived by the individual, rather than of the stimulation itself.

Industrial studies, for example that of Turner and Miclette (1962) suggest that there are intrinsic sources of satisfaction in repetitive work. Also Blood and Hulin (1967) and Walker and Marriott (1951) suggest that the satisfaction/boredom that a person experiences with a job will in part be determined by comparisons that the worker makes with other jobs (p 9). Clearly, this alters, not the nature of the work itself, but the individual's perception of it.

In the educational field, various aspects of the way in which school subjects are perceived by the pupils (for example, the perceived usefulness of the subject) have been shown to be an important factor in determining whether or not the subject is regarded as boring (p 12). Robinson (1975) also suggests that boredom may be alleviated by changing a pupils' cognitive appraisal of his school subjects.

It may therefore be argued that a person would perceive a task as boring if he perceives it as relatively meaningless or irrelevant to him. This is certainly suggested by the educational work of Morton-Williams and Finch (1968) and Robinson (1975) and has been suggested by such experimental researchers as Fiske

and Maddi (1961) and Geiwitz (1966). In addition, a few researchers in the industrial field have suggested that meaning may play an important role in the production of boredom (p9-10).

The last part of this report will be concerned with the final question, that is, with the psychophysiological changes that occur when a person gets bored. This has predominantly been the concern of experimental researchers into boredom who have suggested that boredom is associated with various physiological changes (pp 20 - 24). There would, however, appear to be a certain amount of disagreement as to what psychophysiological changes do occur. Most of the studies concerned assume that boredom occurs when stimulation is physically monotonous, but it has been argued that this may not necessarily be the case, and it is possible that the psychphysiological changes are task, not boredom dependent (p 24).

The last part of this report will therefore be concerned with investigating this proposition with respect to one of the most consistent of the proposed psychphysiological accompaniments of boredom, namely heart rate variability (HRV). It has been suggested by several studies (pp22 - 24) that boredom is associated with an increase in HRV and this section of the report will investigate whether or not this HRV increase is task or boredom dependent.

In summary, it is being proposed that boredom is essentially cognitive in nature, and results when a person perceives stimulation as relatively meaningless or irrelevant to himself. It has been argued that this has implications for his state of cognitive arousal, but that his level of physiological arousla may be high or low depending on the nature of the stimulation. Thus it may be the case that psychophysiological changes that occur may be task, rather than boredom dependent.

SECTION 2

BOREDOM AND FRUSTRATION

CHAPTER 3

INTRODUCTION

The theories and research concerning boredom have suggested that boredom may be accompanied by feelings of frustration (pp 30-31) In addition it has been proposed that boredom may be associated not only with overall frustration, but also with the frustration of particular needs/motives that are relevant to the task being performed. Both educational and industrial studies have proposed that boredom may be associated with situations in which a person's underlying motivational needs are frustrated (pp 30-31).

This section of research will be concerned with investigating the relationship between boredom and both overall frustration, and the frustration of particular motivational needs.

As with all investigations into boredom, certain strategic decisions have to be made. Studies of boredom must either employ a current or a retrospective strategy. That is, they must either look at boredom 'here and now' or boredom which has occured in the past. Allied to this, studies have either been of a laboratory manipulative kind, or they have looked at boredom in naturalistic settings. Educational researchers have tended to adopt a retrospective/ naturalistic approach. That is, they have attempted to ascertain why boredom occured in certain school situations which the pupils had previously experienced (pp 11 - 15).

Industrial researchers, whilst often employing a naturalistic/reterospective approach, have sometimes attempted a current naturalistic approach. That is, they have investigated boredom as it occured in certain industrial situations (pp 3 - 10). Experimental researchers have almost exclusively adopted a current/ laboratory manipulative approach. They have set up laboratory situations which produce boredom and have investigated the accompaniments of this boredom (pp 16-29).

There are obviously advantages and disadvantages allied to each of these strategies. Manipulative laboratory studies have to make certain assumptions

concerning the antecedents of boredom which may not always be desirable. For example, if in a laboratory, it is possible to produce boredom by presenting subjects with monotonous stimulation, this does not imply that such monotony is a necessary condition for the occurrence of boredom. Neither does it imply that any accompaniments of boredom produced by monotony are also associated with boredom resulting from other situations.

Naturalistic investigations have the obvious advantage that they investigate boredom in the situations in which it actually occurs. They make a minimum of assumptions. Equally, they have the disadvantage that they do not enable the degree of control that manipulative laboratory studies allow. Reterospective studies clearly permit naturalistic settings to be used more readily, but they often leave questions relating to causality unanswered, and they may introduce potential memory problems. However, there does not seem to be any reason to assume that 'differential forgetting' will occur. It would seem unlikely that boring events should be less memorable than interesting or disliked ones. 'Current' studies do not suffer from the problems associated with reterospective ones, however it is often difficult to conduct these in a naturalistic rather than a laboratory manipulative manner.

In the light of the choices available, it was decided that a retrospective/ naturalistic approach should be employed for an investigation of the relationship between boredom and frustration. It would seem unlikely that a manipulative laboratory situation could be constructed that would be relevant to the range of motivational needs that may be involved in naturalsettings. As it is the relationship between the satisfaction/frustration of these motivational needs and boredom with which this section is concerned, such manipulative laboratory approach would seem innappropriate.

Such a naturalistic study of satisfaction/frustration involves examining how an individual experiences or perceives events which may be boring, and assessing the effect of these perceptions upon that individual interms of his emotions. That is, it is necessary to assess the impact of activities which a person has performed upon his motivational needs.

Personal Construct Theory (PCT) is concerned with how an individual

structures his experiences, how he perceives and construes events (Kelly, 1955). Within PCT a technique has been developed for assessing how a person construes his experience namely the repertory grid technique (RGT). Thus it may be possible to utilise the RGT, within the framework of PCT, to investigate how a person construes boring experiences. However, in the current context, what is required is an assessment of the way in which people construe their experiences with particular reference to the satisfaction of motivational needs, and this may present problems within the framework of construct theory.

Construct theory as such does not deal with the impact of experiences on a person's underlying motives. Within PCT, needs are considered unnecessary for explanatory purposes, as Kelly (1955) sees motivation in terms of the elaboration of a person's construct system. However, this may seem an unrealistically cognitive approach as Foulds (1975) suggests, and certainly it does not seem to answer the question, why should one choose a particular construct at a particular time? There are evidently sometimes environmental prompts, but at other times it seems reasonable to argue that the whole process starts with the internal construing of need states. For example, if a person goes out for a walk and gets very tired, there are no chairs or beds available, so he may sit down on a tree stump - he construes that tree stump as a seat. In such a case, clearly the construing of that tree stump was based on his internal construing of a need state - he construed himself as tired and needing to sit down.

Consequently, it would seem desirable to use the repetory grid technique, developed with PCT, in a modified way. It should be possible to examine the ways in which individuals construe boring experiences, and also the emotional impact that these have in terms of satisfaction/frustration, by arranging for people to use constructs that relate to motivational needs. Thus, the experiments reported here fit into a modified theoretical framework of personal construct theory.

It would seem reasonable to argue that the degree of satisfaction that a person experiences whilst performing an activity is not simply a function of the extent to which he construes that activity as satisfying particular motivational needs. It would seem likely that satisfaction is also related to the relative strength of those needs within that person. For example, if an activity satisfies a person's need for

achievement, and that person has a high need for achievement, then this activity would be more satisfying and of greater psychological significance than if the person had a relatively low need for achievement. This kind of interaction is certainly suggested by the work of Gjesme (1977), (p 14).

Consequently, within the framework of PCT, it was decided that a motivational need satisfaction schedule (MNSS) should be constructed in order to assess the extent to which particular activities satisfy/frustrate a person's motivational needs. It was considered that the items composing this MNSS might usefully consist of supplied constructs based on the fifteen needs used in the Edwards Personal Preference Schedule (EPPS) (1953). Traditionally, when repertory grids have been used, Constructs have been elicited from the subjects tested. However this does not readily allow comparisons to be made across subjects as different constructs are elicited from different people. When such across people comparisons are required, supplied constructs have been used by researchers in the PCT field (for example Bannister and Fransella, 1966). As it is necessary for the purposes of assessing the relationship between boredom and frustration to make such across subject comparisons, it would seem perferable to use supplied rather than elicited constructs here. On these supplied constructs the activities that a person performs could then be rated and an assessment of the degree of frustration that the person experienced whilst performing that activity could be gained. This degree of frustration can then be weighted by the relative strength of those needs within the individual. The EPPS measures the relative strength of needs within an individual, and the scores from this might be used for such weighting purposes.

As the exercise of constructing the MNSS was thought likely to be a fairly lengthy affair, it was decided that a small initial pilot study should be conducted in order to assess the value and feasibility of the proposed exercise. It is this feasibility study that will be reported first, followed by two more formal studies aimed at validating the proposed MNSS.

CHAPTER 4

EXPERIMENT 1: AN INITIAL FEASIBILITY STUDY

INTRODUCTION

The purpose of this study was to assess whether it was worthwhile developing a MNSS composed of EPPS needs constructs to examine the relationship between boredom and frustration. In this study a pilot MNSS was written and used in the manner it was proposed the fully developed MNSS should be used. It was decided that not only should the degree of satisfaction experienced whilst performing boring and interesting activities be compared, but also the satisfaction experienced whilst performing disliked activities. This would seem to be important because frustration may not be associated particularly with boredom, but with the general negative affect associated with both boring and disliked activities. Previous research in this area has not considered this possibility (pp 30-31).

It should be stressed that the result of this study was not expected to shed any light on the boredom/frustration relationship. Rather, its purpose is to indicate whether this approach to the question is a useful one to pursue.

METHOD

The pilot motivational need satisfaction schedule (MNSS)

For each of the fifteen EPPS motivational needs four bi-polar items were written. As far as possible these items were written to reflect the various different aspects of the motivational needs whose relative strengths are measured by the EPPS. In writing items particular attention was paid to the descriptions of the various aspects of needs given in the EPPS manual (Edwards, 1953). The items were phrased in the form 'I felt...' in a effort to elicit how a person felt whilst performing the activity, rather than what actually happened during its performance. Half of the items for each need had the positive (satisfaction) pole followed by the negative (frustration) pole, and in the other half the poles were reversed. The items were randomly ordered (see Appendix 1).

Subjects

Ten first year undergraduate students: 5 male, 5 female.

Procedure

Each subject was asked to nominate four activities which he had performed recently (within the last month) which he had found interesting, four which he had disliked but not found boring, and four which he had found boring. The subject was asked to think of a specific occasion on which an activity had been performed. For example, reading was not accepted - the person was asked to nominate a specific occasion of reading.

Each subject was then asked to rate how they felt whilst performing these activities on the seven point scales of the items on the pilot MNSS. He was asked to rate the activities in a random order and was asked to indicate:

a) where it was not clear what was meant by an item, and

b) when an item was irrelevant to how he felt whilst performing that activity.

Lastly, the subjects were asked to complete the EPPS.

RESULTS

Scoring

On the seven point scale of each need item, each activity was scored from +3 (extreme satisfaction) to -3 (extreme frustration). The scores for the four items relating to each need were then summed and multiplied by the score for that need on the EPPS. This procedure gave a weighted satisfaction/frustration score for each activity on each need. For example, if the sum of the MNSS scores was + 10 and the raw EPPS score on that need was 7 then the weighted score would be +70.

These weighted scores were then added to give the overall degree of satisfaction/frustration obtained from each activity. Lastly the overall scores for the four boring activities were added to give a total overall satisfaction score for boring activities, and the same prodecure was followed for interesting and disliked activities.

In order to examine whether or not the need items were relevant to the activities nominated by the subjects, the number of times an item had been recorded as irrelevant was calculated for each need across all the activities, for all the subjects.

Need satisfaction/frustration

The total overall satisfaction scores for each class of activity, for each subject were as follows:

TABLE 1

Table showing total overall satisfaction scores

Subject No.	Total Overall Satisfaction Scores		
	Interesting Activities	Disliked Activities	Boring Activities
1	2983	-78	-1963
2	716	-1852	-1721
3	1886	-187	-1934
4	1870	-1758	-3047
5	1437	-1487	-3494
6	6441	-4283	-4904
7	2999	-145	-1927
8	3070	-682	-1871
9	2300	-1098	-3171
10	2465	-3167	-2758
Mean	2616.7	-1473.7	-2692.1

It should be noted that positive scores indicate satisfaction, whilst negative scores indicate frustration of motivational needs.

These results suggest that interesting activities may be highly satisfying and boring activities highly frustrating of motivational needs, with disliked activities falling between the two. A series of Wilcoxon tests was carried out to assess the significance of these observed differences, and the results were as follows:

Interesting/disliked: $T=0$, $p<0.01$

Interesting/boring: $T=0$, $p<0.01$

Disliked/boring: $T=3$, $p<0.01$

Thus there is a significant difference between the satisfaction/frustration of motivational needs for the three classes of activity Interesting activities appear to be most satisfying: boring activities most frustrating.

The relevance of the motivational need items

TABLE 2

Table showing the percentage of times need items in the MNSS were rated as irrelevant

Need	%times items rated as irrelevant
Achievement	6.5%
Deference	10.7%
Order	5.0%
Exhibition	12.7%
Autonomy	7.3%
Affiliation	8.3%
Intraception	32.9%
Succorance	13.6%
Dominance	9.2%
Abasement	11.2%
Nurturance	8.3%
Change	5.4%
Endurance	6.9%
Heterosexuality	47.3%
Aggression	9.6%

DISCUSSION

In the light of the finding of a significant difference between interesting disliked and boring activities in terms of the degree of satisfaction experienced, it seemed worthwhile to continue investigating the relationship between boredom and frustration in the manner proposed. It must be stressed that these results should not be taken as evidence of the relationship between boredom and frustration because of the untested nature of the MNSS used. It is for this reason that no detailed analysis of the satisfaction and frustration of particular needs was carried out. Rather, these results are taken here to indicate that it would be useful to develope the MNSS further in order to investigate the boredom/frustration relationship more fully.

It was argued earlier that task relevant motivational needs should be investigated (p 36). Consequently it is necessary to assess whether the needs

measured by the EPPS, on which it is proposed the MNSS should be based, can be used for this purpose. It can be seen from Table 2 that, with the exception of the items relating to intraception and heterosexuality, on no more than 13.6% of occasions were items relating to the other thirteen needs considered irrelevant to the activities concerned. Thus it would seem that most of the needs were indeed relevant to the activities nominated.

As far as the needs for heterosexuality and intraception were concerned, the items relating to these were considered irrelevant to the activities concerned on 47.3% and 32.9% of occasions respectively. In addition, subjects frequently questioned what precisely was meant by these items, particularly the intraception items. Consequently, it was decided that the MNSS should be developed without these two needs.

There was one final problem encountered with this study, namely, the amount of time it took subjects to complete the various sections. Most subjects took between two and three hours to do the EPPS, nominate twelve activities, and rate each one on the sixty items of the MNSS. This length of time was considered excessive, and consequently it was decided that efforts should be made to reduce the length of the MNSS and possibly the number of activities rated on it, on future occasions.

CHAPTER 5

THE DEVELOPMENT OF THE MNSS: PSYCHOMETRIC PROPERTIES

In order for the MNSS to be a useful instrument for assessing the relationship between boredom and frustration two things seemed necessary. Firstly, in the light of the initial feasibility study it appeared necessary to shorten the MNSS. Secondly, it seemed desirable that the MNSS possess adequate psychometric properties for the uses to which it was to be put. Consequently, the purpose of the next two studies was to assess the psychometric properties of the proposed MNSS in terms of the effects of social desirability upon, and the internal validity of the MNSS items, with a view to selecting just two items to tap each need

SOCIAL DESIRABILITY

In his construction of the EPPS, Edwards (1953) was concerned about the effects of social desirability because such social desirability can affect the value of an inventory. The EPPS is a forced-choice inventory, and Edwards (1953) tried to ensure that each pair of items between which subjects were asked to choose were of equivalent social desirability. He argued that the more nearly equivalent the pairs of statements, the more difficult it would be for subjects to choose between them on the basis of social desirability alone. In the EPPS Edwards achieved an intraclass correlation between the social desirability scale values of the pairs of statements of 0.85.

However, the proposed MNSS is not a forced-choice inventory, and consequently the method employed by Edwards (1953) is not appropriate. Nevertheless, social desirability can still affect a person's responses. Some activities which a person performs will be considered by that person to be socially desirable, others will not. It would seem possible that a person's ratings of an activity on the MNSS may, at least in part, be a function of this social desirability of the activity concerned. If this were the case, then it may obscure the actual pattern of satisfaction/frustration experienced whilst performing the activity. It may also provide misleading results as to the relationship between boredom and frustration, if, for example, interesting activities are largely socially desirable and boring activities largely socially undesirable. Thus it seems essential that a person's

ratings of an activity on the MNSS items should not solely be a function of the social desirability of that activity.

In these two experiments the effects of the social desirability of activities on their MNSS ratings will be assessed by comparing the ratings of four classes of activity elicited from the subjects: interesting socially desirable (IS), interesting socially undesirable (IU), disliked socially desirable (DS) and disliked socially undesirable (DU) activities. The effects of social desirability will then be assessed by the following two criteria:

Condition 1

There should be a significant difference between the ratings of:

IS and DS activities

and

IU and DU activities

Condition 2

There should be no significant difference between the ratings of:

IS and IU activities

and

DS and DU activities

If condition 1 were NOT satisfied then it would appear that the social desirability of the activity concerned was the only factor affecting an activity's rating on the MNSS items. If condition 2 were NOT satisfied then social desirability may, in part, have been affecting the rating of an activity on the MNSS items. Consequently, the ratings of IS, IU, DS, and DU activities on each MNSS item should satisfy both of these conditions.

INTERNAL VALIDITY

The proposed MNSS was comprised of a set of sub-scales, each designed to tap a different EPPS motivational need. Consequently, it seemed necessary to ascertain, firstly, whether items within each sub-scale were tapping the same need, and, secondly, whether items from different sub-scales were tapping different needs. Hill (1976), in his criticisms of the work of Beloff (1957) on the anal character,

proposed a method of assessing the potential construct validity of sub-scales in an inventory. He argued that two criteria should be satisfied in order to assess whether each sub-scale was a good measure of something, even though the precise nature of that something might not be known for certain. Firstly, the items within a sub-scale should be positively and significantly correlated with one another, and, secondly, correlations within sub-scales should be greater than correlations between sub-scales. These two criteria might be termed the 'internal validity' of an inventory, and if they are not satisfied then the sub-scales show little potential construct validity.

It was considered essential that the MNSS sub-scales satisfied these internal validity criteria. Otherwise it would be unlikely that the various sub-scales were tapping the intended needs. Consequently, internal validity was assessed by examining the within scale correlations (correlations between items supposedly tapping the same need) and the cross scale correlations (correlations between items supposedly tapping different needs) in the following manner:

Condition 1

Within scale correlations should be positive and significant for each item on all classes of activity (IS, IU, DS, DU).

Condition 2

Cross scale correlations should not exceed within scale correlations for each item on all classes of activity (IS, IU, DS, DU).

An example may help to clarify these conditions: if items A and B are related to one need, say achievement, and items X and Y are related to another, say autonomy, then the correlations between A and B and between X and Y should be positive and significant (condition 1). In order to satisfy condition 2, the correlation between A and B should exceed the cross scale correlations between A and X, A and Y, B and X, and B and Y. Similarly the correlation between X and Y should exceed the cross scale correlations between X and A, X and B, Y and A, and Y and B.

If condition 1 is not satisfied, then it would seem unlikely that the items within a scale are indeed tapping the same need. If condition 2 is not satisfied then it would seem unlikely that different scales are tapping different needs. Thus it is

desirable that each item satisfies both of these conditions.

The two studies to be reported here will be concerned with assessing the effects of social desirability upon, and the internal validity of the proposed MNSS items with a view to selecting two items per need that satisfy the conditions outlined.

CHAPTER 6

EXPERIMENT 2:
SOCIAL DESIRABILITY AND INTERNAL VALIDITY STUDY (1)

METHOD

The MNSS items

The same MNSS items were used in this study as were used in Experiment 1, with the exception of those relating to the needs of intraception and heterosexuality, which were excluded. The remaining 52 items were divided into two schedules, Form A and Form B (see Appendix 2). Two items relating to each need were placed on each form, and randomly ordered.

Subjects

Sixty undergraduate students: 30 male and 30 female, aged 19 - 23 years (mean age: 20.75 years).

Procedure

All subjects were tested individually. Thirty of the subjects were asked to think of things that they had done recently (within the last month) and had found interesting. They were each asked to nominate four specific activities that they had found interesting and that:

- i) their family had approved of them doing or would have done had they known about it
- ii) their friends had approved of them doing or would have done had they known about it

} Interesting Socially Desirable: IS

- iii) their family had disapproved of them doing or would have done had they known about it
- iv) their friends had disapproved of them doing or would have done had they known about it

} Interesting Socially Undesirable: IU

Next these subjects were asked to think about things they had done recently that they had disliked doing, and to nominate a disliked activity for each of the above conditions. This gave two disliked socially desirable (DS) and two disliked socially undesirable (DU) activities. This gave eight activities in all for each subject: two IS, two IU, two DS, and two DU activities.

For the other thirty subjects, the disliked activities were elicited first, then the interesting ones.

The subjects were then asked to rate how they felt whilst they were performing each of the activities they had nominated on a seven point scale on each of the MNSS items. The activities were randomly ordered, and the subjects were asked to think back to the actual occasion when they had performed the activity. The subjects were asked to look at each pole of the item and to decide which one applied to how they felt and then to indicate how much. Due to time limitations on the part of the subjects, each subject only rated his eight activities on half of the MNSS items ie. either on Form A or Form B (half of the subjects used Form A, the other half Form B).

RESULTS

Scoring

Each activity's rating on each MNSS item was scored from +3 for the positive pole (extreme satisfaction) to -3 for the negative pole (extreme frustration), with a central category of zero. For each subject, the scores for the two IS, IU, DS and DU activities were added for each of the items. Thus each person had four scores for each item.

Social Desirability

Condition 1 (see page 50)

In order to assess whether the items used satisfied the social desirability condition, two t-tests were carried out for each item: between IS and DS scores and between IU and DU scores. These t-tests can be found in Appendix 3. As can be seen, most items show a significant difference, at at least the 0.05 level, between both IS and DS, and IU and DU, scores. There were, however, twelve out of the 52 items which did NOT satisfy this condition. These were:

Deference (form A, item 8)
Order (form B, item 1)
Autonomy (form B, item 17)
Succorance (form A, items 19, 23)
Abasement (form A, item 9)
Nurturance (form A, item 18)

(For details of the items concerned see Appendix 3)

Nurturance (form B, items 8, 10)

Endurance (form B, items 3, 7)

Aggression (form B, item 21)

Despite these items it proved possible to select two items relating to each need which satisfied the social desirability condition, with the exception of the need for nurturance.

Condition 2 (see page 50)

In order to assess whether the items used satisfied this condition, two further t-tests were carried out for each item: between IS and IU scores and between DS and DU scores. These t-tests can be found in Appendix 3. As can be seen, most of these t-tests show significant differences between either or both of these scores, and consequently most items do not satisfy this condition.

Examination of Appendix 3 shows that there were only six items which satisfied both of the social desirability conditions, namely:

Exhibition (form A, items 6, 25)

(form B, item 5)

Autonomy (form B item 23)

Dominance (form B, items 14, 19)

(For details of the items concerned, see Appendix 3)

Internal Validity

In order to investigate the internal validity of tne MNSS, for every possible pair of items in form A, and for every possible pair in form B, a product moment correlation coefficient was calculated for each class of activity, IS, IU, DS and DU.

Condition 1 (see page 51)

The within scale correlation coefficients were as follows:

TABLE 3

Table showing within scale correlation coefficients

Need	Within scale correlations Form A				Within Scale correlations Form B			
	IS	IU	DS	DU	IS	IU	DS	DU
ACHIEVEMENT	.12	.41	.19	.49	.51	.06	.28	.42
DEFERENCE	.17	.26	.25	.56	.06	-.17	.53	.55
ORDER	.31	.47	.47	.66*	.66	.48	.35	.53*
EXHIBITION	.31	-.05	.37	.39	.17	.33	.52	.24
AUTONOMY	.50	.59	.50	.61*	.37	.14	-.14	.31
AFFILIATION	.55	.79	.39	.41*	.57	.38	.65	.51*
SUCCORANCE	.02	.51	.38	-.08	.56	.59	.67	.49*
DOMINANCE	.67	.50	.47	.61*	.22	.41	.29	.45
ABASEMENT	.36	-.18	-.12	.10	.55	.10	.42	-.09
NURTURANCE	.52	.48	.54	.19	.56	.58	.65	.56
CHANGE	.08	.15	.53	.46	.27	.15	.55	.32
ENDURANCE	.13	.29	.58	.27	.22	.63	.27	.69
AGGRESSION	.53	.22	.47	.35	.32	.22	.19	.34

(an * indicates that the correlations for all four categories of activity IS, IU, DS and DU are positive and significant at the 0.05 level.)

Thus it can be seen that this condition is satisfied for only seven pairs of items.

Condition 2 (see page 51)

The number of cross scale correlations exceeding within scale correlations was calculated for each scale. The results were as follows:

TABLE 4

Table showing the number of cross scale correlations that exceed within scale Correlations

Need	Number of cross correlations exceeding within scale correlations Form A	Form B
Achievement	70	57
Deference	20	47
Order	8	7
Exhibition	84	48
Autonomy	18	68

Need	Number of cross scale correlations exceeding within scale correlations	
	Form A	Form B
Affiliation	31	12
Succorance	92	3
Dominance	27	38
Abasement	70	23
Nurturance	21	6
Change	51	21
Endurance	42	27
Aggression	24	70
	(each out of a possible 192)	

Thus it can be seen that there are a very large number of cross scale correlations that exceed within scale correlations. No pair of items satisfied this condition.

DISCUSSION

On the basis of the social desirability and internal validity criteria set out, it would appear that the MNSS in this form fell short of being a satisfactory instrument:

Social Desirability

It would appear that for most items, social desirability is not the only factor affecting a person's rating of an activity. With the exception of the need of nurturance, it was possible to select two items which satisfied condition 1 (see page 50). However, it does appear that for the majority of items, social desirability is excercising some effect. Most items did not satisfy condition 2 (see page 50).

It may be the case that whilst the social desirability of an activity is not the sole determinant of its ratings on the schedule, social desirability may have an overall magnificatory effect. That is, for socially desirable interesting activities scores tend to be higher than those for socially undesirable interesting activities, although the latter are still generally higher than those for disliked activities. Conversley, when an activity is disliked, but socially desirable, it generally obtains higher scores than if it is socially undesirable, but again the scores for the former are still lower than those of interesting activities.

Internal Validity

The MNSS items used in this study would, overall, appear to be totally unsatisfactory with respect ot their internal validity. Only seven pairs of items satisfied condition 1 (see page 51). This suggests that the pairs of items used were not in fact tapping the same need. Similarly, there were a very large number of cross scale correlations that exceeded within scale correlations. This is in part a function of the low level of within scale correlations, but there were still no items which satisfied condition 2 (see page 51). This further reinforces the conclusion that there is grave doubt as to whether the different scales were indeed tapping the needs that they were intended to tap.

In the light of these rather poor results it was decided to rewrite the MNSS items and perform a second social desirability and internal validity assessment. One of the problems with this study was that it did not enable a full internal validity assessment to be carried out as each person only rated his nominated activities on half of the MNSS items. It was decided that in the next study each person should rate his activities on all of the MNSS items.

CHAPTER 7

EXPERIMENT 3:
SOCIAL DESIRABILITY AND INTERNAL VALIDITY STUDY (2)

METHOD

The MNSS items

In view of the internal validity problems experienced with the initial set of items used in experiment 2, at least six items were written for each of the thirteen motivational needs. This gave a total of 85 items (see Appendix 4). These items were again written to reflect, as far as possible, the different aspects of the EPPS needs. Those items which showed significant positive within scale correlations in experiment 2 were not altered. All other items used in experiment 2 were scrutinised for possible sources of confusion, and rewritten. Finally, additional items were written for each need, to see if these would perform better. Again, all the items were phrased in the form 'I felt .....' and were bipolar. Half of them had the satisfaction pole followed by the frustration pole, and for the other half the poles were reversed. All the items were included in the same schedule to permit a full internal validity assessment.

Subjects

Fifty seven, sixth form college students: 29 female, 28 male, aged 16-18 years (mean age 17.2 years).

Procedure

The procedure used in this study was substantially the same as that used in experiment 2. However, due to timetable restrictions at the sixth form college it was not possible for each person to rate eight activities on all 85 items of the revised MNSS. It was found that only two activities could be rated in the 45 minutes available.

Consequently, for the social desirable/undesirable activities, each subject was asked to nominate activities that his family approved/disapproved of, or would have done if they had known about it. It was decided that the familial assessment of social desirability would probably be the most relevant one in the case of these

subjects, as they all lived at home. Time restrictions made the additional peer assessment used previously, impossible.

The subjects were divided into five groups and two activities were elicited from each subject in the following manner:

Group	Composition	Activities elicited
1	6 male, 6 female	IS + IU
2	6 male, 5 female	IS + DS
3	5 male, 7 female	IU + DS
4	6 male, 5 female	IU + DU
5	5 male, 6 female	DS + DU

The subjects rated each of their activities on the items of the MNSS in the manner described previously in experiment 2.

RESULTS

Scoring

Each person's rating of each activity on the MNSS items was scored from +3 (extreme satisfaction) to -3 (extreme frustration) with a central category of zero.

Internal validity

For every possible pair of items a product moment correlation coefficient was calculated for each class of activity, IS, IU, DS and DU.

Condition 1 (see page 51)

The within scale correlations were scrutinised and it was found that for each scale, at least one such correlation was positive and significant for all classes of activity (see Appendix 5). Where more than one pair of items satisfied this condition, the decision of which pair to select was made on the following criteria:

a) The two items should show a similar correlation for each category of activity,

b) The two items should as far as possible tap different aspects of the EPPS need.

The items selected in this manner are indicated in Appendix 5.

Condition 2 (see page 51)

The cross scale correlations were then inspected for the 26 items selected as satisfying condition 1. Table 5 shows the number of cross scale correlations that exceed the within scale correlations for each need:

TABLE 5

Table showing the number of cross scale correlations that exceed within scale correlations

Need	Number of cross scale correlations that exceed within scale correlations	
	IS, IU DS and DU	IS and DS only
Achievement	7	0
Deference	0	0
Order	8	1
Exhibition	9	0
Autonomy	6	6
Affiliation	6	5
Succorance	0	0
Dominance	11	10
Abasement	0	0
Nurturance	0	0
Change	7	3
Endurance	18	18
Aggression	5	0
	(out of a possible 192)	(out of a possible 96)

As can be seen, the number of cross scale correlations higher than within scale correlations is considerably less for these items than for those in experiment 2. However, there are still some problems, particularly with the two endurance items.

Social Desirability

For each of the 26 selected items t-tests were performed on the following pairs of scores: IS/DS, IU/DU, IS/IU, and DS/DU. These can be seen in Appendix 6.

Condition 1 (see page 50)

It can be seen from Appendix 6 that only 10 items satisfy this condition.

Condition 2 (see page 50)

Only seven items satisfy this condition and only two items satisfy both conditions: affiliation item number 14 and abasement item number 54 (see Appendix 6).

DISCUSSION

The changes in the items made as a result of experiment 2 do not seem to have improved the MNSS with respect to the effects of the social desirability of the activities rated. Indeed, such social desirability effects seem to have worsened. This may be a result of the different population tested, however, it may be a function of the needs themselves. For example, one of the needs whose items seem most affected by the social desirability of the activity rated is nurturance. The need of nurturance seems essentially to involve considering, and being considerate towards, other people. It may seem unlikely that such a need would be satisfied by an activity which a person's family/friends did not approve of. Consequently, it may be the case that some needs are simply not satisfied by socially undesirable activities, or are satisfied by socially desirable ones, and vice versa. If this were the case then apparently unsatisfactory items with respect to social desirability may in fact be quite satisfactory, as their aim is to assess whether particular needs have been satisfied or not.

Nevertheless, it would seem sensible to use this MNSS for comparing the satisfaction/frustration experienced only with socially desirable activities.

Whilst the social desirability findings are not very encouraging, the internal validity of the MNSS seems to be much improved. Each pair of items selected does appear to be related to the same need, as all within scale correlation coefficients are positive and significant for the items selected. In addition the number of cross scale correlations greater than within scale correlations has been substantially reduced, which suggests that the different scales are more nearly tapping different needs than previously. If, as has been suggested in the light of the social desirability findings, the MNSS is only used with socially desirable activities then the number of cross scale correlations greater than within scale correlations is reduced still further (see Table 5). However, the items relating to endurance may require further development.

Thus it seemed reasonable to proceed, using the MNSS in substantially its present form, to assess the satisfaction/frustration experienced whilst performing interesting and boring, socially desirable activities.

CHAPTER 8

THREE EXPERIMENTS INVESTIGATING THE RELATIONSHIP BETWEEN BOREDOM AND FRUSTRATION

INTRODUCTION

As outlined previously, the last two experiments in this section were concerned with investigating, more thoroughly than had previously been done, the relationship between boredom and frustration. Previous research suggested, firstly, that boredom was associated with frustration and, secondly, that boredom may be associated with the frustration of particular needs. It was to these two issues that the next two experiments were addressed.

The basic methodology used was similar to that employed in the initial feasibility study. That is, boring, interesting and disliked activities were elicited from a person, who was then required to rate these on the revised MNSS. These ratings were then weighted by a person's relative need strength scores obtained from the EPPS. The rationale behind this weighting procedure was, as was argued earlier (p 42), that the degree of satisfaction that a person derives from an activity will be a function, not only of the extent to which that activity satisfies a particular need, but also of the relative strength of that need within the person concerned.

It was also considered important to include disliked, as well as boring activities, in these studies. Previous research in this area has not compared the degree of frustration experienced during disliked activities with that experienced during boring activities (p 44). It was, therefore, possible that frustration may be associated with the negative affect in general rather than boredom in particular. This distinction between disliked and boring activities may be particularly important with respect to the satisfaction of particular motivational needs. It may be the case that the frustration of some needs is associated with negative affect generally, whereas the frustration of others is associated with boredom in particular. By comparing the pattern of need satisfaction/frustration for interesting, disliked and boring activities it was considered possible to investigate both of these possiblities.

EXPERIMENT 4

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN BOREDOM AND FRUSTRATION

In addition to investigating the relationship between boredom, general frustration, and the frustration of particular motivational needs, this study had one further purpose: the further refinement of the MNSS. As was pointed out earlier, there was some doubt in the previous study as to whether or not the endurance items were satisfactory. Also, it was decided that the decision to drop the items relating to heterosexuality and intraception had been a little hasty and based on insufficient evidence. Consequently, it was decided that four test items should be written for each of these needs, (endurance, heterosexuality and intraception) and added to the revised MNSS so that they might be assessed in terms of their internal validity. If the MNSS is to be used only for assessing the satisfaction/frustration experienced whilst performing socially desirable activities then an assessment of the effects of socially desirability upon these items should not be necessary.

Hypotheses

It was hypothesised that boring activities would be associated with a significantly higher degree of overall frustration than interesting or disliked activities. No specific hypotheses were made concerning the pattern of satisfaction/frustration of particular motivational needs.

METHOD

Materials

The revised version of the MNSS, developed in experiment 2 and 3, was used, with the two items relating to endurance dropped and four new ones added. Four items relating to each of the needs of endurance, heterosexuality and intraception were also added (see Appendix 7). The EPPS was used for weighting purposes.

Subjects

Twenty-four lower sixth form comprehensive school students: 11 male, 13 female, aged 16-17 years (mean age: 16.33 years).

Procedure

Each subject was tested individually and asked to think of nine things that they had done recently (within the last month): three activities they had found interesting (I), three that they had found boring (B) and three that they had disliked doing but had not found boring (D). In order to ensure that all these activities were considered socially desirable by the subjects, they were asked to nominate only things that they had done that their parents approved of them doing, thought were a good thing, or would have thought desirable had they known about them. Attempts were also made to ensure that the activities were as comparable as possible across the categories, for example, going to France was not considered comparable with washing up the dishes. Subjects were asked to think of a specific occasion when they had performed these activities, and not just to nominate an activity in general, eg. reading. The subjects were then asked to rate each of the activities they had nominated on the MNSS. The subjects were divided into six groups in order to randomise the order of elicitation and rating of activities:

Group	Order of elicitation and rating
1	I-D-B
2	I-B-D
3	D-I-B
4	D-B-I
5	B-D-I
6	B-I-D

Lastly each subject was asked to complete the EPPS.

RESULTS

Scoring

All the items on the MNSS were scored from +3 (extreme satisfaction) to -3 (extreme frustration) with a central point of zero. Then the three I scores, the three D scores and the three B scores for each item were added separately.

The internal validity of the items relating to endurance, heterosexuality and intraception

The internal validity of the items relating to endurance, heterosexuality and intraception was assessed in the manner described in experiments 2 and 3

(see pages 54 - 57). The correlation between every possible pair of scores for each class of activity was calculated and scrutinised:

Heterosexuality items

Two of the four heterosexuality items showed significant positive within scale correlations for I, D and B activities (.48, .42 and .51 respectively for item numbers 18 and 31: see Appendix 7). Thus these two items satisfy condition 1 (see page 51). There were no cross scale correlations higher than these within scale correlations. Thus these two items satisfy both internal validity conditions (see page 51).

Endurance items

Two of the four endurance items (items 25 and 35: see Appendix 7) showed significant positive within scale correlations for I, D and B activities (.39, .41 and .47 respectively). However, there were 11 higher cross scale correlations: ten for I activities and one for disliked activities. Nevertheless this is an improvement upon the eighteen higher cross scale correlations that occured with the previous endurance items. Consequently, these items have been somewhat improved with respect to their internal validity

Intraception items

It was not possible to find a pair of intraception items which satisfied condition 1 (see page 51). The best two (items 19 and 30: see Appendix 7), and consequently the ones selected for further analysis, showed significant positive within scale correlations for I and B activities, and a positive, though non-significant within scale correlation for D activities (.38, .12 and .39 respectively). Forty three higher cross scale correlations were found, mostly for D activities.

Despite the remaining problems with the intraception items, it was decided that the two selected items for each need should be included in the further analyses, but all calculations should be performed both including and excluding these items.

Weighting of scores

For the reasons discussed previously (p 42), each person's I, D and B

score for each need was weighted by the relative strength of that need within the person concerned. These weightedscores were obtained by multiplying each raw MNSS score by the need score obtained from the EPPS. Thus, if for activities the raw MNSS score was +6 on the need for achievement, and the EPPS achievement need score was 20, the weighted satisfaction score would be +120.

Overall satisfaction/frustration

In order to assess the overall level of satisfaction/frustration experienced whilst performing I, D, and B activities, the weighted scores for each need were added to give a single I, D and B score for each person. A table showing each person's overall I, D and B scores including and excluding the endurance, heterosexuality and intraception items con be found in Appendix 8. The mean satisfaction/frustration scores were as follows:

TABLE 6

Table showing mean satisfaction and frustration scores

	Mean satisfaction/frustration scores		
	I activities	B activities	D activities
Mean score excluding End, Het and Int.	992.75	-229.25	-653.375
Mean score including Het, End and Int.	1389.375	-184.58	-793.125

Note: positive scores indicate satisfaction, negative scores indicate frustration.

Three Wilcoxon tests were carried out on the overall satisfaction scores and the differences between the categories of activity in terms of satisfaction experienced were found to be significant at the 0.01 level. This was the case whether or not the endurance, heterosexuality and intraception scores were included. Excluding endurance, hetersexuality and intraception: B/D: T=39, I/D: T=0, I/B: T=0. Including all need scores: B/D: T=25, I/D: T=0, I/B: T=0. Thus it appears that interesting activities are very satisfying and boring activities are very frustrating of motivational needs. Disliked activities are frustrating,

but significantly less so than boring ones.

The pattern of satisfaction/frustration of individual needs

For each class of activity, t-tests were carried out using the weighted scores for each motivational need. The results of these t-tests can be seen in table 7:

TABLE 7

Table showing t-tests between Interesting, Disliked and Boring activities for each motivational need

	t-tests			Mean Scores			Pattern
NEED SCALE	I/D	I/B	B/D	I	D	B	of Satis-faction
Achievement	t=5.01***	t=8.32***	t=4.74***	155.35	38.0	-137.48	I-D-B
Deference	t=-8.4***	t=-6.47***	t=-0.08	-41.17	56.39	57.65	DB-I
Order	t=6.9***	t=7.08***	t=-1.21	91.91	-37.69	-18.30	I-DB
Exhibition	t=7.68***	t=9.04***	t=4.42***	141.17	-2.39	-68.83	I-D-B
Autonomy	t=8.99***	t=6.93***	t=-0.5	197.22	-125.74	-104.78	I-DB
Affiliation	t=8.2***	t=7.89***	t=0.12	184.83	-64.43	-67.35	I-DB
Succorance	t=5.22***	t=5.27***	t=0.14	92.56	-59.65	-62.17	I-DB
Dominance	t=5.93***	t=5.56***	t=0.29	96.65	-53.87	-63.65	I-DB
Abasement	t=-5.25***	t=-7.39***	t=-1.49	-162.65	11.35	58.43	DB-I
Nurturance	t=3.64***	t=4.72***	t=1.88	87.26	22.0	-2.43	I-DB
Change	t=6.77***	t=8.96***	t=5.48***	179.0	-55.13	-200.48	I-D-B
Aggression	t=-0.98	t=2.3*	t=3.32**	9.22	26.17	-59.78	ID-B
Endurance	t=4.93***	t=6.19***	t=3.5**	132.3	23.83	-126.26	I-D-B
Hetero-sexuality	t=5.2***	t=5.66***	t=-0.51	130.17	8.47	12.91	I-DB
Intraception	t=4.52***	t=5.3***	t=2.01	119.49	13.48	-30.56	I-DB

*** $p<0.001$

** $p<0.01$

* $p<0.05$

It would appear from this table that there are two patterns of need satisfaction/frustration: 'bi-polar' and 'tripolar' patterns.

The 'bi-polar' patterns

It would appear that there are three types of bi-polar pattern. Some needs appear to be satisfied by interesting activities and frustrated by both disliked and boring activities. These needs are order, autonomy, affiliation, succorance, dominance, nurturance, heterosexuality and intraception. In the case of all of these needs, mean I satisfaction scores are positive and significantly higher than mean D and B satisfaction scores, which do not differ significantly from each other. This will be referred to as an 'I-DB' pattern. The frustration of needs showing this I-DB pattern may be taken as reflecting negative affect generally not boredom in particular.

Other needs appear to behave in the opposite manner to those showing an I-DB pattern, that is they are frustrated by interesting activities and satisfied by disliked and boring ones. These needs are deference and abasement and the pattern of satisfaction/frustration they exhibit has been called a 'DB-I' pattern. On these needs mean I satisfaction scores are negative and significantly lower than mean D and B satisfaction scores which do not differ significantly from each other. The satisfaction of this type of need would appear to be associated with negative affect generally.

The last type of bi-polar pattern to emerge reflects needs satisfied by interesting and disliked activities and frustrated by boring ones. There seems to be only one need showing this pattern, namely aggression. This has been called an 'ID-B' pattern. Here I and D activities are associated with higher mean satisfaction scores which do not differ significantly from each other, but do differ significantly from the mean B score. It may be the case that frustration of this need is associated with boredom in particular.

The 'tri-polar' patterns

These fall into one 'I-D-B' type and are achievement, exhibition change and endurance. Needs showing the I-D-B pattern are particularly interesting because they follow the overall satisfaction/frustration pattern. That is, I,D and B mean satisfaction scores differ significantly from one another: I mean satisfaction scores are positive, D mean satisfaction scores are significantly lower and either slightly positive or slightly negative, whilst B mean satisfaction scores are

significantly lower still and are negative. It would appear that needs showing this pattern are satisfied by interesting activities and frustrated by boring activities with disliked activities falling in between.

DISCUSSION

The results of this experiment clearly indicate that interesting activities are associated with overall satisfaction of motivational needs and boredom is associated with frustration (see Table 6). Whilst disliked activities were, overall, slightly frustrating, this frustration was significantly less than that associated with boring activities. Thus it appears that extreme frustration is not simply associated with the general negative affect assumed to occur in both D and B activities. Rather it appears to be associated with boredom. These results show the same pattern whether the endurance, intraception and heterosexuality scores are included or not.

However, there would appear to be some needs whose frustration/satisfaction is associated with negative affect in general, namely those showing an I-DB and DB-I patterns respectively. It seems to be the case that it is specifically the I-D-B and ID-B patterns whose frustration is associated with boredom. These two categories include the needs of achievement, exhibition, change, endurance and aggression. It may have been expected that the need for achievement might fall into this category on the basis of the work of Gjesme (1977). He found a complex relationship between boredom and satisfaction at school, and achievement motivation and ability (p 14). In the present study, the activities being rated were not school subjects/classes. Thus it may be the case that frustration of the achievement motive is not simply related to boredom at school, but to boredom in general.

It may also have been expected that the need for change would be frustrated by boring activities, if it is assumed that boring activities lack variety. However, it should be pointed out here that the measure of 'change' obtained was essentially a subjective one. That is, people were asked whether they felt that what they were doing lacked variety. Consequently, it is essentially a measure of subjective variety/monotony, that has been found here to be associated with interest/boredom.

The relationship between frustration of the need for endurance and boredom may also be explained. This need was tapped by such items as wanting to avoid/welcoming distractions (item 3: see Appendix 7). It has been argued by several authors (see page 31) that if a person is not constrained to continue performing a task which does not interest him, he will cease to perform that task. Presumably, if he is constrained to perform it, he will welcome distractions and want to give up, rather than feel he wants to persist, avoid distractions and thus satisfy his endurance need. Thus it is likely that boring activities will be associated with frustration of the endurance need as a result of a person's desire to escape the boring situation. However, there does not seem to be any immediately obvious explanation of the relationship between the frustration of the needs of exhibition and aggression and boredom.

In conclusion it may be said that this study suggests that boredom is associated with frustration, and in particular, the frustration of specific motivational needs. It may have been the case, however, that these findings were a function ot the types of activities that the subjects nominated. For example, if. despite attempts to ensure their comparability, there was any tendency for systematic differences in the nature of activities elicited for the three categories (other than the boredom/interest experienced) to occur, then these may be responsible for the differences found.

Consequently it was decided that a further study should be carried out in an attempt to replicate these findings. In the next study, however, comparability of activities was controlled more precisely than in this one. This was done by requiring the activities all to come from the same class; school subjects.

EXPERIMENT 5

A SECOND INVESTIGATION OF THE RELATIONSHIP BETWEEN BOREDOM AND FRUSTRATION

The purpose of this experiment was to attempt to replicate the findings of the previous study using activities that were more comparable with each other, namely, school subjects which the person had found interesting, boring, or which he had disliked.

Hypotheses

It was hypothesised that boring school subjects would be significantly more frustrating than disliked or interesting ones and that interesting school subjects would be more satisfying than disliked ones. Further, it was predicted that the pattern of satisfaction/frustration of individual needs would be similar to that found in Experiment 4.

METHOD

Materials

The revised version of the MNSS was used with the addition of the two items for each of the needs of endurance, heterosexuality and intraception that were tested in Experiment 4 (see Appendix 9). The EPPS was used for weighting purposes.

Subjects

Eighteen 'A' level college of further education students: 10 female, 8 male, aged 16-20 years (mean age = 18.66 years).

Procedure

The procedure used in this study was identical to that used in Experiment 4, with the exception of the type of activities elicited. In this study, the subjects were asked to think about the subjects they had taken in school in their fifth year, and to nominate two which they had found interesting, two which they had disliked but not found boring, and two which they had found boring. (It was assumed that doing school subjects would be regarded by pupils as socially desirable.) When the pupils were rating these subjects on the MNSS they were

asked to think of a particular class in the subject and to rate how they felt during it.

RESULTS

Scoring

The MNSS items were scored and weighted in the same manner as was employed in Experiment 4.

Overall satisfaction/frustration

In order to assess the overall level of satisfaction/frustration experienced whilst taking interesting, disliked and boring school subjects, the weighted scores on each MNSSscale were added for each person to give single I, D and B scores. A table showing each person's overall I, D and B scores can be found in Appendix 10.

The mean satisfaction scores for I, D and B subjects were as follows:

TABLE 8

Table showing overall mean satisfaction scores

	Interesting subjects	Disliked subjects	Boring subjects
Mean score	731.88	-39.28	-383.78

Three Wilcoxon tests were carried out on the set of eighteen satisfaction scores and the difference between the three categories of school subject were found to be significant at the 0.01 level or better (B/D: T=18, I/D: T=0, I/B: T=0). Thus, again. it appears that interesting subjects are very satisfying, boring subjects are very frustrating and disliked subjects are slightly frustrating of motivational needs.

The pattern of satisfaction/frustration of individual needs

For each class of school subject, t-tests were carried out, using the weighted scores for each motivational need. The results of these t-tests can be seen in Table 9.

This time it appears that the pattern of satisfaction/frustration falls into

three types: 'unipolar', bi-polar' and tri-polar' patterns.

TABLE 9

Table showing t-tests between Interesting, Disliked and Boring school subjects for each motivational need

	t-tests			Mean scores			Pattern
NEED SCALE	I/D	I/B	D/B	I	D	B	of Satis-faction
Achievement	t=6.25***	t=8.72***	t=1.42	117.67	-43.28	-79.89	I-DB
Deference	t=-2.12*	t=-2.96**	t=0.07	-7.94	25.56	24.61	DB-I
Order	t=5.29***	t=7.3***	t=2.13*	74.39	8.56	-34.5	I-D-B
Exhibition	t=2.98**	t=3.28**	t=1.02	43.72	-3.56	-25.17	I-DB
Autonomy	t=3.44**	t=2.49*	t=-0.69	41.0	-52.78	-41.56	I-DB
Affiliation	t=3.7**	t=5.01***	t=0.56	119.33	49.11	35.06	I-DB
Succorance	t=2.11*	t=3.9***	t=0.6	58.17	-0.28	-15.28	I-DB
Dominance	t=4.41***	t=5.15***	t=2.22*	49.67	-29.94	-61.5	I-D-B
Abasement	t=-6.36***	t=-5.58***	t=-0.37	-98.28	-49.22	57.78	DB-I
Nurturance	t=2.35*	t=2.73*	t=-0.38	38.11	-23.94	-18.44	I-DB
Change	t=4.84***	t=9.55***	t=4.41***	113.33	-19.28	-113.22	I-D-B
Aggression	t=-0.76	t=-0.36	t=0.32	-11.0	-3.28	-7.28	IDB
Endurance	t=4.55***	t=7.89***	t=2.28*	74.56	-0.56	.33.5	I-D-B
Hetero-sexuality	t=1.99	t=1.66	t=0.47	31.44	6.72	1.78	IDB
Intraception	t=5.72***	t=5.28***	t=-0.35	99.33	-28.33	-24.33	I-DB

*** $p<0.001$

** $p<0.01$

* $p<0.05$

The 'Unipolar' pattern

It would appear that on this occassion the pattern of satisfaction of two needs failed to distinguish between I, D and B activities. The needs showing this pattern were aggression and heterosexuality. The differences between the three classes of school subject in terms of the satisfaction/frustration experienced were not significant. It should be noted that a large number of people considered the MNSS item relating to these needs irrelevant to how they felt whilst performing their school subjects. On 62.03% of occasions aggression items were recorded

as irrelevant, and on 73.61% of occasions heterosexuality items were rated as irrelevant.

The 'bi-polar' pattern

On this occasion two bi-polar patterns were found. Those where frustration was associated with negative affect generally: I-DB patterns, and those where satisfaction was associated with negative affect generally: BD-I patterns. Needs showing an I-DB pattern were achievement, exhibition, autonomy, affiliation, succorance and intraception. The DB-I pattern was exhibited by abasement and deference needs.

The 'tri-polar' pattern

The needs falling into the I-D-B pattern were, on this occasion, order, dominance, change and endurance. It is interesting to note that achievement and exhibition did not show this pattern as they did in experiment 4. They were replaced by order and dominance which, in experiment 4, showed an I-DB pattern.

It was considered possible that the achievement need did not show an I-D-B pattern because of the nature of the activities being rated in this experiment. The pupils were rating subjects that they had taken in school in their fifth year, many of which had been examined at 'O' level or CSE. It was hoped that the achievement being tapped by the MNSS was essentially subjective feelings of achievement, and in experiment 4 where activities in general were rated this may have been the case. However, in this study, the pupils had external criteria to judge their achievement upon, namely examination results and teachers' comments. It would seem possible that it was these external criteria of achievement that had been used by the pupils in this study.

In order to investigate this a small supplementary study was carried out:

EXPERIMENT 6

EXPERIMENT TO ASCERTAIN UNDER WHAT CIRCUMSTANCES PUPILS FEEL A SENSE OF ACHIEVEMENT AT SCHOOL

METHOD

Subjects

Eighteen sixth form college students: 9 male, 9 female, aged 16 - 18 years (mean age 16.89 years).

Procedure

Each subject was individually asked the following question:

'When do you feel that you are achieving something in your school subjects?' The pupils replies were recorded.

RESULTS

A list of each person's replies to the question asked can be found in Appendix (11). 61% of the pupils mentioned good examination or essay marks as a criteria for assessing such achievement.

33% of people mentioned teacher's praise as a criteria for assessing such achievement, 72% of people mentioned one or both of these criteria to assess their achievement in school subjects.

It would appear likely, on the basis of these results, that most pupils use the external criteria of success provided by examination results and teachers praise to assess their achievement in school subjects. If such external criteria were being used with respect to school subjects but not with respect to the general activities elicited in Experiment 4, then this may account for the difference in the pattern of satisfaction/frustration of the achievement need found.

DISCUSSION OF THE RESULTS OF EXPERIMENTS 4, 5 AND 6

Experiment 5 again clearly indicates that satisfaction of motivational needs is associated with interest, and that frustration is associated with boredom. Disliked school subjects appear to be associated with slight frustration, but significantly less than boring subjects. The overall satisfaction/frustration results from Experiment 5 clearly strengthen those of Experiment 4.

There would, however, appear to be some discrepancy between the results of Experiments 4 and 5 with respect to the satisfaction and frustration of individual needs. The results of these two experiments in this respect are summarised in Table 10:

TABLE 10

Summary table of the pattern of satisfaction/frustration of individual needs from experiments 4 and 5

Pattern of Satisfaction/frustration

I - DB		DB - I	
Expt. 4	Expt. 5	Expt. 4	Expt. 5
Order	Achievement	Deference	Deference
Autonomy	Exhibition	Abasement	Abasement
Affiliation	Autonomy		
Succorance	Affiliation		
Dominance	Succorance		
Nurturance	Nurturance		
Heterosexuality	Intraception		
Intraception			

Pattern of Satisfaction/frustration

ID - B		I - D - B		IDB	
Expt. 4	Expt. 5	Expt. 4	Expt. 5	Expt. 4	Expt. 5
Aggression		Achievement	Order		Heterosexuality
		Exhibition	Dominance		Aggression
		Change	Change		
		Endurance	Endurance		

It can be seen from Table 10 that nine out of the fifteen needs showed the same pattern of satisfaction/frustration in both studies. It appears that the I-DB pattern needs of autonomy, affiliation, succorance, nurturance and intraception, and the DB-I pattern needs of deference and abasement, reflect general negative affect. Frustration of the I-DB pattern needs, and satisfaction of the DB-I needs, was associated with both dislike and boredom. It is the I-D-B pattern needs that seem to characterise the particular negative affect associated with boredom. Two needs exhibited this I-D-B pattern of satisfaction/frustration in both studies, namely the needs of change and endurance. Consequently, it appears that the frustration of these two needs may be central to the negative affect associated with boredom.

It seems not unreasonable that frustration of the need for change should be associated with boredom. Frustration of this need is associated with lack of variety in experience, and this is commonly accepted to be an aspect of boredom (see pages 25 - 29). However, this frustration of the need for change may reflect subjective rather than physical monotony. The subjects felt that things were monotonous, but there is no evidence that these feelings reflected actual physical monotony in the activities they were performing. Consequently, it may have been the subjects' perceptions of the activities that led to frustration of the need for change, rather than any lack of physical variety in the activities themselves.

The reasons for a relationship between boredom and frustration of the endurance need are, at first sight, less obvious. Frustration of this need is essentially frustration of the wish to persist. It seems possible that this wish to persist was frustrated because of the higher level of overall frustration that was associated with boredom. It may be the case that the more frustration of other needs is experienced, the less the person wants to continue what he is doing and frustration of the endurance need results.

The results obtained in Experiments 4 and 5 clearly show the value of comparing not only interest and boredom, as has been done by previous researchers (see page 30-31), but dislike as well. It can be seen that, whilst boredom is associated with significantly more frustration than dislike, the frustration of some needs appears to be associated with general negative affect (the I-DB pattern needs), and the frustration of others seems to be associated with the particular negative

affect of boredom (the I-D-B pattern needs).

It is not possible to be sure whether the differences in individual need satisfaction that were found between Experiments 4 and 5 were real or spurious: whether they were statistical artifacts or results of the different types of activities being construed. It would seem likely that the differences are not statistical artifacts, because there is a considerable degree of commonality between the two sets of results. Assuming that the differences are real it would seem likely that they in part arose because some needs are simply not relevant to certain activities. It would seem unreasonable to suppose that all activities satisfy or frustrate all needs. Rather it is likely that some activities, in personal construct theory terms, fall outside the range of convenience of some needs.

In Experiment 5 it seems probable that the needs of heterosexuality and aggression may have failed to show different levels of frustration/satisfaction for I, D and B activities as they did in Experiment 4, because these two needs were considered largely irrelevant to school subjects. The items relating to both of these needs were considered irrelevant in a large proportion of cases and thus the spread of scores on these two needs was small.

It is possible that in experiment 5 different criteria of achievement may have been used by the subjects in rating the activities than were used in Experiment 4. Experiment 6 suggests that school pupils employ the external criteria of examination results and teacher's comments to assess their achievement in school subjects. It seems likely that this was responsible for the absence of a significant difference between the frustration of the achievement need experienced in D and B activities. It should be noted, however, that the differences between D and B activities in this context was in the same direction in both studies, although in Experiment 5 it failed to reach significance (see Tables 7 and 9).

The pattern of satisfaction/frustration of the need for exhibition in the two studies shows the same pattern as that of the achievement need. In Experiment 4 it showed an I-D-B pattern whereas in Experiment 5 the difference between D and B activities, although in the same direction as in the first, failed to reach significance. This may be explained in similar terms to the differences in the satisfaction of the

achievement need. Maybe different criteria were used for assessing exhibition need satisfaction in the two studies. It is possible that in a school classroom pupils only feel that they can 'show off' if the do well in the subject.

The needs of order and dominance show an I-D-B pattern in Experiment 5, whereas in the first they showed an I-DB pattern. However, again, the pattern of mean scores in Experiments 4 and 5 for I, D and B activities were the same, but in the former the difference between D and B activities in terms of their satisfaction scores failed to reach significance.

That the order need should show an I-D-B pattern is rather interesting. It appears that boredom is associated with frustration of the order need: things appear disorderly, chaotic. If boredom results when a person is unable to extract appreciable meaning from stimulation, as has been suggested (pp25-29), then this may explain the finding. It seems likely, particularly with school subjects that if a person feels that everything is organised and orderly, then he is able to understand what he is being taught and thus more likely to extract appreciable meaning from it. Feelings of disorganisation would seem likely to be associated with lack of understanding, and this, as shown by Morton-Williams and Finch (1968) is related to boredom at school. It is probable that in school the prime focus is on understanding what is going on, more so than in general life. Thus this may account for the difference found between the two studies with respect to the pattern of satisfaction of the order need.

A similar explanation might be offered for the I-D-B pattern of satisfaction/ frustration on the dominance need. In the MNSS, the dominance need is tapped by such items as 'I felt dominant/I felt submissive'. Maybe, in relation to school subjects, if a person feels he can understand what is going on, if he feels he can do well, then he will also feel dominant. Conversly if he fails to understand, he is likely to experience frustration of the need for dominance, and boredom.

Thus as far as overall satisfaction/frustration is concerned, Experiment 5 confirm the results of Experiment 4. Namely interesting activities are associated with satisfaction, whilst boring activities are associated with frustration. The patterns of satisfaction for individual needs shows considerable commonality between

the two studies, though certain differences in pattern are evident and these may be explicable in terms of the different types of boring and interesting activities considered.

CHAPTER 9

SUMMARY AND CONCLUSIONS FROM THE EXPERIMENTS ON BOREDOM AND FRUSTRATION

The initial experiments in this section (1, 2 and 3) were concerned with constructing an instrument (a MNSS) to assess the satisfaction/frustration experienced whilst performing particular activities. The MNSS consists of a series of supplied constructs based on the needs used in the EPPS. The results of Experiment 3 show that the revised version of the MNSS possessed satisfactory psychometric properties for the uses to which it was put. The internal validity of the MNSS was reasonably good (see pages 60 - 61) and although social desirability appeared to exercise some effects on MNSS ratings (see page 61), it was decided that this problem might be avoided by comparing only the satisfaction/frustration experienced in the performance of socially desirable activities. The MNSS and the EPPS were used in an investigation of the satisfaction/frustration experienced whilst performing interesting, boring and disliked activities.

The last experiments in this section (experiments 4 and 5) were concerned with investigating the relationship between boredom and frustration, and their results may be summarised as follows:

Overall satisfaction/frustration and the experience of boredom

Both Experiments 4 and 5 clearly indicated that boredom is associated with frustration. Not only were boring activities significantly more frustrating than interesting ones, they were also significantly more frustrating than disliked ones. This confirms the informal observations of such researchers as Zweig (1953), Barmack (1937), Baldamus (1951), Stagner (1975) and Heron (1957), and is consistent with the theories of Berlyne (1960, 1967) and Hebb (1966). However it is not consistent with the results of London, Schubert and Washburn (1972). It was suggested previously (p 30) that the single scale assessment of frustration used in the London et al study was not a very satisfactory way of assessing the frustration experienced. In the light of the results obtained here, this would indeed seem to be the case, and it appears reasonable to conclude that boredom is associated with frustration.

Specific need satisfaction/frustration

There would appear to be three major types of satisfaction/frustration pattern experienced whilst performing interesting, disliked and boring activities. The frustration of some needs appears to be associated with negative affect in general. This has been called an I-DB pattern and was consistently exhibited in two studies by the needs of affiliation, autonomy, succorance, nurturance and intraception. Conversley, the satisfaction of some needs appears to be associated with negative affect generally. This has been called a BD-I pattern, and was consistently exhibited by the needs for deference and abasement.

Most interesting with respect to the relationship between boredom and frustration are the needs showing an I-D-B pattern (and the one ID-B pattern need). It would appear that whilst boredom is associated with overall frustration, it is also associated with the frustration of particular needs, that is those showing an I-D-B pattern. These include change, endurance and possibly under some circumstances achievement, exhibition, order and dominance. This offers some confirmation of the findings of Gjesme (1977) and the observations of industrial researchers such as Baldamus (1951) and Turner and Miclette (1962), who have argued that motives are important in the development of boredom.

It would appear that the particular needs whose frustration is associated with boredom do to some small extent differ with respect to the particular activities that produce the boredom. It seems likely that, in personal construct theory terms, some activities fall outside the range of convenience of particular needs. It would NOT seem likely that all activities satisfy/frustrate all needs, rather it would appear probable that some activities neither satisfy nor frustrate particular needs. That is, some needs are irrelevant to the construing of certain activities. Differences between activities rated in the two studies (Experiment 4 and 5) may therefore have in part lead to the few different patterns of satisfaction/frustration found.

The results of Experiments 4 and 5 would suggest that the naturalistic/ retrospective strategy of investigating the boredom/frustration relationship, within the framework of personal construct theory, was an appropriate one to use. Despite the small sample sizes used (24 and 18 subjects respectively) the results found were highly significant in both cases, and some very interesting patterns of individual need

satisfaction/frustration were revealed.

The over-riding conclusions from these experiments must be that boredom is associated with a significantly higher degree of frustration than either interest or dislike, and specifically the frustration of particular motivational needs that are relevant to the task being performed.

SECTION 3

THE ANTECEDENT CONDITIONS OF BOREDOM

CHAPTER 10

INTRODUCTION

It was argued earlier (pp 25-29) that physically monotonous stimulation may be neither a necessary nor a sufficient condition for the occurrance of boredom. It was suggested that the cause of boredom might lie in the way in which a person perceives stimulation. That is, boredom may result when stimulation has little psychological impact upon the person concerned. It may be the case that stimulation lacks psychological impact for a person because he is unable to extract appreciable meaning from that stimulation. This inability to extract appreciable meaning from stimulation may lead to a situation in which the person perceives stimuli as being 'all the same', ie as subjectively monotonous. Thus the experiments reported in this section investigated the hypothesis that boredom results when stimulation lacks psychological impact for a person, and that this impact is a function of two elements: meaning extracted and subjective monotony/variety.

Experiment 7 was concerned, in general terms, with the impact of boring, disliked and interesting events. That is, it investigated people's ability to construe their experiences of such events.

Experiment 8 attempted a replication and extension of Experiment 7. It was designed to clarify the notion of psychological impact in terms of its proposed elements: subjective monotony and meaning extracted. Consequently, the construing of those who were bored and those who were interested in a task, was compared in relation to the meaning they extracted from stimulation and the variety they perceived in it.

Experiment 9 was an attempt at a causal study of the relationship between boredom and subjective monotony. That is, it attempted to determine whether a person's construing changes as he becomes bored - whether, as he becomes bored, he gradually perceives less variety and/or extracts less meaning from stimulation.

CHAPTER 11

EXPERIMENT 7: AN INVESTIGATION OF THE PSYCHOLOGICAL IMPACT OF INTERESTING, DISLIKED AND BORING ACTIVITIES

The purpose of this experiment is to investigate, in general terms, the psychological impact of interesting, disliked and boring activities upon the people performing them. It was noted, whilst talking to subjects in previous experiments, that, whilst they were able to offer long explanations for their interest in or dislike of certain activities, they offered few reasons for being bored. It was considered that this apparent use of few constructs to construe the experience of boredom, indicated that boring events may lack psychological impact for the people concerned - they apparently construed their experiences in an undifferentiated manner. Consequently, it was decided that the number and type of constructs used to construe the experience of interest dislike and boredom, should be investigated in a more formal manner.

It was decided that this study might usefully employ a retrospective/ naturalistic strategy, as was used in the previous section. It was considered that such a naturalistic study would provide more useful information than a manipulative one, as it makes a minimum of assumptions concerning the nature and antecedents of boredom.

As well as investigating the number of constructs used, this study was also concerned with investigating the types of construct people used to construe their experience of boredom, interest and dislike. These have been studied in both educational and industrial fields by such researchers as Morton-Williams and Finch (1968) and Turner and Miclette (1962). However, such studies have not compared the reasons for dislike of an activity with those for boredom in particular. It seems reasonable to assume that boring activities are a subset of disliked activities. Consequently, it is unclear whether the perceived meaninglessness and lack of relevance that such studies find to be associated with boredom are a function of dislike in general or boredom in particular.

Nevertheless, the main purpose of this study was to investigate the

psychological impact of boring, interesting and disliked experiences. Impact was provisionally defined in terms of the number of constructs a person used to construe his experiences: the more constructs, the greater the impact.

Hypotheses

It was predicted that significantly fewer constructs would be used to construe boring experiences than disliked or interesting ones. No specific hypotheses were made concerning the type of constructs that would be used.

METHOD

The technique used in this investigation was similar to one used by researchers within the field of personal construct theory for investigating the construing of thought disordered schizophrenics (Dixon, 1968). The person was required to say why he was interested in/bored by/disliked certain activities. The replies were then analysed for the number and nature of reasons given by that person for his interest/dislike/boredom.

It was considered necessary that the events to be construed should be as similar as possible. If they were not, then any differences in construing that were found may be a function of differences in the nature of the events, and not the boredom/interest/dislike experienced. Consequently, it was decided that people should be required to construe their school subjects. Again, it was considered important to include disliked, as well as boring and interesting school subjects. This allowed a comparison to be made between the construing of disliked experiences in general and boring experiences in particular.

Subjects

Eighteen 'A' level college of further education students: 10 female, 8 male, aged 16 - 20 years (mean age 18.66 years).

Procedure

Each person was seen individually and asked to consider the subjects which he had taken in his fifth year at school. He was asked to nominate two subjects which he had found interesting (I), two which he had disliked, but not found boring (D), and two which he had found boring (B). These school subjects were

then randomly ordered and presented to the person, who was asked:

"Why did you find (the subject) interesting?"

or

"Why did you dislike (the subject)?"

or

"Why did you find (the subject) boring?"

Each person was given three prompts for every school subject, of the form:

"Any other reasons?"

The person's replies were written down verbatim. (Attempts were made in a small pilot trial to tape-record the person's replies, but it was found that this reduced the quality and quantity of the person's response - people tended to give more reasons and more detail when a recorder was not used.)

ANALYSIS OF DATA

The transcripts of each person's replies were given to two judges for analysis. The judges were both experienced psychologists who had no prior information about the experiment or its hypotheses. Both judges analysed the transcripts independently, and were given the following instructions:

> "These are transcripts of the reasons that several people gave when asked why they had found their school subjects interesting, boring or why they had disliked them. I would like you to list the number of distinctly different reasons that each person gives for his interest/dislike/boredom with every subject."

The reasons thus extracted by each of the judges can be found in Appendix 12.

The number of constructs used by each subject to construe his interest/dislike/boredom was assessed by adding the number of reasons extracted by each judge separately. This gave each person an I, D and B score for each judge. These scores can be found in Appendix 13. Although the correlations between the number of reasons extracted by each judge were high and significant ($r=0.75$ for interesting activities, $r=0.62$ for disliked activities and $r=0.69$ for boring activities) there was some discrepancy between them. Consequently, for further analyses the judges scores were treated separately.

In order to investigate the types of reason people gave for their interest/

dislike/boredom, the reasons elicited by the two judges were scrutinised and divided into categories. As the judges differed slightly with respect to the reasons they elicited, this procedure was carried out separately for each judge. This categorisation of reasons can be found in Appendix 14.

RESULTS

The number of constructs used

For each judge's scores, three t-tests were carried out between I and D, I and B and D and B reasons. The results of these t-tests can be seen in table 11:

TABLE 11

Table showing t-tests between the number of reasons given for finding Interesting, Disliked and Boring school subjects interesting, disliked or boring

	T-TESTS			MEAN NUMBER OF REASONS		
	I/D	I/B	D/B	I	D	B
Judge 1	t=5.22 ***	t=6.8 ***	t=3.4 **	8.083	6.028	4.556
Judge 2	t=3.01 **	t=8.42 ***	t=3.91 **	7.111	5.778	4.000

*** $p<0.001$ ** $p<0.01$

Thus it can be seen that significantly more reasons were extracted by both judges for interest than for boredom. Whilst significantly fewer reasons were given for dislike than for interest, there were significantly fewer reasons given for boredom than for dislike.

The type of construct used

From the categorisation of the reasons elicited by both judges (see Appendix 14) the following conclusions appear to emerge:

1. Interest in a school subject appears to be associated with:

a) Good relationships with the teacher and other members of the class.

b) An ability to do the subject - understanding of the subject.

c) Autonomy and independence in that subject's classes.

d) Perceived variety within the subject and difference from other subjects.

e) An ability to relate to the subject - the subject was perceived as relevant.

f) Perceived 'good' teaching in terms of explanation, feedback, method and content.

g) Enthusiasm, effort and amusement.

2. Dislike of a school subject appears to be associated with:

a) Poor relationships with the teacher and other members of the class.

b) An inability to do the subject - lack of understanding of the subject.

c) Perceived lack of variety within the subject.

d) An inability to relate to the subject: it was perceived as irrelevant.

e) Perceived 'poor' teaching in terms of explanation, feedback and content.

f) Lack of enthusiasm and either too much or too little effort required.

3. Boredom with a school subject appears to be associated with:

a) Poor relationships with the teacher and other class members.

b) An inability to understand the subject.

c) Perceived lack of variety within the subject.

d) Perceived lack of relevance of the subject.

e) Perceived 'poor' teaching in terms of explanation, feedback and content.

f) Lack of enthusiasm and effort.

DISCUSSION

This experiment suggests that boring events lack psychological impact. That is, people use fewer constructs to construe the experience of boredom than they use to construe the experience of dislike or interest. There were differences between the two judges in terms of the number of reasons extracted from the transcripts, which suggests that the two judges may have been using slightly different criteria. However, the results of the t-tests carried out, show there is a highly significant difference between the number of reasons given for experiencing interest, boredom or dislike of school subjects, whichever judge's figures are used. Consequently, it does appear that boredom is associated with the use of relatively few constructs.

It is interesting to note that it appears to be the case that people construe boring and interesting school subjects at the opposite poles of the same constructs. This is consistent with the findings relating to the satisfaction and frustration of motives of the previous section. It may be taken as indicating that interesting subjects were probably satisfying, and boring subjects probably frustrating of underlying motives. Indeed the reasons given for experiencing boredom are very

similar to those found by Morton-Williams and Finch (1968). They found lack of understanding, repetitiveness, passivity and perceived uselessness to be associated with boredom at school (see pages 11 - 12). These were found to be associated with boredom in this study, with the exception of passivity (however this may have been included in some of the comments on teaching style). Boredom was also found in this study to be associated with lack of enthusiasm and effort, which again has been found by other educational researchers (Morton-Williams and Finch, 1968; Robinson, 1975; Newsom, 1963). This study also suggests that boredom may be associated with poor teacher-pupil and pupil-pupil relationships. Such relationships, when good, may tend to alleviate boredom that may otherwise be experienced. That is, good social relationships within the class may well constitute a diversionary activity.

However, what is particularly interesting here, is that the reasons given for dislike of school subjects are substantially the same as those given for boredom with school subjects. A few people even reported that disliked subjects were monotonous, but not boring. This may be explained if it is assumed that boring subjects are a subset of all disliked subjects, and suggests that features such as lack of understanding are common to disliked subjects, not specific to boring ones. However, there is no indication from this study as to the degree of lack of understanding, etc. It may be the case, for example, that boring activities are associated with a greater lack of understanding than disliked ones.

Thus this experiment suggests that people use relatively few constructs to construe the experience of boredom - they are relatively unable to construe the experience of boredom in a differentiated manner. Although people apparently construe the experience of boredom and dislike at the same pole of similar constructs, they use significantly fewer constructs to construe the experience of boredom. This suggests that boring events lack impact for the people concerned. This lack of impact may be associated with perceived repetitiveness, and an inability to extract appreciable meaning from stimulation, as is suggested by the types of reasons people gave for their boredom. It would seem unlikely that this perceived repetitiveness is a reflection of the actual physical monotony of the school subjects. One person regarded mathematics as interesting whilst another, who had been in the same class, thought it boring. It would seem reasonable to assume that the physical monotony/

variety experienced by both was the same - they just perceived it differently.

However, there may have been a problem with this experiment with respect to its retrospective nature. It may have been the case that the subjects which a person was interested in at 'O' level were pursued at 'A' level. They may thus have been more memorable and the experience of interest during them construed using more constructs. That is, differential memory for the school subjects may have affected the number of constructs used.

Consequently, Experiment 8 will attempt to replicate the findings of this experiment in a current setting, and to investigate the role of meaning and subjective monotony in the production of boredom.

CHAPTER 12

EXPERIMENT 8: IMPACT, SUBJECTIVE MONOTONY, MEANING AND BOREDOM

INTRODUCTION

Experiment 7 demonstrated that the experience of boredom seemed to lack psychological impact. This lack of impact seems likely to be a function of the way in which a person construes situations which he finds boring. It was argued earlier that an event may lack impact for a person because he is unable to extract appreciable meaning from it, and that this may lead to a situation in which he perceives events as 'all the same' - as subjectively monotonous. Certainly, the results of Experiments 4 and 5 suggested that perceived lack of variety in experience was associated with boredom. That is, boredom was associated with frustration of the need for change, and there was no evidence to suggest that this was a function of a lack of physical variety in stimulation.

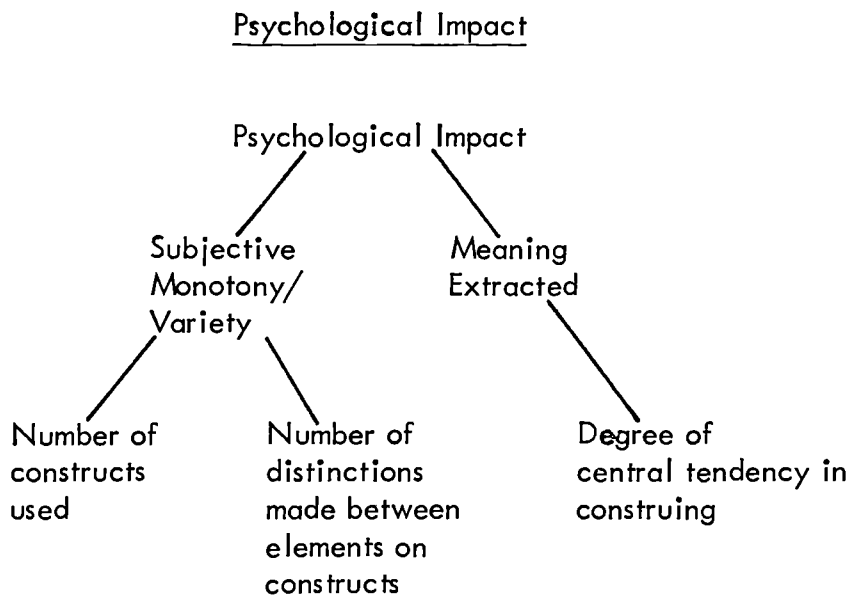
If a person perceives stimuli as 'all the same' then this may be reflected in his construing in two ways. Firstly, Crockett (1965) has shown that the more constructs a person uses, the more differentiations he is making between elements. Consequently, if a person perceives stimuli as subjectively monotonous then it may be expected that he would use few constructs to construe that stimulation. Secondly, if a person perceives stimuli as 'all the same' it seems likely that he would make few, rather gross distinctions between them on the constructs which he does use. Consequently, in this study subjective monotony will be operationally defined in terms of the use of few constructs and few distinctions between elements on those constructs.

The degree of meaning that a person extracts from stimulation may be ascertained using a method developed by Hill (1980). Osgood (1957) has argued that stimuli that are meaningless to a person are construed near the central point on semantic differential scales. As the construct scales used in a repertory grid are similar to those in a semantic differential, Hill (1980) argued that a measure of such 'central tendency' in construing can be used as a measure of the meaning of the

elements for the person who construes them. Using such a measure, Hill (1980) found that people's construing of films that they had found boring or interesting differed significantly in the expected direction. Consequently, in this study, lack of appreciable meaning extracted from stimulation was operationally defined in terms of a tendency to construe elements near to the central point of construct scales.

Thus it was argued here that boring events lack psychological impact for a person, and that this lack of impact is a function of the way in which that person construes situations which he finds boring. A diagram might help to clarify this argument:

DIAGRAM 1



Psychological impact may be a function of the meaning extracted from stimulation and the subjective monotony/variety experienced. Subjective monotony/variety may be viewed in terms of the number of constructs used and the number of distinctions made between elements on those constructs. The degree of meaning extracted may be seen in terms of the extent to which elements are construed near to the central point of construct scales.

In order to investigate these factors it seemed necessary to exercise considerable control over the stimuli producing interest and boredom. If the stimuli producing boredom and those producing interest differed with respect

to their actual physical variety or 'meaning', then any differences in subjective monotony experienced or meaning extracted might result from actual physical differences between the stimuli, not perceived differences. Consequently, it was decided that a current/manipulative strategy should be adopted, using the repertory grid technique, developed within the framework of the personal construct theory.

In addition to investigating the relationship between subjective monotony, meaning extracted and boredom, this experiment was also designed to attempt a replication of the results of Experiment 7. That is, it investigated the psychological impact of interesting and boring activities in the 'here and now' in order to avoid the problems of differential memory that may have influenced the results of the previous study. This lack of impact was again operationally defined as the use of few constructs to construe the experience of boredom.

Hypotheses

1) With respect to the relationship between boredom and lack of psychological impact it was hypothesised that significantly fewer constructs would be used to construe boring experiences than interesting ones.

2) With respect to the relationship between boredom and meaning extracted it was predicted that bored subjects would construe elements significantly closer to the central point of construct scales than interested subjects.

3) With respect to the relationship between boredom and subjective monotony it was hypothesised that:

a) Bored subjects would use significanly fewer constructs to construe elements than interested subjects, and

b) Bored subjects would make significantly fewer distinctions between elements on the constructs that they did use than interested subjects.

METHOD

As the purpose of this study is to compare the construing of those who were interested in a task with those who were bored by it , it was considered necessary to require people to perform a task that some would find interesting and others would find boring. There is considerable industrial literature indicating that a situation that is boring to one person is not boring to others (see pages 3-6).

If all subjects are required to perform the same task, then any differences in their construing of it cannot be explained in terms of physical differences in the task. It was decided that the construing of motorcycles might constitute a suitable task, as some people appear fanatically interested in motorcycles, whilst others are 'bored to death' by them.

As far as the constructs on which these motorcycles were construed were concerned, it was decided that some should be elicited from, and some supplied to, the subjects. In order to assess how many constructs a person uses, it is obviously necessary to elicit constructs from him. However, it seemed likely that different types of constructs would be spontaneously used by those who are bored by motorcycles and those who are interested in them, and such differences may lead to spurious differences in the nature of construing that do not reflect the meaning extracted or the subjective monotony/variety experienced. Thus it was decided that a set of common, supplied, constructs should also be used.

Selection of subjects

It was necessary for the purposes of this investigation, to select two groups of subjects: one group who were likely to find a task involving looking at motorcycles interesting and another who were likely to find it boring. Consequently a large number of undergraduates were given a set of questions to answer, directed at ascertaining their interest in, or boredom with, motorcycles (see Appendix 15). Subjects who said that they were interested in motorcycles and answered 'Yes' to at least four of the other questions were selected for further testing, as such people were considered likely to be interested with the task. Subjects who said they were bored by motorcycles, and who answered 'No' to at least four of the other questions, were also selected for further testing, as such people were considered likely to be bored by the task.

The composition of the groups selected for further testing was as follows:
Likely to be interested - 6 female, 6 male, mean age 21.58 years.
Likely to be bored - 6 female, 6 male, mean age 22.67 years.

Materials

Seven pictures of a variety of motorcycles were obtained from magazines.

These pictures were in colour and were all approximately 6 inches x 8 inches in size. They were mounted on A4 size paper and the name and model number of the mototcycle was written beneath the picture. The motorcycles ranged in size from 50cc to 1200cc and were of a variety of ages and designed for a variety of uses. These pictures were the elements to be construed.

In order to determine the constructs that should be supplied to the subjects, ten people (who were not motorcycle experts or enthusiasts) were asked to list the terms which they used to think about motorcycles (see Appendix 15). The most commonly occuring six of these were selected as the basis of the bipolar constructs to be supplied (see Appendix 16).

Procedure

Each subject was tested individually and asked to perform the following:

1) Initial familiarisation

In order to familiarise the subjects with the motorcycle pictures to be used, a paired comparison was carried out. The subjects were presented with every possible pair of pictures and asked on each occasion to say which one they preferred. This exercise was solely intended to familiarise the subjects with the stimuli, and the results of it were not used for further analysis.

2) Construct elicitation and element rating

Constructs were elicited from the subjects using the minimum context method (Bannister and Mair, 1968). Three of the motorcycle pictures were layed out in front of the subject, who was asked to provide a way in which he considered one of them to be different from the other two. He was asked not to give physical details of the bikes, but rather to consider:

a) The qualities that the bikes might have

b) The sort of uses they may have

c) The sort of person who might own them

d) The reasons why one might want to own them

e) The sort of bike they might be to ride.

Having given a construct and contrast, the person was then presented with all seven pictures and asked to give each a mark out of seven on that construct. He was asked to give a high mark (7) if the bike was very _____(construct) and low mark (1) if the bike was very _____(constrast). If the bike was in

between, he was asked to give a mark between these extremes. The subjects were also told that they may give more than one motorcycle the same mark if they considered them to be the same on that construct. As the person gave the bikes their marks he handed the photographs to the tester.

This procedure was repeated twentyone times with different triplets of pictures. The triplets were arranged so that each picture appeared an equal number of times and each triplet was different.

If a person was unable to give a different construct he was prompted (using prompts (a) to (e) on page 99). The subject was only permitted not to give a new construct when all the prompts had been exhausted. Thus those subjects who found difficulty in giving constructs received more prompting than those who had no difficulty.

If a new construct appeared to the tester, to be similar to one that had already been given, the subject was asked to give another one. If the construct given was the same as one later to be supplied he was also asked to think of another.

3) Rating on the supplied constructs

Subjects were then asked to rate seven pictures on the six supplied constructs (see Appendix 17). This rating was performed in the same manner as used for the elicited constructs.

4) Assessment of interest/boredom

Each subject was asked, orally, the following question:

"Now I want you to tell me whether you found this task interesting or boring. Did you find it boring or interesting?"

The subject reply was recorded, and he was then asked to state his degree of boredom/interest. Each subject was asked the following question:

"Did you find it slightly, reasonably or very (interesting/boring)?"

Again the subject's reply was recorded.

5) Overall impact

Lastly, each subject was asked:

"Why did you find it (interesting/boring)?"

Each person was given three prompts of the form:

"Any other reasons?"

The subject replies were recorded.

RESULTS

The subjects were divided into two groups in terms of their stated interest/boredom with the experiment. The bored (B) group comprised three people who had found the experiment slightly boring, five who had found it reasonably boring and three who had found it very boring, making a total of eleven. The interested (I) group comprised three people who had found the experiment slightly interesting, eight who had found it reasonably interesint, and two who had found it very interesting, making a total of thirteen. Thus the two groups were reasonably comparable with respect to the extent of their interest/boredom. (It should be noted that the rating that three subjects gave of the experiment did not correspond to their response to the initial subject selection questions.)

Overall impact

The transcripts of the reasons that each subject gave for his boredom/interest with the task were given to two judges. These judges were both experienced psychologists who had no prior knowledge of the experiments. The instructions which they were given were substantially the same as those used in Experiment 7 (see page 90). Each judge was asked to decide on the number of distinctly different reasons that each person had given for his boredom/interest. The reasons which the judges extracted can be found in Appendix 18. As it can be seen, the judges must, again, have been using slightly different criteria for the reasons they extracted, but the correlations between them were high ($r=0.92$ for those who were interested and $r=0.75$ for those who were bored). Consequently, separate t-tests were performed on the number of reasons extracted by each judge separately, and the results can be seen in Table 12.

TABLE 12

Table showing t-tests between the number of reasons given by subjects for their boredom or interest

	T-TESTS	MEAN NUMBER OF REASONS	
		I	B
Judge 1	t=6.60	5.15	2.18
	p<0.001		
Judge 2	t=2.42	4.77	3.00
	p<0.05		

It can be seen that significantly more reasons were extracted by both judges for interest than for boredom. This suggests that the task lacked impact for those subjects who found it boring. Consequently, in order to assess the importance of subjective monotony and meaning extracted, two further sets of analyses were carried out.

Subjective Monotony

a) The number of constructs elicited

It has been argued that if a person finds something subjectively monotonous, then he will not use many constructs to construe it. Consequently, the number of constructs elicited from each subject in both I and B groups was counted. These figures appear in Appendix 19. The mean number of constructs elicited from the I group was 18.77. The mean number of constructs elicited from the B group was 14.18. The difference between the number of constructs elicited from the two groups was found to be significant at the 0.001 level (t=3.90).

b) Category usage scores

It has been argued that if a person finds something subjectively monotonous he will not make many distinctions between events, either in terms of the number of constructs used, or in terms of the way in which these constructs are applied to the elements. It was with the latter of these that the category usage scores were concerned. It may be argued that if a person is making few distinctions between elements in a grid then this is likely to be reflected in his rating of those elements on the constructs. That is, he is likely to give several elements the same rating on a particular construct. For example if a person (x) rated his elements on a

construct in the following manner: 1, 2, 3, 5, 7, 6, 4, then he would be making many distinctions between those elements. If another person (y) rated his elements 1, 1, 3, 4, 7, 7, 7, then he would be making fewer distinctions between them. In order to calculate the category usage scores, the number of different ratings given on a construct were counted. For example, person x's score would be 7 and person y's score would be 4. Thus it can be seen that the higher this category usage score on a construct, the more distinctions between elements the person is making on that construct.

On the basis of these category usage scores, three scores were calculated for each person:

i) Mean category usage score (elicited)

The mean of the category usage scores for the elicited constructs was calculated for each person. These scores can be found in Appendix 19. The average mean category usage score for the I group was 5.25 and that for the B group was 4.44. The difference between the mean category usage scores of the two groups was significant at the 0.001 level ($t=4.58$). Although the difference between these two mean scores is not large, its consistency is impressive. Appendix 17 shows that all the subjects who were bored with the task obtained lower mean category usage scores than those who were interested in it.

ii) Total category usage score (elicited)

The number of constructs on which the mean category usage score was based was not the same for each person because the number of constructs elicited was different. This may have affected the results obtained. Consequently, the category usage scores for the first nine constructs were added for each person. The mean for the I group was 47.15 and for the B group was 40.73, and there was a significant difference between the scores of the two groups at the 0.002 level ($t=3.66$).

iii) Total category usage score (supplied)

It may by the case that the difference in category usage scores found between the groups on the elicited constructs was a function of the different type of construct used. Consequently, category usage scores for the supplied constructs were calculated and added together for the six constructs. These total supplied category usage scores can be found in Appendix 19. The mean score for the I group was 31.69 and for the B group was 25.27, and there was a significant difference between

the groups at the 0.001 level (t=4.79).

Meaning extracted

It has been argued (see page 96) that an element that is relatively meaningless to a person will be construed nearer to the central point of the construct scale than one that is relatively meaningful. In order to achieve a numerical assessment of this, Hill (1980) has developed a measure called a total discrepancy score. For each construct, the discrepancy from the mid-scale point value is calculated. For example, if on a rating scale of 1 to 3 the ratings of the elements are 1, 1, 3, then the discrepancy score on this construct is |1-2| + |1-2| + |3-2| = 3. In order to achieve a total discrepancy score, the individual construct discrepancy scores, thus calculated, are added. The greater the total discrepancy score is, the greater the deviation of ratings from the central point of the scale, and the greater the meaning extracted.

In this experiment, total discrepancy scores were calculated for each person on both supplied and elicited constructs. Again, as the number of elicited constructs differed between people, only the first nine elicited constructs were considered. These total discrepancy scores can be seen in Appendix 19. On the elicited constructs, the mean total discrepancy score for the I group was 116.15 and for the B group 125.27, but the difference between the scores was not significant at the 0.05 level (t=-1.85). On the supplied constructs, the mean for the I group was 73.77 and for the B group 79.45. Again there was not a significant difference between the scores of the two groups at the 0.05 level (t=-1.52). Indeed in both cases the difference between the groups in terms of these total discrepancy scores was in the opposite direction from that expected (although not significantly so).

DISCUSSION

The technique that was used here for producing boredom and interest appears to have been particularly successful. Asking subjects to construe pictures of motorcycles was perceived as boring by some and interesting by others. This means that any difference between the two groups' performance on the task cannot be explained either in terms of differential memory for boring and interesting events, or in terms of differences in the physical variety of the stimulation. The task

produced boredom ' here and now' and was the same in terms of its physical variety for both bored and interested subjects.

The results shown in Table 12 clearly replicate those of Experiment 7. It does appear that boring experiences lack psychological impact - people were relatively unable to construe the experience of boredom. Despite the differences in the number of reasons extracted by the two judges, the results from both show a highly significant difference between the number of reasons given for boredom and interest.

The results obtained further indicate that boredom is associated with subjective monotony. Subjects who were bored by the task used significantly fewer constructs to construe motorcycles. This suggests that bored subjects tended to perceive the motorcyles as 'all the same' - they used fewer constructs to differentiate between them. Crockett (1965) has argued that the more constructs a person uses, the more differentiations he is making between elements. Consequently, if a person uses few constructs it would seem reasonable to assume that he is making few distinctions between elements, and hence his experience will be relatively monotonous.

It could, however, be argued, that the number of constructs that were used was a function of that person's knowledge about motorcycles. If a person was very knowledgeable then he may have more constructs available. If, as seems likely, people who were interested in motorcycles were more knowledgeable about them, then the results obtained may be a function of knowledge rather than subjective monotony/variety. However, there is a little evidence available to suggest that this may not have been the case. The constructs used by several of the interested subjects, particularly the women, did not indicate any great technical knowledge about motorcycles. They tended to comment upon the appearance and colour of the motorbikes. For example, such constructs as 'pleasing to look at', 'would show the dirt easily' and 'unpleasant front mudguard' were elicited from such subjects. Such constructs would appear not to be associated with great knowledge, but do indicate that the person was distinguishing between the motorcycles. In addition, many of the interested subjects said that they really didn't know anything about the bikes, and appeared worried about the 'accuracy' of the constructs they gave. Thus it may

have been the case that lack of knowledge per se was not associated with the use of few constructs, simply the use of less technical constructs.

Less equivocal evidence of a relationship between boredom and subjective monotony can be gained from the category usage scores. Here a direct measure of the extent to which a person was differentiating between elements on particular constructs was obtained. The results clearly show that people who were interested made more differentiations between elements than those who were bored. Those who were interested apparently perceived more variety in the motorcycles than those who were bored, although the photographs were identical for both groups. This cannot be a function of the type of constructs elicited from the subjects because more differentiations were made by interested people on both supplied and elicited constructs. Thus these results clearly indicate that boredom is associated with a tendancy to perceive events as 'all the same' - as subjectively monotonous, and this cannot be a function of the actual physical monotony present in the stimulation.

However, this subjective monotony does not seem to be associated with 'lack of meaning' as measured here. The total discrepancy scores did not show the expected difference between the construing of the two groups. This is not consistent with the findings of Hill (1980) who found a significant difference in this respect between the construing of films that people had found interesting and boring. This discrepancy between the findings of this study and that of Hill (1980) may be explained in terms of the type of construct used by the subjects. Because of the way in which Hill's constructs were elicited, they were essentially descriptive in nature, but the ones used by the subjects in this study were essentially evaluative. It may thus be the case that this type of meaning assessment may not be particularly useful in this kind of study.

However, it may be that, whilst it is not lack of meaning in the Osgood (1957) sense that leads events to be perceived as 'all the same' it is lack of meaning or relevance of a different nature. Possibly a person assesses the meaning or relevance of an event for him in relation to his underlying needs/motives. That is, something may be perceived as relevant if it satisfies these motives and irrelevant if it does not. There is evidence from Experiments 4 and 5 that boredom is associated with the frustration of motivational needs. Thus it may be irrelevance to motivational

need satisfaction which leads to subjective monotony and so to boredom.

The overriding conclusion from this study must, nevertheless, be that boredom is associated with subjective monotony, and that this subjective monotony is not simply a reflection of physical monotony. This experiment was, however, dealing with boredom and interest in different groups of subjects. It would now appear necessary to investigate the causal relationship between boredom and subjective monotony more closely, by investigating whether a person's construing changes as he gets bored. It is with this that Experiment 9 will be concerned.

CHAPTER 13

EXPERIMENT 9: BOREDOM AND SUBJECTIVE MONOTONY

INTRODUCTION

Experiment 8 clearly suggested that people who are bored with a task perceive it as less varied than those who are interested in it. That is, they used fewer constructs, and made fewer distinctions between elements on those constructs than did people who were interested. The purpose of this experiment is to examine whether construing changes in the direction of subjective monotony as a person gets bored, that is, whether as he gets bored he perceives less variety in stimulation than he did initially.

Clearly such an investigation requires a current/manipulative strategy, and again the repertory grid technique will be employed. In this study, subjective monotony will be defined in terms of the number of distinctions made between elements on the constructs.

Hypotheses

It was predicted that:

1) Subjects who became bored with the task would make progressively fewer distinctions between elements on the construct scales.

2) Subjects who remained interested throughout the task would show no significant changes in the number of distinctions they made between elements on the construct scale.

3) There would be no significant changes in the extent to which elements were construed close to the central point of the construct scales for either bored or interested subjects.

METHOD

In order to examine changes in construing with the onset of boredom it is necessary for subjects to perform a task which they initially find interesting, but eventually get bored with. It is also necessary to compare changes in construing of people who get bored with those who remain interested in the task. If this is not done, then any changes in construing may result from repeated performance

rather than boredom. In order to exclude the effects of physical monotony as well, it is necessary to devise a single task which has the following characteristics:

a) Some subjects will initially be interested in the task, but eventually get bored with it

b) Some subjects will remain interested in the task from beginning to end.

c) The task will permit an analysis of subjects construing.

It had been noted by the author in previous experiments (not reported here) that some people find the construing of people in repertory grids boring after a while, whilst others appear to remain interested in it. It was thus decided that a suitable task for the present investigation might be the repeated construing of human faces. This would, of course, permit an analysis of changes in construing. In addition, if unknown people were construed, the problems of differential knowledge that may have affected some of the results of Experiment 8, would be avoided.

Consequently it was decided that subjects should be required to perform repeated repertory grids in which faces of unknown people were construed. In order that the construing on these repeated grids might be compared, it seemed preferable that the subjects should use the same constructs on different occasions. Thus it was decided that constructs should initially be elicited from each subject and then these same constructs could then be supplied to him on subsequent repetitions. This ensured that each subject was construing in his own terms, whilst enabling the desired comparisons of construing to be made.

However, if the same elements were construed on the same constructs on each repetition, then a subject may simply give remembered judgements, and this may obscure changes in construing. Consequently it was decided that different sets of elements should be used on each occasion. Such a procedure also ensured that the task would not provide physically monotonous stimulation to subjects.

Materials

Three sets of ten photographs of people (A, B and C) were prepared for use as the elements in the repertory grids. Each set of photographs consisted of the faces of five men and five women, who had no unusual distinguishing features. All the photographs were of people of comparable age (18 - 24 years) and skin colour.

Subjects

Twenty-six sixth form college students: 19 females, 7 males, aged 16 - 18 years (mean age 16.88 years).

Procedure

Each subject was tested individually. He was first given a brief introduction to the experiment (see Appendix 20) and was then asked to look at three photographs of people from one of the sets and asked to imagine what these people would be like. He was asked to think of a way in which one of the people might be different from the other two. The construct and contrast poles elicited by this minimum context method were recorded. The subject was then presented with all ten photographs in the set and asked rate each one out of ten in terms of the construct in the manner described in Experiment 8 (see page 99). This procedure was repeated until six constructs had been elicited and the ten photographs rated on each.

The subject was then asked the following question:

"Now I want you to tell me whether you found this task interesting or boring. Did you find it boring or interesting?"

The subject's reply was noted and he was asked to state the degree of his boredom or interest:

"Did you find it slightly, reasonably or very (interesting/boring)?"

Each subject's rating of his boredom/interest thus obtained was recorded.

The subject was then required to rate two different sets of photographs in terms of the constructs he had given so that a second and third grid were completed (see Appendix 20). After the third grid, a second boredom/interest rating was obtained in the manner described above.

In order to account for any differences in construing that might result from differences between the three sets of photographs, the subjects were divided into six groups and the sets of photographs were randomly ordered in the manner shown in Table 13.

The photographs within each set were numbered 1 - 5 for the men and 6 - 10 for the women, and the triplets of photographs used to elicit the constructs in grid 1

are as shown in Table 14.

TABLE 13

Table showing the order of photograph sets used

Subject Group	Photograph set used		
	Grid 1	Grid 2	Grid 3
1	A	B	C
2	A	C	B
3	B	A	C
4	B	C	A
5	C	A	B
6	C	B	A

TABLE 14

Table showing photographs used to elicit constructs in Grid 1

Photograph Numbers	Composition
1, 2, 3	3 men
4, 5, 6	2 men, 1 woman
6, 10, 1	1 man, 2 women
3, 4, 7	2 men, 1 woman
9, 10, 2	1 man, 2 women
7, 8, 9	3 women

Whichever photograph set was used to elicit the constructs in grid 1, the above triplets of photographs, in the above order were used for the elicitation procedure.

(For details of the instructions given to the subjects see Appendix 20.)

RESULTS

Boredom/Interest generated

The boredom/interest ratings given by each of the subjects after the 1st and 3rd grids can be found in Appendix 21. Twenty three out of the twenty-six subjects

were interested in the experiment after grid 1. Sixteen of the subjects showed a decrease in interest from grid 1 to grid 3, whilst the remaining ten showed an increase in, or a constant, interest from grid 1 to grid 3. Consequently, the subjects were divided into two groups for the purposes of analysis: one group who showed a decrease in interest (N=16) and one group who did not (N=10).

However, within each of these groups, there were some subjects who might be considered dubious cases. Twelve of the subjects in the decrease in interest group clearly began by being interested in the task and ended up being bored by it: their rating after the first grid was one of interest and after the last grid was one of boredom. However, three of the decrease in interest group said they were interested after the first grid, and still interested after the last grid, but less so. For example, one person's rating changed from 'very interested' to 'reasonably interested'. Similarly one subject in this group was both bored after grid 1 and grid 3, but more so after grid 3: her rating moved from 'slightly bored' to'very bored'.

Within the group whose interest did not decrease, two subjects said they were 'slightly bored' after the first grid. One of these said she was still 'slightly bored' after the third grid, the other said she was 'slightly interested'. However, the remaining eight subjects said they were interested after grid 1 and equally or more interested after grid 3.

It was thus decided that the construing of the two groups should be compared twice: once including and once excluding the six dubious cases.

Measures of Changes in construing

There were two indicators of subjective monotony that had proved particularly useful in Experiment 8, namely, total number of constructs used, and category usage score. The design of this experiment did not allow the former to be used here, so only the category usage score was used. Total discrepancy scores, as used in Experiment 8, were also calculated - in order to assess whether the degree of meaning extracted by the subjects changed over the experiment.

Category usage scores

1) For the first and third grids of each subject category usage scores for each

construct were calculated in the manner described in Experiment 8 (see page 103). These were then added for the six constructs in each grid to give each subject two total category usage scores, one for the first and one for the third grid. These scores can be found in Appendix 21. For each group (the bored or decrease in interest group and the constant or increase in interest group) t-tests were carried out on these scores both including and excluding the dubious cases discussed above. The results of these t-tests were as follows:

TABLE 15

Table showing t-tests and mean total category usage scores

	Constant or increase in interest group				Bored or decrease in interest group			
	All subjects N = 10		Excluding dubious cases N = 8		All subjects N = 16		Excluding dubious cases N = 12	
	G1	G3	G1	G3	G1	G3	G1	G3
Mean total category usage score	35.9	37.1	36.12	37.12	36.44	33.81	37.0	34.08
t-tests on total category usage scores	t=-0.89 p>0.05		t=-0.79 p>0.05		t=3.32 p<0.005		t=3.40 p<0.006	

This table clearly shows that those subjects who got bored exhibited a significant decrease in total category usage scores. That is, they made fewer distinctions between elements in grid 3 than they had done in grid 1. The subjects who remained interested showed, overall, a slight but non-significant increase in total category usage scores. It should be noted that, because of the small number of subjects, this group included both those subjects whose interest remained constrant (N=4) and those subjects whose interest increased (N=6).

Total discrepancy scores

Total discrepancy scores were calculated for the first and third grid of each subject in the manner described in Experiment 8 (see page 104). These scores can be found in Appendix 21. For each group t-tests were carried out on these scores both including and excluding the dubious cases discussed earlier. These results can

be seen in table 16.

TABLE 16

Table showing t-tests and mean total discrepancy scores

	Constant or increase in interest group				Bored or decrease in interest group			
	All subjects N = 10		Excluding dubious cases N = 8		All subjects N = 16		Excluding dubious cases N = 12	
	G1	G3	G1	G3	G1	G3	G1	G3
Mean total discrepancy scores	128.1	128.8	133.12	133.88	129.56	129.06	129.83	128.33
t-tests on total discrepancy scores	t=-0.11 p>0.05		t=-0.13 p>0.05		t=0.14 p>0.05		t=0.32 p>0.05	

This table clearly shows that, for all groups of subjects, there was no significant change in total discrepancy scores from grid 1 to grid 3.

DISCUSSION

Again the technique used here for generating boredom and interest seems to have been singularly successful. Most of the subjects started off by being interested in the task. Some subjects subsequently got bored with it, whilst others remained interested in it. It would have been ideal if there had been sufficient subjects in the 'constant or increase in interest' group to divide this group into two: one group whose interest did not change and another whose interest increased. Despite the fact that this was not possible, it was possible to compare the changes in construing of those people who had got bored with those who had remained interested.

The results obtained from the total discrepancy scores clearly reinforce those obtained in Experiment 8. Experiment 8 found that there was no difference between bored and interested groups in terms of their total discrepancy scores. The results of this study extend this by showing no significant difference between the total discrepancy scores within individuals when they move from a state of interest to one of boredom. This would clearly support the conclusion of Experiment 8, that

meaning in the Osgood (1957) sense does not seem to be associated with boredom. The subjects in this study, again, seemed to be using evaluative rather than descriptive constructs and this might explain the difference between the results obtained here and those of Hill (1980).

The results of Experiment 8 also suggested that there was a relationship between boredom and subjective monotony. Subjects who were bored used fewer constructs and made fewer distinctions between elements on those constructs than did people who were interested. This clearly suggested that boredom was associated with subjective monotony - the feeling that things were 'all the same'. The results in the present study from the category usage scores (see Table 15) clearly extend and reinforce this conclusion. In this study it was found that people who got bored showed a significant decrease in the number of distinctions they made between elements as they got bored. It would appear that initially, whilst they were interested, they perceived more variety in the photographs than they did when they got bored. It would seem that, for these subjects, the stimulation was gradually perceived as having less variety: the photographs were perceived as increasingly similar towards the end of the experiment. It could be argued that this decrease in differentiation was simply a function of repeated construing rather than of boredom. However, this seems highly improbable in view of the category usage scores obtained from the subjects who remained interested in the task. The mean total category usage scores of these interested subjects showed a slight, although non-significant, increase from grid 1 to grid 3. This suggests these subjects were making at least as many differentiations between the photographs on the two occasions. That is, the elements apparently remained subjectively varied for them.

Berlyne (1960) has argued that boredom occurs when there is a low flow of sensory information. That is, stimulation will produce boredom when it lacks novelty, surprisingness and complexity in information theory terms. Certainly, the situation in this experiment was less novel in the last grid than in the first, but it is clearly not this that accounts for the changing perception of the stimulation. The stimuli were identical in these respects for both the subjects who remained interested and those who got bored. Novelty, surprisingness and complexity were the same for both groups, yet their construing changed over the experiment in markedly different ways.

Thus, it would seem reasonable to suggest on the basis of these results, that boredom occurs when a person ceases to perceive the variety that may be present in stimulation. The physical monotony of the stimulation does not appear to be the important thing, rather, subjective monotony would appear to lead to boredom.

CHAPTER 14

SUMMARY AND CONCLUSIONS FROM EXPERIMENTS 7, 8 AND 9

The experiments reported in this section challenged the view that boredom results from physically monotonous stimulation. Previous research has often assumed that boredom is a function of the physical nature of stimulation. The theories of both Berlyne (1960, 1967) and Hebb (1966) imply that physical monotony is a necessary and sufficient condition for the occurrence of boredom. Indeed many experimental investigations have made this assumption (for example, London, Schubert and Washburn, 1972; Bailey et al, 1976; Thackray et al, 1974, 1975).

However the results of the experiments reported here clearly suggest that physical monotony is NOT the important factor in the production of boredom. In both Experiments 8 and 9, those subjects who were bored and those who were interested performed exactly the same task. Their boredom or interest could not, therefore, be a function of the task itself. Instead, boredom and interest appeared to be a function of the way in which the task was perceived by the people concerned.

Experiments 7 and 8 dearly suggest that the experience of boredom appeared to be one which makes relatively little psychological impact upon the individual. Subjects used significantly fewer constructs to construe the experience of boredom than they did to construe the experience of interest or dislike. It was proposed that this lack of impact may be a function of the way in which a person construed situations which he found boring. In particular it was suggested that the subjective monotony/variety experienced and the degree of meaning extracted might determine the psychological impact of an experience.

Experiments 8 and 9 clearly indicate that subjective monotony may be responsible for lack of psychological impact. It was argued that if a person perceives stimulation as subjectively monotonous then this would manifest itself in that person's construing in two ways. Firstly, he would use few constructs to construe events and, secondly, he would make few distinctions between elements on those constructs. Experiment 8 revealed that people who were bored used significantly fewer constructs to construe the stimuli with which they were bored than did those who were interested.

This experiment also showed that people who were bored made significantly fewer distinctions between stimuli on the constructs which they did use than those who were interested. Experiment 9 indicated that people made significantly fewer distinctions between stimuli as they got bored. That is, things which at first seemed relatively varied gradually appeared more similar and the person got bored.

It would, at first sight, seem possible to interpret the results of experiments 8 and 9 as indicating that boredom leads to subjective monotony, rather than the other way around. However, in order to argue that subjective monotony is not instrumental in producing boredom, some other cause for that boredom is necessary. This cannot be found in the nature of the stimulation, as other researchers have suggested, because both those who were interested and those who were bored bored performed exactly the same task. The only difference between the groups in both Experiments 8 and 9 was the way in which they perceived and construed that stimulation. Consequently it seems reasonable to argue that boredom results when a person perceives stimuli as subjectively monotonous. Physical variety may be high or low in Berlyne's information theory terms. The important factor appears to be the variety a person perceives in the stimulation. It would seem that if physical variety is very low (as it was, for example, in the boring conditions used by London, Schubert and Washburn, 1972) then a person is likely to perceive little variety in the stimulation. However this does NOT imply that physical monotony will automatically lead either to subjective monotony or boredom. Whether or not a person finds physically monotonous stimulation boring or interesting may depend on other features of that individual, particularly his cognitive complexity with respect to the stimuli involved.

It was proposed earlier that the psychological impact of an experience may also be a function of the degree of meaning extracted from stimulation. This was based on the findings of Landon and Suefeld (1969), Locke and Bryan (1967) and a suggestion by Fiske and Maddi (1961) (see pages 26-28). It is also consistent with the educational and industrial observations of researchers like Morton-Williams and Finch (1968), Sorcher (1968), Brown (1954) and Wanous (1974).

In Experiments 8 and 9 an attempt was made to assess the degree of meaning extracted from stimulation using a method outlined by Hill (1980) based on one proposed by Osgood (1957) for use with semantic differential scales. However,

the total discrepancy scores thus calculated showed no difference between the degree of meaning extracted by those who were bored and those who were interested. This is not consistent with the findings of Hill (1980) who found that people extracted less meaning from films which they found boring than those which they disliked or found interesting. It may be possible to explain this discrepancy in the findings in terms of the type of construct used. In Hill's study, subjects used predominantly descriptive constructs whereas the subjects in Experiments 8 and 9 used largely evaluative ones.

Nevertheless, the conclusion from the data of Experiments 8 and 9 on 'meaning extracted' must be that the inability to extract meaning in the traditional Osgood (1957) sense is not a necessary condition for the occurrence of boredom, and does not necessarily contribute to lack of psychological impact. However, the results of Experiments 4 and 5 may suggest that lack of meaning in another sense may be responsible for lack of psychological impact. It may be the case that a person assesses the meaning or relevance of stimulation in relation to his underlying motives.

The overall strategy employed here appears to have been singularly successful. It was possible, using repertory grids, to generate the desired boredom and interest in subjects, and some interesting differences in construing were found. It would appear reasonable to conclude that boring activities lack psychological impact and in particular that boredom results when a person perceives stimuli in a subjectively monotonous manner. Whilst it does not appear that lack of impact results from an inability to extract meaning in the traditional sense, it may result from an activity being construed as irrelevant to the satisfaction of a person's underlying motivational needs.

CHAPTER 15

A RE-ANALYSIS OF THE MNSS DATA

INTRODUCTION

At the end of the last chapter it was concluded, on the basis of the data from Experiments 8 and 9, that Osgood (1957) type meaning did not underly lack of psychological impact and boredom. However, in the context of the present research, there may be a more fruitful way of looking at meaning, in terms of relevance to underlying motives.

Much of the work reported here has been carried out within the framework of personal construct theory. This theory essentially sees the individual as imposing meaning upon the world, that is, as trying to make sense of the world by successive reconstructions of it. However, personal construct theory does not consider motivation to be important. Kelly (1955) argues that man is not some kind of inert substance that is spurred into action by environmental stimuli or his underlying motives. Rather, he sees motivation in terms of the elaboration of a persons construct system.

However, as was argued earlier (p 42), this may seem an unrealistically cognitive position, and it does not really answer the question of why one chooses to use a particular construct at a particular time. Foulds (1973) has criticised personal construct theory for its lack of a motivational basis. He argues that:

> "It does not ... follow that because man is never inert, the concept of motivation is redundant ... It is required to explain departures from the normal, rule following purposive model." (Foulds, 1973; p 221)

If Foulds is correct, then the meaning that a person imposes upon events may not simply be the traditional Osgood (1957) type meaning, but meaning in terms of his underlying motives. Sometimes environmental prompts may determine the choice of which construct to use at a particular time, but at other times it seems likely that the whole process starts with the internal construing of need states. In order to avoid confusion in terms, when talking about this type of 'meaning in relation to underlying motives' the term relevance will be used. An example used previously (p 42) may help to illustrate this point. If a person is out for a walk he may feel tired and

want to sit down. If there are no chairs available, but there is a tree stump, he may construe that tree stump as a seat. The tree stump still has Osgood (1957) type meaning for him, but its relevance for him is as a seat.

If a person assesses the relevance of stimulation in relation to his underlying motives, then it may be meaning in this sense which is a determinant of the psychological impact of experiences and not meaning in the Osgood sense, as was previously supposed (see Experiments 8 and 9). In particular, if stimulation is irrelevant to the satisfaction of motives, then a person may perceive that stimulation as subjectively monotonous and consequently boring. This notion of the relevance of an activity to the satisfaction of motivational needs is certainly suggested by the educational observations of Morton-Williams and Finch (1968) (see page 11), and the industrial work of Baldamus (1951) and Turner and Miclette (1962) (see pages 7 - 8).

If it is the case that it is the relevance of stimulation that is an important determinant of the psychological impact of an experience, then this relevance may be a function of the number of instrumentally satisfying constructions that are made of that stimulation. In particular it may be hypothesised that:

1) If few instrumentally satisfying constructions are made, then an activity will be perceived as not relevant and consequently subjectively monotonous and boring.

2) If many instrumentally satisfying constructions are made, then an activity will be perceived as relevant and consequently subjectively varied and interesting.

It appeared possible to test these hypotheses by re-analysing the MNSS data from Experiments 4 and 5. The items of the MNSS were designed to reflect motivational needs. If a large number of these motivational constructs were satisfied by an activity, then that activity may be deemed relevant to the satisfaction of underlying motives. If a large number of these motivational constructs were not satisfied by an activity (that is, they were either irrelevant to or frustrated by an activity) then that activity may be deemed not relevant to the satisfaction of motives. Consequently, this re-analysis of the MNSS data from Experiments 4 and 5 was concerned with assessing the number of motivational constructs satisfied or frustrated by or considered irrelevant to, boring, disliked and interesting activities.

Hypotheses

It was hypothesised that:

1) Interesting activities would satisfy a significantly larger number of motivational constructs than either disliked or boring activities.

2) Boring activities would satisfy significantly fewer motivational constructs than either interesting or disliked activities.

3) Disliked activities would satisfy a moderate number of constructs.

METHOD

In order to assess the number of motivational constructs satisfied by the interesting, boring and disliked activities rated by the subjects in Experiments 4 and 5 their ratings of these activities were scrutinised. An activity was considered to have satisfied a motivational construct if it was rated towards the positive pole of that construct. That is, if it scored +1, +2 or +3 on the seven point scale used. An activity was considered to have frustrated a motivational construct if it was rated towards the negative pole of that construct (scores -1, -2 and -3 on the seven point scale). If an activity was rated in the central, 'O' score, category of a construct it was considered irrelevant to that construct. The number of satisfactions (S), frustrations (F) and irrelevancies (I) was calculated for each activity performed by each subject in Experiments 4 and 5.

For each subject in Experiment 4 the S, F and I scores thus calculated were added for the three interesting, the three disliked and the three boring activities. Thus each person had a total S, F, and I score for each class of activity. Similarly, for each person in Experiment 5, the S, F and I scores for the two interesting, the two disliked and the two boring school subjects were added seperately. These scores can be seen in Appendix 22 .

ANALYSIS OF DATA

The total S, F and I scores from Experiment 4 and Experiment 5 were analysed separately. The mean S. F and I scores for interesting, disliked and boring activities can be seen in Table 17:

In order to compare the number of motivational constructs satisfied, frustrated or irrelevant to interesting, disliked and boring activities, a series of

t-tests were carried out:

Number of constructs satisfied

Three t-tests on the total S scores for each study were performed Interesting S/Disliked S, Interesting S/Boring S, Disliked S/Boring S. The results of these t-tests can be seen in Table 18:

TABLE 17

Mean number of motivational constructs satisfied, frustrated or irrelevant to interesting, disliked and boring activities

Experiment 4	Number of Constructs Satisfied (S)	Number of Constructs Frustrated (F)	Number of Constructs Irrelevant (I)
Interesting activities	41.78	14.39	16.26
Disliked activities	22.35	31.48	18.13
Boring activities	16.56	35.17	20.26
Experiment 5	**Number of Constructs Satisfied (S)**	**Number of Constructs Frustrated (F)**	**Number of Constructs Irrelevant (I)**
Interesting school subjects	32.33	8.16	18.94
Disliked school subjects	19.28	23.61	18.33
Boring school subjects	13.61	27.05	20.33

TABLE 18

t-tests on total satisfaction (S) scores

t-tests	Experiment 4	Experiment 5
Interesting/ Disliked	t= 9.43***	t= 6.58***
Interesting/ Boring	t=15.52***	t=10.79***
Disliked/ Boring	t= 4.91***	t= 3.25**

*** $p<0.001$ ** $p<0.005$

Thus it can be seen that, in both studies, interesting activities satisfied significantly more motivational constructs than did either disliked or boring ones. Also disliked activities satisfied significantly more constructs than boring ones. Consequently, in terms of the number of constructs satisfying motivational needs:

Interesting>Disliked>Boring

Number of constructs frustrated

As with the S scores, three t-tests were carried out on the F scores from each study:

TABLE 19

t-tests on total frustration (F) scores

t-tests	Experiment 4	Experiment 5
Interesting/ Disliked	t= -7.43***	t=-7.01***
Interesting/ Boring	t=-10.18***	t=-9.63***
Disliked/ Boring	t= -1.73	t=.1.59

*** p<0.001

Interesting activities frustrated significantly fewer motivational constructs than did boring or disliked activities which did not differ in terms of F scores. Consequently, in terms of the number of constructs frustrating motivational needs:

Interesting>Disliked = Boring

Number of constructs considered irrelevant

Again t-tests were carried out on the I scores from each study:

TABLE 20

t-tests on total irrelevancy (I) scores

t-tests	Experiment 4	Experiment 5
Interesting/ Disliked	t=-1.28	t=0.35
Interesting / Boring	t=-2.31*	t=-0.85
Disliked/ Boring	t=-1.11	t=-1.62

*p<0.05

Thus it can be seen that, overall, interesting, disliked and boring activities did not differ significantly with respect to the number of motivational constructs considered irrelevant. That is, in general, in terms of irrelevancy to motivational needs:

Interesting = Disliked = Boring

However, a scrutiny of the mean I scores and the one significant t-value reveals a slight tendency for more motivational constructs to be irrelevant to boring activities than to interesting or disliked ones.

DISCUSSION

This reanalysis of the data from Experiments 4 and 5 reveals that disliked and boring activities do not differ with respect to the number of constructs which lead to frustration - both disliked and boring activities are associated with significantly more frustrations than are interesting ones. This suggests that the number of need frustrating perceptions is not the important factor in mediating boredom. However, what does seem to be important is the number of constructs leading to satisfaction. Interesting activities satisfied significantly more of the MNSS motivational constructs than disliked ones, which in turn satisfied significantly more than boring activities. This data, combined with the data on degree of frustration gained from Experiments 4 and 5 suggests that there are two components involved in the relationship between boredom and motivational needs - a cognitive and an affective component.

The re-analysis suggests that for boring activities there are relatively few constructs relevant to the satisfaction of motivational needs - significantly less than for either interesting or disliked activities. Consequently it may be the case that a person assesses the meaning or relevance of stimulation for himself in terms of its relevance to the satisfaction of his motivational needs. When stimulation is construed in terms of a relatively large number of constructs relevant to the satisfaction of needs, that stimulation will tend to be perceived as subjectively varied and interesting. When stimulation is construed in terms of very few constructs relevant to the satisfaction of needs, that stimulation will tend to be perceived as subjectively monotonous and boring. Stimulation will be disliked when it is construed in terms of a moderate number of constructs relevant to the satisfaction of needs. The number of constructs applied to stimulation which are

relevant to the satisfaction of motivational needs represents the cognitive component of boredom. The fewer instrumentally satisfying constructions that are made, the more likely boredom is to occur.

On the affective side, the negative affect associated with boredom may be a function of the high degree of overall frustration that Experiments 4 and 5 revealed to be associated with boredom. The results obtained here suggest that this high degree of overall frustration does not result from more constructs being frustrated - there was no significant difference between the number of constructs leading to frustration in the case of boring and disliked activities. Rather, the high degree of overall frustration found to characterise boredom seems to be a consequence of few instrumentally satisfying constructions and a high degree of frustration of those needs which are frustrated.

Thus whilst meaning in the traditional Osgood (1957) sense may not be the important factor in subjective monotony and boredom (as shown by experiments 8 and 9), meaning in terms of the number of instrumentally satisfying constructions that are made may be. There is, of course, only correlational rather than causal evidence of the role of relevance to the satisfaction of motivational needs. However, the evidence which is available is consistent with the hypothesis that when few instrumentally satisfying constructions of stimuli are made, this leads to a situation in which the person perceives that stimulation as subjectively monotonous and consequently boring.

It would, however, seem that these two conceptions of 'meaning' are not totally unrelated. If a person is unable to extract meaning from stimulation in the traditional Osgood sense, then he is unlikely to make many instrumentally satisfying constructions of that stimulation. Consequently, lack of Osgood type meaning may be a sufficient condition for the occurance of boredom, and this may account for the findings of Hill (1980). However, it would not appear to be a necessary condition. Even if a person is able to extract meaning in the traditional sense, he may still construe that stimulation as not relevant to the satisfaction of motivational needs, and consequently see it as subjectively monotonous and boring.

The re-analysis of the data from Experiments 4 and 5 would suggest that not only is boredom associated with a high degree of overall frustration - the affective component - but that there is also a cognitive component that may be responsible for subjective montony. Meaning in terms of relevance to the satisfaction of motivational needs may be the truely important element of the psychological impact of an event, not meaning in the traditional Osgood (1957) sense.

SECTION 4

THE PSYCHOPHYSIOLOGICAL ACCOMPANIMENTS OF BOREDOM

CHAPTER 16

INTRODUCTION

It has been suggested, by several experimental researchers (pp 20-22), that boredom may be accompanied by certain psychophysiological changes, although there would appear to be some dispute over the precise nature of these changes. For example, London, Schubert and Washburn (1972), conducted a set of experiments designed to test Berlyne's (1960, 1967) hypothesis that boredom is associated with an increase in autonomic arousal. The indices of autonomic arousal that they used were, galvanic skin potential (GSP), skin conductance (SC) and heart rate (HR). Their results showed that both boredom and interest were associated with a decrease in GSP, but that boredom was associated with a significantly smaller decrease. They failed to find any relationship between boredom and SC, but did find boredom to be associated with a higher HR than was interest.

Bailey et al (1976) on the other hand found a significant decrease in both SC and HR was associated with boredom. Thus these experiments failed to show conclusive evidence of a relationship between boredom and arousal, and it was propsed earlier (p 24) that such changes in indices of arousal may be task, rather than boredom dependent.

There is, however, more consistent evidence of a relationship between boredom and increase on heart rate variability (HRV) from the studies of Thackray et al (1974, 1975) and Bailey et al (1976). These authors argue that, as HRV is an index of attention (Kagan and Rosman, 1964; Ettema and Zeilhuis, 1971), boredom may be more closely related to attentional processes than to arousal.

However, as was proposed earlier (pp 23-24) there is evidence that HRV changes may also be an artifact of the type of tasks used to produce boredom. Several authors have found HRV decreases to be associated with task difficulty and mental load (Karlsbeek and Ettema, 1963; Ettema and Zielhuis, 1971; Rohement et al , 1973- Muller et al, 1973; Lacey and Lacey, 1974). It was thus argued (p 24) that the boring tasks used by Bailey et al (1976) and Thackray et al (1974,

1975) may have imposed a low mental load on subjects, and it could be low mental load, not boredom, that is associated with an increase in HRV.

The results of studies investigating the psychophysiological accompaniments of boredom may thus be determined by assumptions made about the antecedents of boredom. Studies such as those by London, Thackray and Bailey cited above all assume that physical monotony is a necessary condition for the occurrence of boredom. However, the experiments reported here in Section 3 would suggest that this is not the case. Consequently it may be hypothesised that these psychophysiological changes are not a function of boredom, but of task demands (attention/mental load) used to produce boredom.

It is this proposition that the final experiment reported here was designed to investigate with respect to the two most apparently reliable psychophysiological indices: the heart rate index of arousal and the heart rate variability index of attention.

CHAPTER 17

EXPERIMENT 10: AN INVESTIGATION OF THE RELATIONSHIP BETWEEN HEART RATE (HR), HEART RATE VARIABILITY (HRV) AND BOREDOM

INTRODUCTION

This experiment was designed to investigate whether changes in HR and HRV are a function of boredom or the type of task used to produce that boredom. As it is changes in these measures that may occur as a person becomes bored that are of interest, this study employed a ' Current' strategy, looking at boredom 'here and now'. Similarly, it has been suggested that the nature of the task used to produce boredom may be responsible for changes in HR and HRV, and not the boredom itself. Thus considerable control over the conditions producing the boredom was required, which would not be possible in a 'naturalistic' type of investigation. Consequently, a current/laboratory manipulative approach was employed here.

Within this approach it seemed desirable to attempt to produce boredom using two different tasks. If each of these tasks was accompanied by different HR and HRV changes then it would seem reasonable to argue that the HR and HRV changes were task dependent. If the two different tasks produced similar changes in HR and HRV it would seem likely that the HR and HRV changes were boredom dependent.

As it has been suggested that mental load, and not boredom, may have produced the changes in HRV found by other researchers (pp 23-24), it was decided that two tasks should be used: one imposing a high mental load and another imposing a low mental load on the subjects. Apart from imposing a different mental load, these tasks must be as similar as possible in terms of their physical features. If this is not the case, then it may be differences in physical variety that produce differences in HR and HRV changes.

Hypotheses

It was predicted that HRV would decrease significantly in the high mental load condition. No specific prediction was made concerning HRV changes in the low mental load condition as it was not known how low the mental load imposed by

a task had to be before an increase in HRV would be found. Similarly, no clear predictions were made concerning changes in HR because of the inconsistent nature of the findings of other researchers.

METHOD

It was decided that a task requiring subjects to repeatedly add numbers might be suitable for this investingation and would be likely to produce boredom. In the low mental load condition subjects could be asked to repeatedly add numbers between 1 and 6. In the high mental load condition 10 could simply be added to each of these numbers, so that the subjects would be required to add numbers between 11 and 16. It was considered likely that subjects would get bored with this repeated addition and at the same time find the latter task more difficult than the former.

In order to ensure that subjects were actually bored by these tasks, it was decided that they should not be asked directly whether they were bored. It was considered preferable to simply ask them how they felt whilst they were performing the task, on the basis of the assumption that if they were bored they would spontaneously say so.

Materials

A set of 102 triplets of numbers between 1 and 6 were generated using random number tables (see Appendix 23). These triplets of numbers constituted the stimuli to be used in the low mental load condition. In order to generate a set of triplets for the high mental load condition +10 was added to each of these numbers to give a second set of 102 triplets of numbers between 11 and 16 (see Appendix 23). These sets of numbers were then recorded on separate tapes with successive triplets occuring at ten second intervals. The three numbers from the first triplet were recorded (3 seconds), there was then a two second gap followed by a 'buzzer' followed by a further five second gap. The next triplet of numbers followed immediately. Each tape was 17 minutes long.

Measures of heart rate were taken using a 78 series Grass Polygraph. An AKG-pulse pre-amplifier (model 7P6BC) and a Tachograph pre-amplifier (model 7944AB)were used in conjunction with a Polygraph D.C. drive amplifier model 7DAF.

The electrodes were placed in one of the three Grass recommended positions (an electrode on each ankle and one on the left wrist) and minimal filtering to exclude outside interference was used. This gave a continuous record of heart beat and a graph of heart rate calculated for each inter-beat interval (see Appendix 24).

Subjects

Nineteen first year undergraduate students: 9 male, 10 female, aged 17 - 21 years (mean age 18.63 years). None of the subjects had any prior knowledge of the nature of the experimenter's research.

Procedure

Each subject was tested individually on two occasions separated by one week. Half of the subjects performed the low mental load condition on the first occasion and the high mental load condition on the second occasion. For the other subjects the order was reversed.

On the first occasion of testing, the polygraph was shown to the subject and its function explained. The subject was assured that it was simply a recording device and that there was no possibility of him getting an electric shock from it. The subject was then asked to sit down and the electrodes were positioned and the polygraph adjusted to give a satisfactory record. The record was then shown to the subject and its recordings explained. The subject was asked to sit as still as possible and to relax during the experiment. The consequences of not doing so in terms of muscle artifact on the record were demonstrated.

The subject was then asked to relax and to close his eyes for a period of four minutes, in order to obtain a basal measure of heart rate and heart rate variability. This period also served to make the subject more at ease with the polygraph.

Next, the nature of the task was explained to the subject and an oral example given by the experimenter. The subject was told that he would be required to add repeated sets of three numbers and to give the answer when a buzzer sounded. He was told that if, for any reason, he was unable to give an answer, he was to ignore that triplet of numbers and go on to the next one, which would follow immediately.

A practice trial of one minute (six triplets of numbers) was then given to each subject. These numbers were the first six triplets on the tape. After this, the tape was stopped and the subject asked if he could hear it satisfactorily. Then the subject was again asked to relax, and to close his eyes and keep them closed throughout the experiment (blind folds were not used as in some initial pilot trials subjects found them uncomfortable and had to move during the task, causing excessive muscle artifact on the record). When the subject was ready, the tape was started again and the subject added the remaining 96 triplets of numbers. This lasted for 16 minutes. The subjects responses were recorded. On completion of the experiment, the subject was asked how he felt whilst performing the task and his replies were recorded verbatim.

The same procedure was repeated on the second occasion of testing. After a four minute resting period a one minute practice trial was given using the first six triplets of numbers from the second tape. Then the remainder of the second task was performed and the subjects evaluation of the task elicited.

On both occasions of testing, if the subject moved during the experiment and thus caused muscle artifact on the record, the movement was noted on the relevant portion of that record.

RESULTS

The boredom induced and mental load experienced

The subjects' responses to the question concerning how they felt during the task were scrutinised. All the subjects reported finding the low mental load condition easier than the high mental load one. These reports by the subjects were reinforced by the number of errors in the additions that they made. The mean number of errors in the low mental load condition was 2.37 whilst in the high mental load condition it was 12.68.

Sixteen out of the nineteen subjects tested said specifically and without prompting that they were interested in the task to start with, but got bored with it after a while in both conditions. The remaining three subjects did not mention whether or not they were bored in either or both of the conditions. Consequently, the data from these three subjects were not included in further analyses.

Several researchers have reported that boredom is accompanied by restlessness (see page 30), and consequently, it was decided that a measure of restlessness could be used as a supplementary index of boredom. All subjects were asked not to move during the tasks, however, this instruction was not always observed completely. Consequently, short bursts of muscle artifact associated with movement on the part of the subjects appeared on most of the records. It would seem reasonable to argue that such movements, as indexed by muscle artifact on the record, constitute a measure of restlessness (for an example of such muscle artifact, see Appendix 25). There were insufficient incidences of this muscle artifact to analyse on an individual level, however the total number of instances for the sixteen subjects who said they got bored can be seen in Table 21:

TABLE 21

Table showing number of body movements as indexed by muscle artifact on the polygraph record

	Duration of Task			
	1st 4 mins	2nd 4 mins	3rd 4 mins	4th 4 mins
Both Conditions	10	13	19	32
Low mental load condition	6	5	6	11
High mental load condition	4	8	13	21

Clearly, the number of movements made by these subjects increased as the experiment progressed, particularly in the high mental load condition. This is of course, what would be expected if boredom were accompanied by restlessness and if, (as was the case) subjects were initially interested but subsequently became bored.

The Heart Rate and Heart Rate Variability Measures

The records from the polygraph for each subject in each task were divided into twenty, one minute sections: four, one minute sections during the resting period before the experiment began, and sixteen, one minute sections during the task. For each of these one minute sections a measure of heart rate (HR) and heart rate variability (HRV) was calculated.

The polygraph record gave a graph of heart rate calculated for each interbeat interval (see Appendix 24) and the heart rate thus shown for each heart beat was obtained by extrapolation. The HR measure for each one minute section was calculated by taking the mean value of these figures. The HRV measure for each section was calculated by taking the standard deviation of the heart rate figures. Thus the measure of HRV used here was essentially the standard deviation of the interbeat intervals for each one minute period. In both the HR and HRV measures, muscle artifact on the record was excluded (these were rarely of more than 2-3 seconds duration).

Heart Rate

For each task condition a t-test was carried out between the HR for the last minute of the resting period and the first minute of the experiment:

TABLE 22

Table showing t-tests between the HR of the last minute of the resting period and the first minute of the experiment

	low mental load condition	high mental load condition
mean HR for last minute resting	80.04	80.45
mean HR for first minute of experiment	85.73	90.37
t-test	t=-3.34 p<0.01	t=-5.44 p<0.001

Thus it can be seen that there was a significant increase in HR at the start of the experiment in both conditions.

For each subject the mean HR for the first 4 minutes of the experiment and the mean HR for the last 4 minutes of the experiment was calculated for each condition (see Appendix 26). The overall mean heart rate for these two periods can be seen in Table 23:

TABLE 23

Table showing overall mean heart rates

	first 4 minutes	last 4 minutes
High mental load task	88.51	83.49
Low mental load task	84.35	81.77

Two t-tests on the mean HR figures of Appendix 26 revealed the following:

a) There was not a significant difference in HR from start to end of the low mental load condition ($t=1.69$, $p>0.05$)

b) There was a significant decrease in HR from the start to the end of the high mental load condition ($t=3.39$, $p<0.01$)

Heart Rate Variablity

For each task condition a t-test was carried out between the HRV for the last minute of the resting period and the first minute of the experiment:

TABLE 24

Table showing t-tests between the HRV of the last minute of the resting period and the first minute of the experiment

	Low mental load condition	High mental load condition
mean HRV for last minute resting	4.88	5.19
mean HRV for first minute of experiment	5.28	6.27
t-test	$t=-0.71$	$t=-1.85$
	$p>0.05$	$p>0.05$

Thus it can be seen that there was no significant change in HRV ot the start of the experiment in either condition.

For each subject, the mean HRV for the first four minutes of the experiment

was calculated for each condition, and the mean for the last four minutes (see Appendix 27). The overall mean HRV for these two periods can be seen in Table 25.

TABLE 25

Table showing overall mean heart rate variability

	first 4 minutes	last 4 minutes
High mental load condition	5.75	4.73
Low mental load condition	5.14	5.39

Two t-tests were carried out on the mean HRV figures and revealed the following:

a) There was a slight but non-significant increase in HRV in the low mental load condition ($t=-0.82$, $p>0.05$)

b) There was a significant decrease in HRV in the high mental load condition ($t=5.14$, $p<0.001$)

DISCUSSION

The experimental manipulation of boredom and task difficulty employed here seems, again, to have been successful. Clearly the mental load imposed by the tasks used was different as can be seen from the number of errors made. Similarly, most of the subjects found that both tasks got boring as can be seen from their comments and the restlessness they exhibited. In any event only the data from subjects spontaneously reporting boredom were analysed.

Heart rate varibility changes

The results obtained here clearly suggest that changes in HRV are a function of mental load. The high mental load task was accompanied by a decrease in HRV whilst the low mental load task was accompanied by a slight, but non-significant increase. This is consistent with the findings of Karlsbeek and Ettema (1963), Ettema and Zielhuis (1971), Rohment et al (1973), Muller et al (1973) and Lacey and Lacey (1974). As it seems clear that subjects were bored by both tasks, these findings are not consistent with those of Thackray et al (1974, 1975) and Bailey et

al (1976). These authors suggested that boredom is accompanied by an increase in HRV. However, the tasks that they used to produce boredom appear to have imposed a low mental load upon their subjects: Bailey et al (1976) used a simple vigilance task to produce boredom and Thackray et al (1974) used a simple serial reaction task. The results obtained here clearly suggest that it was this mental load, and not the boredom that was responsible for the increase in HRV found. In this experiment when boredom was produced using a high mental load task, a decrease in HRV was found.

It could be argued that these findings of different changes in HRV with the different mental loads occured because the tasks were producing different degrees of boredom. If the high mental load task was less boring then the results may be considered more consistent with those of Thackray et al (1974, 1975) and Bailey et al (1976). Whilst there is no direct evidence concerning this point, such evidence as there is would suggest that this was not the case. There was a much greater increase in restlessness (as indexed by muscle artifact on the polygraph record) in the high mental load condition than in the low mental load one. This suggests that, if anything, subjects were more bored by the high load condition than the low one, and this high load condition was accompanied by a highly significant decrease in HRV.

Thus the changes found here in HRV clearly suggest that the findings of an increase in HRV with boredom (Thackray et al 1974, 1975; Bailey et al 1976) are on artifact of the type of tasks used be these investigators. It would appear that HRV changes are a function of mental load NOT boredom. However, it may still be the case, despite the results found here, that boredom is related to attentional processes as Thackray et al (1974) suggests. It seems likely that if a person is bored by a task, then his attention will tend to wander. If he does not find the task difficult, that is , if the task does not impose much of a mental load, then this may lead to an increase in HRV. However, if the task is difficult, then the person will have to make on effort to attend to it when he does not want to because he is bored by it. These increased efforts to attend would seem likely to be associated with a decrease in HRV. Thus, whilst boredom may not necessarily be associated with an increase in HRV as suggested by Thackray et al (1974, 1975) and Bailey et al (1976), it may still be related to attentional processes.

Heart rate changes

London Schubert and Washburn (1972) found boredom to be associated with a higher heart rate than interest. This they argued supported Berlyne's (1960, 1967) hypothesis that boredom is associated with an increase in autonomic arousal. However, the results obtained here clearly suggest that this finding is again an artifact of the type of task used to produce boredom.

In this study, after an initial increase in heart rate (possibly due to a startle effect) boredom was either accompanied by no change, or a decrease in heart rate depending on the type of task performed. Again, it would not seem possible to argue that the high mental load task produced a decrease in HR because it was less boring than the low mental load one. If anything the latter was less boring than the former.

The results obtained would, however, seem to be consistent with the results of Lacey and Lacey (1974). They investigated the effects of different tasks on HR and found that as task difficulty increased HR decreased. Similarly, Elliott (1969) found that a difficult signal detection task was associated with a decrease in HR. He also found that the subjects performing this difficult task reported an increase in their motivation for, and interest in, the task. The difficult task used in Experiment 9, whilst producing a decrease in HR, was reported by subjects as boring. Thus it would appear that HR changes are not associated with boredom per se, but with other features of the task used to produce the boredom, such as its difficulty.

Thus Experiment 9 suggests that changes in both HR and HRV are not necessarily associated with boredom, as has been suggested by other researchers. Rather it would seem that these psychophysiological changes are a function of features of the task other than the boredom to which it leads. The results of Experiment 9 also suggest that the assumptions made by experimenters concerning the antecedents of boredom may have led to some misleading conclusions. It has been found that physically montonous stimulation can lead to boredom and that such boredom is accompanied by certain psychophysiological changes. However, this does NOT imply that these psychophysiological changes are necessary accompaniments of boredom. It seems likely that such changes are task,

not boredom, dependent.

SECTION 5

SUMMARY AND CONCLUSIONS

CHAPTER 18

TOWARDS A MODEL OF BOREDOM

Much of the experimental research into boredom has been based on two major theories of boredom, that of Hebb (1955, 1966) and that of Berlyne (1960, 1967). There would appear to be three elements to each of these theories:

a) Physically monotonous stimulation is a necessary and sufficient condition for the occurrence of boredom,

b) That this physically monotonous stimulation leads to an aversive state of neurophysiological arousal,

c) Boredom is consequently associated with restlessness and frustration.

In the light of the experiments carried out here and the investigations of other researchers, each of these elements will now be examined.

a) Physical monotony and boredom

One of the points of agreement between Hebb (1955, 1967) and Berlyne (1960, 1967) is that the antecedent of boredom is relatively weak, scarce or unvarying stimulation. That is, they argue that boredom occurs when there is a low flow of sensory information. This assumption has not really been questioned by other researchers (London Schubert and Washburn, 1972; Bailey et al, 1976; Thackray et al, 1974, 1975). That physical monotony leads to boredom has been taken as an article of faith, and this has coloured much research strategy. However, there would appear to be grounds for challenging this view.

There is a wealth of industrial literature that suggests that physical monotony is not a sufficient condition for the occurrence of boredom. Smith (1955), Hill (1975), Rosseel (1975) and Stagner (1975) amongst others (see pages), have shown that there are several individual difference factors that affect a person's susceptability to boredom.

It does not appear, either, that physical monotony is a necessary condition for the occurrence of boredom, as the experiments of Bailey et al (1976), London and Suedfeld (1969), and Locke and Bryan (1967) have suggested (see pages 25 - 29). These studies appear to introduce the notion of the 'meaning' of a stimulus, or rather the lack of

it, as a determinant of boredom. This idea has also been proposed by Fiske and Maddi (1961) and is supported by the work of Hill (1980).

The results of Experiments 7 - 9 show that physical monotony is not a necessary antecedent of boredom. Rather, the important factor seems to be the way in which a person perceives stimulation. In both Experiments 8 and 9 those subjects who were bored and those who were interested performed exactly the same task. Interested and bored subjects did, however, differ in their construing of that stimulation in two ways. Firstly, Experiment 8 showed that people used few constructs to construe the stimuli with which they were bored. This will be termed undifferentiated construing. Secondly, Experiments 8 and 9 revealed that subjects who were bored made fewer distinctions between elements on those constructs which they did use. This will be termed unarticulated construing and would appear to be associated with seeing the stimulation as 'all the same', ie. as subjectively monotonous.

However, as far as the 'meaning' of the stimulus is concerned, the results obtained in Experiments 8 and 9 would appear to contradict those of Hill (1980). Whilst Hill's results suggested that an inability to extract meaning from stimulation was associated with boredom, Experiments 8 and 9 suggested that this was not the case. There was no significant difference between the amount of meaning extracted by those who were bored and those who were interested.
However, in both Hill's (1980) study and Experiments 8 and 9, 'meaning' was considered in the traditional Osgood sense. The reanalysis of the MNSS data (see pages 120-127) shows that meaning or relevance in a different sense is the important factor to consider. It seems likely that a person assesses the meaning or relevance of stimulation in terms of the extent to which his constructions of stimulation satisfy his underlying motivational needs. The MNSS data reanalysis shows that significantly fewer instrumentally satisfying constructions are made of boring activities than of disliked or interesting ones.

It would, however, seem reasonable to assume that if stimulation lacks Osgood type meaning for a person then it is unlikely that he will construe it as satisfying his motivational needs. This would explain the discrepancy between the results of Experiments 8 and 9 and those of Hill (1980). However, it seems likely

that lack of Osgood type meaning is not a necessary condition for the occurrence of boredom. Even if stimulation is meaningful, it may still not be construed as satisfying underlying motives.

Experiments 7, 8 and 9 show that boredom is not a function of the physical characteristics of stimulation - its physical monotony. Rather, boredom seems to be a function of th way in which a person perceives that stimulation. In particular, it seems likely that a person assesses the meaning or relevance of stimulation for himself in terms of its relevance to the satisfaction of motivational needs. The more stimulation is viewed as relevant to the satisfaction of motives, the more it will be perceived as subjectively varied (construed in an articulated manner) and consequently interesting. Conversley, the more stimulation is viewed as lacking the capacity for the satisfaction of motives, the more likely it is that it will be construed as subjectively monotonous (construed in an unarticulated manner) and consequently boring. The process of imposing constructions relevant to underlying motives, and the use of these constructions, may be considered the cognitive component of boredom/interest. Thus it will be argued that boredom occurs when stimulation is construed in both an undifferentiated and an unarticulated manner. Such construing is characteristic of a state of subjective monotony for the individual.

b) Boredom and arousal

At first sight, Hebb (1955, 1966) and Berlyne (1960, 1967) disagree on the aversive state of arousal which they consider accompanies boredom. Hebb (1966) argues that boredom is associated with a low level of cortical arousal, whereas Berlyne (1960) considers it to be associated with a rise in autonomic arousal (see pages 17 - 19). However, as Berlyne (1967) points out, these two positions are not incompatible - as cortical arousal decreases, brain stem mechanisms are released from restraint and autonomic arousal rises.

Nevertheless, the experimental findings on the relationship between boredom and indices of autonomic arousal , seem to be somewhat contradictory. For example, London, Schubert and Washburn (1972) found no relationship between boredom and skin conductance, but that boredom was associated with higher heart rate than was interest. They also found that both boredom and interest were associated with a decrease in galvanic skin potential, but that boredom was

associated with a significantly smaller decrease. On the other hand, Bailey et al (1976) found a significant decrease in both skin conductance and heart rate to be associated with boredom.

However, Experiment 10 would suggest that some of these measures of autonomic arousal may be influenced by features of the task other than the boredom to which it leads. Both of the tasks used in this experiment were considered boring by the subjects, but the one imposing a low mental load produced no change in heart rate (HR), whilst the other, imposing a high mental load, lead to a decrease in HR. Consequently, it seems that an increase in HR is not necessarily associated with boredom.

Thus the evidence for a relationship between boredom and arousal is far from conclusive. In particular it seems likely that some indices of autonomic arousal may be task, rather than boredom dependent.

Another group of researchers, Thackray et al (1975), have speculated that boredom may be more closely related to attentional processes than to arousal. Several researchers have found that boredom is associated with an increase in heart rate variability (HRV) (Bailey et al, 1976; Thackray et al, 1974 ,1975). Other researchers have shown that HRV decreases as mental load increases (Karlsbeek and Ettema, 1963; Ettema and Zielhuis, 1971; Rohment et al, 1973; Muller et al, 1973).

The results of Experiment 10 show that mental load is the important determinant of HRV changes in tasks producing boredom. In high mental load condition a significant decrease in HRV was found, whereas in the low mental load condition there was no significant change in HRV, but both conditions were spontaneously reported as boring by the subjects. It would seem reasonable to argue that the boring task used by, for example Bailey et al (1976) - a simple vigilance task - was imposing a low mental load on the subjects. If this were the case, then it seems likely that it was the low mental load, and not the boredom experienced, that produced the increase in HRV.

However, it may still be the case that boredom is related to attentional processes, as Thackray et al (1974) suggests. If a person gets bored, then it seems

likely that his attention will wander from the task. If the task is imposing a low mental load this may lead to an increase in HRV. However, if the task is imposing a high mental load and particularly, perhaps, if constraint is present, the person's increased efforts to attend may lead to a decrease in HRV.

Thus it would appear that the assumptions made by experimenters concerning the antecedents of boredom have led to some misleading conclusions. Boredom can be produced by physically monotonous stimulation, but this does not imply that psychophysiological changes that accompany this boredom are necessary accompaniments of boredom in general. The results of Experiment 10 strongly suggest that some indices of attention and arousal are dependent upon task demands and not boredom.

c) Boredom and Frustration

Several authors have suggested that boredom is associated with frustration (Heron, 1957; Berlyne, 1960; Zweig, 1953; Barmack 1937; Stagner, 1975; Baldamus, 1951). However there is little formal evidence concerning this relationship. London, Schubert and Washburn (1972) asked subjects to rate the degree of frustration they felt whilst performing a boring or an interesting task. From these ratings they found no difference between the tasks in terms of the frustration they produced. However, as was argued earlier (p 30) their method of assessing the degree of frustration experienced was not wholly satisfactory.

Several industrial and educational researchers (Baldamus, 1951; Turner and Miclette, 1962; Gjesme, 1977) have suggested that motivation might be an important factor in boredom. Consequently, Experiments 1 - 5 were concerned with looking at the relationship between boredom and frustration in more detail, in particular in terms of the degree of satisfaction/frustration of motives.

Experiments 4 and 5 clearly show that boredom is associated with a high degree of frustration. Boring activities were highly frustrating of motivational needs, disliked ones were slightly frustrating and interesting ones were satisfying. In particular, it appears from these studies, that the frustration of some needs is associated with the general negative affect experienced during both boring and disliked activities. The frustration of other needs appears to be associated with

boredom in particular. The latter needs included change, endurance and possibly, achievement, exhibition, order and dominance.

It would seem likely that this frustration with boring activities would be associated with an increase in autonomic arousal, and this, at first sight, would appear to contradict the findings of Experiment 10. That is, it may be expected that HR should have increased with boredom if subjects were frustrated, which it did not in Experiment 10. However, it would seem likely that, if the task imposes a high mental load as it did in Experiment 10, the attentional requirements of the task would cause a suppression of HR increase (Lacey and Lacey, 1974). Consequently it may be argued that whilst this frustration which accompanies boredom is likely to lead to an increase in autonomic arousal, the task demands can also affect some arousal indices and the expected changes may not be found.

In view of the results of Experiments 4 and 5 it is possible to argue that the negative affect associated with boredom is a function of the high degree of overall frustration that is associated with boredom. In particular boredom appears to be associated with a high degree of frustration of the needs for change and endurance. Although in Experiments 4 and 5 boring activities were considered to be frustrating of other needs, in both of these studies the change and endurance needs were frustrated by boring activities significantly more than by interesting or disliked activities. Consequently, frustration of the needs for change and endurance seems to be an important feature of boredom.

The cognitive and affective components of boredom

It has been argued here that there are two interrelated elements in the relationship between boredom and motivational needs. On the one hand boredom appears to be associated with the instrumental construing of stimulation in terms of the satisfaction of motivational needs. The fewer instrumentally satisfying constructions that are made the more stimulation will be construed in an undifferentiated and unarticulated manner, and will consequently be experienced as boring. This might be termed the cognitive component of boredom.

On the other hand, the negative affect associated with boredom appears to be a function of the high degree of overall frustration apparently associated with

boredom. This may be termed the affective component of boredom, and seems to result from few instrumentally satisfying constructions being made, and a high degree of frustration of those needs which are frustrated.

There has been an increasing trend in many areas of psychology towards regarding cognition and emotion as linked, not separate entities. For example, Kelly (1955) attempts to remove the distinction between cognition and emotion in his redefinition of such emotional states as threat, guilt and fear:

> "Threat is the awareness of imminent comprehensive change in one's core structures ... (p 489)
>
> Fear is like threat, except that, in this case, it is a new incidental construct, that seems about to take over ... (p 494)
>
> Perception of one's apparent dislodgement from his core role structure constitutes the experience of guilt " (p 502)

As Bannister and Mair (1968) argue:

> "... the whole concept of "emotion" in its conventional sense (as a mysterious hydraulic pressure within the person) has no place in personal construct theory. Instead Kelly is proposing one psychology (not two psychologies, one for "cognition" and one for "affect") with an integral language." (p 33)

Similarly, Spielburger (1966, 1972) offers a cognitive theory of anxiety, in which he argues that:

> "If the stimulus situation is cognitively appraised as dangerous or threatening, then an A-state (anxiety state) is evoked. Through sensory and cognitive feedbackmechanisms, the A-state reaction may serve as a signal that initiates a behaviour sequence..."(Spielburger, 1966; p 18)

In addition, Seligman (1975) in his learned-helplessness theory of depression, argues that

> "...cognitions of helplessness are the core cause of depression."(p 95)

He argues that

> "A man...must begin with information about the contingency of outcome upon response. This information is a property of the organism's environment not a property of the perceiver ..." (p47)

This information about the contingency

> "...must be processed and transformed into a cognitive representation of the contingency..."(p 48)

In the case of learned helplessness, this representation takes the form of a perception that responding and outcome are independent. It is this cognitive representation that Seligman (1975) argues is the

> "...causal condition for the motivational, cognitive and emotional debilitation that accompanies helplessness."

In the model of boredom to be proposed here, it is similarly argued that cognitions of the stimulation are at the root of boredom and interest. It seems likely that a person construes stimulation in terms of his motivational needs and if he makes few instrumentally satisfying constructions this will lead on the one hand to subjective monotony and on the other to high degree of frustration, and consequently to boredom.

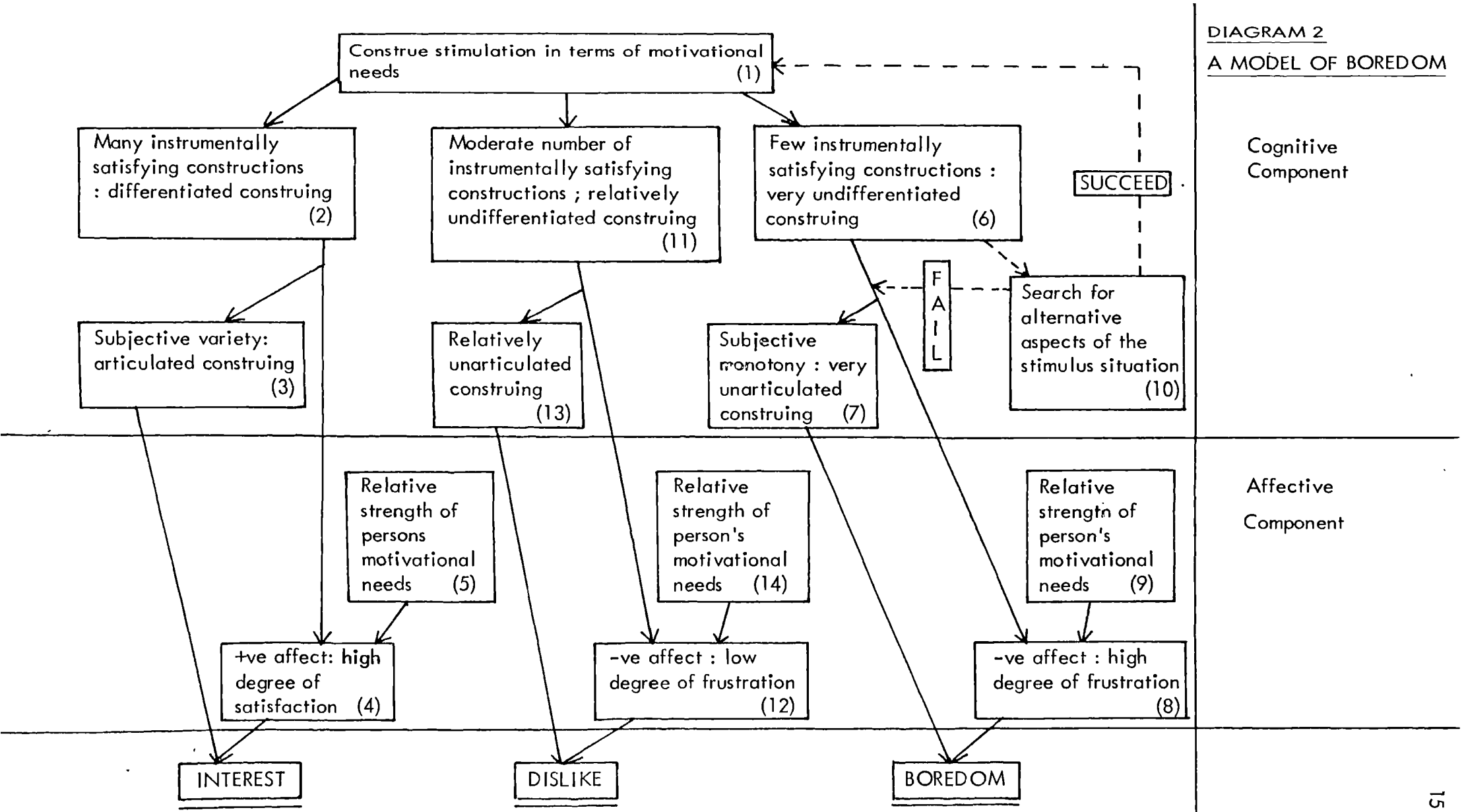
A model of boredom

Diagram 2 shows a model of boredom that has been developed from the results of the research reported here. It is proposed that the root of boredom and interest lies not in the physical characteristics of stimulation as has been proposed by Berlyne (1960, 1967) and Hebb (1966). Rather, the crucial factor is the way in which that stimulation is construed in terms of its relevance to the satisfaction of motives (see term(1) in Diagram 2).

If many instrumentally satisfying constructions are made (term 2) then this may lead both to subjective variety (term 3) (articulated construing) and to positive affect interms of a high degree of overall satisfaction (term 4), and so to interest. There is correlational evidence from the reanalysis of the MNSS data (see pages 120-125) that interest is associated with a large number of instrumentally satisfying constructions. Also, Experiment 8 showed that people used a relatively large number of constructs to construe the stimuli which they found interesting. That is, they showed differentiated construing. Similarly, there is correlational evidence of a relationship between a high degree of overall satisfaction and interest from Experiments 4 and 5. As was argued earlier (see page 42), the overall degree of satisfaction that a person experiences is likely to be related not only to

DIAGRAM 2

A MODEL OF BOREDOM



the extent to which he construes stimuli as satisfying motivational needs, but also to the relative strength of those needs within that person (term 5). (It was for this reason that the raw MNSS scores were weighted by the EPPS scores on those needs to give the overall degree of satisfaction/frustration scores.)

More nearly causal evidence of a relationship hetween subjective variety and interest is available from Experiment 9. This study showed that people who remained interested in a task made more distinctions between elements than did those who became bored with it. That is, those who remained interested continued to show articulated construing.

If few instrumentally satisfying constructions are made (term 6), then this may lead both to subjective monotony (term 7) and to negative affect in terms of a high degree of overall frustration (term 8), and so to boredom. Again correlational evidence is available which shows that boredom is associated with few instrumentally satisfying constructions (see pages120-126), and Experiment 8 showed that people used few constructs to construe both the experience of boredom and stimuli which they found boring. Boredom also appears to be associated with a high degree of overall frustration (Experiments 4 and 5), and again the relative strength of the person's motivational needs will affect this (term 9). Experiment 9 showed that people who became bored with a task gradually made fewer distinctions between elements - that is their construing became less articulated as they became bored.

An additional section has been added to the model presented (term 10) which is not actually evidenced by the experiments carried out here, but which is suggested by other literature. It is proposed that if a person makes few instrumentally satisfying constructions of stimulation, he may search for other aspects of the stimulus situation which may be instrumentally satisfying to him.

There is considerable evidence from the industrial field that diversionary activities such as talking and day-dreaming can alleviate boredom (Wyatt, 1927, 1934; Wyatt and Langdon, 1937; Kishida, 1973). As Rosseel (1974) has argued, boredom occurs when a person is unable to involve himself in some alternative activity in the work situation. It would seem possible to argue that a person who makes few instrumentally satisfying constructions of his actual task might find

satisfaction in such diversionary activities and consequently not experience boredom.

It is in this context that constraint, both external and internal, may be an important factor. Several authors have stressed the importance of external constraint in the production of boredom (Geiwitz, 1966; Stagner, 1975; Berlyne, 1960; Hebb, 1966). It would seem likely that if a person is constrained to attend a particular task which he does not construe as instrumentally satisfying, and if by virtue of the constraint he is unable to involve himself in any other activity in the situation (such as talking to his work mates) which may be satisfying, he will consequently experience boredom. As Kishida (1973) has found, work situations which offer less opportunity for diversionary activities lead to more boredom being experienced by the workers.

Another type of constraint may be important here, namely, internal constraint. It would seem likely that a person's search for other aspects of the stimulus situation which he may find instrumentally satisfying may be limited by his ability/inclination to perform such a search. It seems not uncommon to find a person who says that he is bored with what he is doing, but also, that he either cannot or cannot be bothered to find anything else to do.

The last part of the model presented concerns dislike. This section has been included because, in several of the experiments carried out, it was considered necessary to distinguish between the experience of dislike and that of boredom. This was necessary because it may be assumed that boring activities are a subset of all disliked activities. Consequently, in order to elicit features particular to boredom, these must be distinguished from general dislike.

It was shown by the reanalysis of the MNSS data, that the number of instrumentally satisfying constructions made of disliked activities fell between that for interesting and boring ones (term 11). The number of instrumentally satisfying constructions made was significantly fewer than that for interesting activities and significantly greater than that for boring activities. In addition, Experiment 7 showed that people used an intermediate number of constructs to construe the experience of dislike - significantly fewer than for interest and significantly more

than for boredom. There is also correlational evidence that a low degree of frustration (term 12) is associated with dislike from Experiments 4 and 5. However, the design of Experiments 8 and 9 did not permit the inclusion of disliked activities. Consequently, there is no direct evidence on whether dislike is associated with relatively articulated construing (term 13).

The reasearch carried out here has attempted to treat boredom as an everyday practical problem. This approach led this work to break with the assumption that physical monotony is a necessary antecedent of boredom. For example, it is a common experience for a person to experience boredom in situations where there is a great deal of varied stimulation (for example, at lectures and parties). Similarly, it is common for one person to experience boredom in a particular situation and for another to experience interest. This lead to the hypothesis that boredom was more likely to be a function of the way in which people perceive situations, than of the actual physical characteristics of those situations. This seems to have been a particularly useful way of approaching the problem, and has led to the construction of a model which can account, not only for previous experimental findings, but also for everyday experiences of boredom.

Further research on the question might usefully be carried out in two areas. Firstly, more research, within the framework of this model, is required on the psychophysiological accompaniments of boredom. Possibly indices of arousal should be considered that are less likely than heart rate to be influenced by task demands. Secondly, a study of the particular role of individual differences in relation to this model might prove fruitful. In particular cognitive style variables may be important.

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APPENDICES

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5	191	Experiment 3 Internal Validity Within Scale Correlations.
6	195	Social Desirability t-tests for Experiment 3.
7	198	The Motivational Need Satisfaction Schedule used in Experiment 4.
8	203	Overall Satisfaction/Frustration Scores from Experiment 4.
9	206	The Motivational Need Satisfaction Schedule used in Experiment 5.
10	210	Overall Satisfaction/Frustration scores from Experiment 5.
11	212	Subjects' replies from Experiment 6.
12	214	The reasons extracted by the two judges for people's interest, dislike, or boredom with their school subjects in Experiment 7.
13	225	The number of reasons extracted by the two judges for people's interest, dislike or boredom with their school subjects in Experiment 7.
14	227	Categorisation of the reasons extracted by the two judges for people's interest, dislike or boredom with their school subjects in Experiment 7.
15	240	The subject selection questions used in Experiment 8.
16	242	The selection of the supplied constructs used in Experiment 8.
17	244	The supplied construct grid used in Experiment 8.
18	246	The reasons extracted by the two judges for people's interest or boredom with the task in Experiment 8.

Appendix Number	Page	
19	253	Tables showing the number of constructs used, category usage scores and total discrepancy scores for subjects in Experiment 8.
20	257	Instructions given to subjects in Experiment 9.
21	260	Boredom/interest ratings, category usage scores and total discrepancy scores from Experiment 9.
22	264	The re-analysis of the MNSS data: number of motivational constructs satisfied, frustrated or considered irrelevant to the activities rated in Experiments 4 and 5.
23	268	The triplets of numbers used in Experiment 10.
24	271	A sample of the polygraph output used in Experiment 10.
25	273	An example of muscle artifact from Experiment 10.
26	275	Heart Rate Measures from Experiment 10.
27	278	Heart Rate Variability Measures from Experiment 10.

APPENDIX 1

ITEMS USED IN THE PILOT MOTIVATIONAL NEED SATISFACTION SCHEDULE

The Pilot Motivational Need Satisfaction Schedule

The pilot motivational need satisfaction schedule appears on page 167 to 169 . The motivational needs which the items were designed to reflect can be seen in the following table. Half of the items for each need had the positive (satisfaction) pole followed by the negative (frustration) pole, and for the other half the poles were reversed. The order in which the poles were presented can also be seen in the following table.

TABLE 1.1

Table showing the items reflecting each need and the order in which the poles were presented

Motivational Need	Item numbers	
	Positive pole followed by negative pole	Negative pole followed by positive pole
Achievement	21,40	15,54
Deference	17,46	10,58
Order	1,6	14,20
Exhibition	8,26	45,59
Autonomy	30,55	32,48
Affiliation	18,27	5,50
Intraception	36,60	16,35
Succorance	28,44	34,37
Dominance	47,51	24,43
Abasement	12,52	7,39
Nurturance	29,33	25,38
Change	19,42	3,23
Endurance	13,22	9,31
Heterosexuality	4,56	11,49
Aggression	2,53	41,57

	+ + +	+ +	+	In Between or Irrelevant	+	+ +	+ + +	
1. I felt things were orderly								I felt things were chaotic
2. I felt I was getting rid of pent up feelings								I felt I was bearing pent up feelings to myself
3. I felt that what I was doing was monotonous								I felt that what I was doing was varied
4. I felt I was liked by people of the opposite sex								I felt I was disliked by people of the opposite sex
5. I felt unfriendly								I felt friendly
6. I felt I had planned things before starting them								I felt I had failed to plan in advance
7. I felt able to cope								I felt unable to cope
8. I felt I was expressing my personality								I felt I was failing to express my personality
9. I felt I would welcome these actions								I felt I wanted to avoid distractions
10. I felt I was being rebellious								I felt I was being deferential
11. I felt misunderstood by people of the opposite sex								I felt understood by people of the opposite sex
12. I felt I was to blame for my mistakes								I felt I was not responsible for my mistakes
13. I felt I wanted to continue what I was doing								I felt I wanted to give up
14. I felt that everything was in a mess								I felt things were running smoothly
15. I felt I was being kindly								I felt I was doing my best
16. I felt I could not understand others								I felt I understood others
17. I felt I was conforming								I felt I was being non-conformist
18. I felt I was being sociable								I felt I was being unsociable
19. I felt I was experimenting with something new								I felt I was doing something routine
20. I felt that everything was disorganised								I felt I had things organised
21. I felt a sense of achievement								I felt I was achieving nothing

	+++	++	+	In Between or Irrelevant	+	++	+++	
22.I felt I was trying hard								I felt I was not trying
23.I felt things were predictable								I felt things were unpredictable
24.I felt submissive								I felt dominant
25.I felt I was hindering others								I felt I was helping others
26.I felt I could show off a little								I felt unable to show off
27.I felt I was getting on with others								I felt I was failing to get on with others
28.I felt that other people were sympathetic								I felt that other people were unsympathetic
29.I felt generous								I felt mean
30.I felt I was doing what I wanted								I felt constrained by what others wanted
31.I felt I was being lazy								I felt I was working hard
32.I felt dependent								I felt independent
33.I felt concerned about others								I felt unconcerned about others
34.I felt unwanted								I felt wanted
35.I felt I was learning nothing about myself								I felt I was learning more about myself
36.I felt I was gaining insight into others								I felt I was failing to gain insight into others
37.I felt that other people were being unkind to me								I felt that other people were being kind to me
38.I felt unsympathetic towards others								I felt sympathetic towards others
39.I felt confident								I felt unsure of myself
40.I felt I was accomplishing something of significance to myself								I felt I was accomplishing nothing of significance
41.I felt I had to keep feelings of anger to myself								I felt I could express my anger
42.I felt I was doing something novel								I felt I was doing something familiar
43.I felt unimportant								I felt a sense of importance
44.I felt as if I was being helped								I felt as if I was being hindered

	+++	++	+	IN BETWEEN OR IRRELEVANT	+	++	+++	
45.I felt I was being ignored by others								I felt that other people noticed me
46.I felt I was being conventional								I felt I was being unconventional
47.I felt a sense of power								I felt powerless
48.I felt concern about what others thought of me								I felt unconcerned by what others thought of me
49.I felt people of the opposite sex were unattractive								I felt attracted towards a person of the opposite sex
50.I felt lone								I felt part of a group of people
51.I felt I could influence things								I felt I was being influenced by things
52.I felt guilty								I felt justified in what I was doing
53.I felt I was being aggressive								I felt unable to express feelings of aggression
54.I felt I was failing								I felt I was being successful
55.I felt free from obligations								I felt constrained by obligations
56.I felt I was physically attractive to members of the opposite sex								I felt physically unattractive to people of the opposite sex
57.I felt I had to keep frustrations to myself								I felt I was working out frustrations
58.I felt I was pleasing myself								I felt I was doing what was expected of me
59.I felt out of things								I felt I was the centre of attention
60.I felt I was gaining insight into myself								I felt I was failing to gain insight into myself

APPENDIX 2

FORM A AND FORM B OF THE MOTIVATIONAL NEED SATISFACTION SCHEDULE USED IN EXPERIMENT 2

FORM A

The motivational need satisfaction schedule items in Form A appear on pages 172 to 173 . The motivational needs which these items were designed to reflect can be seen in the following table. One item for each need had the positive (satisfaction) pole followed by the negative (frustration) pole, and for the other item the poles were reversed. The order in which the poles were presented can also be seen in the following table.

TABLE 2.1

Table showing the items reflecting each need and the order in which the poles were presented

Motivational Need	Item numbers	
	Positive pole followed by negative pole	Negative pole followed by positive pole
Achievement	16	12
Deference	13	8
Order	1	11
Exhibition	6	25
Autonomy	21	22
Affiliation	14	4
Succorance	19	23
Dominance	26	17
Abasement	9	5
Nurturance	20	18
Change	15	3
Endurance	10	7
Aggression	2	24

	+ ++	. + +	+	IN BETWEEN OR IRRELEVANT	→	+ . +	+ + +	
1. I felt things were orderly								I felt things were chaotic
2. I felt I was getting rid of pent up feelings								I felt I was keeping pent up feelings to myself
3. I felt that what I was doing was monotonous								I felt that what I was doing was varied
4. I felt unfriendly								I felt friendly
5. I felt able to cope								I felt unable to cope
6. I felt I was expressing my personality								I felt I was failing to express my personality
7. I felt I would welcome distractions								I felt I wanted to avoid distractions
8. I felt I was being rebellious								I felt I was being deferential
9. I felt I was to blame for my mistakes								I felt I was not responsible for my mistakes
10. I felt I wanted to continue what I was doing								I felt I wanted to give up
11. I felt that everything was in a mess								I felt things were running smoothly
12. I felt I was doing badly								I felt I was doing my best
13. I felt I was conforming								I felt I was being non-conformist
14. I felt I was being sociable								I felt I was being unsociable
15. I felt I was experimenting with something new								I felt I was doing something routine
16. I felt a sense of achievement								I felt I was achieving nothing
17. I felt submissive								I felt dominant
18. I felt I was hindering others								I felt I was helping people
19. I felt that other people were sympathetic								I felt that other people were unsympathetic
20. I felt generous								I felt mean
21. I felt I was doing what I wanted								I felt constrained by what others wanted
22. I felt dependent								I felt independent

23. I felt unwanted				IN BETWEEN OR IRRELEVANT				I felt wanted
24. I felt I had to keep feelings of anger to myself								I felt I could express my anger
25. I felt I was being ignored by others								I felt that other people noticed me
26. I felt a sense of power								I felt powerless

FORM B

The motivational need satisfaction schedule items in Form B appear on pages 175 to 176. The motivational needs which these items were designed to reflect can be seen in the following table. One item for each need had the positive (satisfaction) pole followed by the negative (frustration) pole, and for the other item the poles were reversed. The order in which the poles were presented can also be seen in the following table.

TABLE 2.2

Table showing the items reflecting each need and the order in which the poles were presented

Motivational need	Item numbers	
	Positive pole followed by negative pole	Negative pole followed by positive pole
Achievement	12	22
Deference	16	25
Order	1	2
Exhibition	5	26
Autonomy	23	17
Affiliation	6	18
Succorance	15	9
Dominance	19	14
Abasement	20	11
Nurturance	8	10
Change	13	4
Endurance	3	7
Aggression	21	24

	+ +	+ +	+	OR IRRELEVANT	+	+ +	+ +	
1. I felt I had planned things before starting them								I felt I had failed to plan in advance
2. I felt that everything was disorganised								I felt I had things organised
3. I felt I was trying hard								I felt I was not trying
4. I felt things were predictable								I felt things were unpredictable
5. I felt I could show off a little								I felt unable to show off
6. I felt I was getting on with others								I felt I was failing to get on with others
7. I felt I was being lazy								I felt I was working hard
8. I felt concerned about others								I felt unconcerned about others
9. I felt that other people were being unkind to me								I felt that other people were being kind to me
10. I felt unsympathetic towards others								I felt sympathetic towards others
11. I felt confident								I felt unsure of myself
12. I felt I was accomplishing something of significance to myself								I felt I was accomplishing nothing of significance
13. I felt I was doing something novel								I felt I was doing somethin familiar
14. I felt unimportant								I felt a sense of importance
15. I felt as if I was being helped								I felt as if I was being hindered
16. I felt I was being conventional								I felt I was being unconventional
17. I felt concern about what others thought of me								I felt unconcerned by what others thought of me
18. I felt alone								I felt part of a group of people
19. I felt I could influence things								I felt I was being influenced by things
20. I felt guilty								I felt justified in what I was doing
21. I felt I was being aggressive								I felt unable to express feelings of aggression

	+ ++	+ +	+	IN BETWEEN OR IRRELEVANT	+	+ +	+ ++	
22. I felt I was failing								I felt I was being successful
23. I felt free from obligations								I felt constrained by obligations
24. I felt I had to keep frustrations to myself								I felt I was working out frustrations
25. I felt I was pleasing myself								I felt I was doing what was expected of me
26. I felt out of things								I felt I was the centre of attentiom

APPENDIX 3

SOCIAL DESIRABILITY T-TESTS FOR EXPERIMENT 2

TABLE 3.1

Table showing the social desirability t-tests for Form A of the Motivational Need Satisfaction Schedule used in Experiment 2

Motivational Need	Item number	t-tests			
		IS/IU	DS/DU	IS/DS	IU/DU
Achievement	12	3.03 **	-2.35 *	5.30 ***	-4.89 ***
	16	4.51 ***	0.16	9.98 ***	-4.76 ***
Deference	8	4.31 ***	-2.91 **	-1.93	3.56 ***
	13	3.62 ***	-5.54 ***	-6.08 ***	2.99 **
Order	1	3.55 ***	-2.68 *	4.67 ***	-4.61 ***
	11	4.68 ***	-1.78	8.92 ***	-7.64 ***
Exhibition	6	1.91	0.76	10.39 ***	-8.15 ***
	25	1.83	1.28	5.05 ***	-2.62 *
Autonomy	21	1.45	6.53 ***	17.23 ***	-7.50 ***
	22	1.46	2.65 *	9.09 ***	-5.18 ***
Affiliation	4	3.06 **	-0.37	7.86 ***	-6.64 ***
	14	5.55 ***	-1.89	4.18 ***	-2.06 *
Succorance	19	6.84 ***	0.23	6.55 ***	-0.55
	23	3.10 **	-1.89	3.79 ***	-1.74
Dominance	17	1.93	2.68 *	6.86 ***	-3.45 **
	26	2.93 **	1.00	8.85 ***	-4.87 ***
Abasement	5	-3.03 **	2.12 *	-6.12 ***	5.62 ***
	9	-0.88	2.84 **	1.17	0.78

TABLE 3.1 continued

Motivational Need	Item number	t-tests			
		IS/IU	DS/DU	IS/DS	IU/DU
Nurturance	18	3.51 ***	-4.33 ***	0.29	-3.38 **
	20	3.14 **	-2.4 *	3.91 ***	-3.65 ***
Change	3	2.15 *	1.74	10.38 ***	-7.09 ***
	15	1.52	2.62 *	8.27 ***	-4.48 ***
Endurance	7	1.07	2.51 *	6.10 ***	-3.77 ***
	10	2.77 **	2.61 *	17.37 ***	-8.80 ***
Aggression	2	0.57	2.29 *	7.06 ***	-6.94 ***
	24	3.32 *	3.07 **	6.55 ***	-2.83 **

IS - interesting, socially desirable activity ratings

IU - interesting, socially undesirable activity ratings

DS - disliked, socially desirable activity ratings

DU - disliked, socially undesirable activity ratings

*** $p<0.001$

** $p<0.01$

* $p<0.05$

'Item number ' refers to the item number in Form A - see appendix 2, page 171.

'Motivational need' refers to the EPPS need which the item was designed to reflect.

TABLE 3.2

Table showing the social desirability t-tests for Form B of the Motivational Need Satisfaction Schedule used in Experiment 2

Motivational Need	Item number	t-tests			
		IS/IU	DS/DU	IS/DS	IU/DU
Achievement	12	2.34 *	0.76	9.55 ***	-5.82 ***
	22	5.23 ***	-1.87	7.74 ***	-4.55 ***
Deference	16	2.52 *	-5.19 ***	-5.61 ***	2.66 *
	25	2.18 *	-5.16 ***	-9.52 ***	7.91 ***
Order	1	3.52 ***	0.26	6.85 ***	-1.21
	2	3.09 **	-1.43	4.83 ***	-3.21 **
Exhibition	5	1.7	1.21	5.97 ***	-3.30 **
	26	3.22 **	0.83	8.01 ***	-3.31 **
Autonomy	17	-2.15 *	-2.87 **	-1.27	-3.18 **
	23	-0.57	0.68	8.08 ***	-7.63 ***
Affiliation	6	3.76 ***	-1.35	8.85 ***	-4.55 ***
	18	3.84 ***	-1.10	7.12 ***	-4.34 ***
Succorance	9	4.58 ***	-1.40	4.18 ***	-2.14 *
	15	4.5 ***	-0.15	7.07 ***	-3.46 **
Dominance	14	1.96	0.72	6.47 ***	-4.18 ***
Abasement	11	-3.07 **	3.95 ***	-4.92 ***	7.42 ***
	20	-3.67 ***	2.62 *	-4.79 ***	3.28 **

TABLE 3.2 continued

Motivational Need	Item number	t-tests			
		IS/IU	DS/DU	IS/DS	IU/DU
Nurturance	8	3.76 ***	-0.57	2.73 *	-0.23
	10	4.01 ***	0.30	6.92 ***	-1.09
Change	4	-0.82	2.51 *	5.31 ***	-2.85 **
	13	-0.37	3.15 **	6.37 ***	-4.10 ***
Endurance	3	3.44 **	-0.91	2.13 *	-0.05
	7	4.41 ***	-0.09	2.37 *	1.2
Aggression	21	-0.85	0.55	1.84	-1.68
	24	1.22	2.31 *	8.25 ***	-3.5 **

IS - interesting, socially desirable activity ratings

IU - interesting, socially undesirable activity ratings

DS - disliked, socially desirable activity ratings

DU - disliked, socially undesirable activity ratings

*** $p<0.001$

** $p<0.01$

* $p<0.05$

'Item number' refers to the item number in Form B - see appendix 2, page 174.

'Motivational need' refers to the EPPS need which the item was designed to reflect.

APPENDIX 4

THE MOTIVATIONAL NEED SATISFACTION SCHEDULE USED IN EXPERIMENT 3

The Motivational Need Satisfaction Scale used in Experiment 3

The items from the motivational need satisfaction schedule that were used in xperiment 3 can be seen on pages 184 to 190 . The motivational needs which the items were designed to reflect can be seen in the following table. In addition, Table 4.1 shows the order in which the positive (satisfaction) and negative (frustration) poles were presented.

TABLE 4.1

Table showing the items reflecting each need and the order in which the poles were presented

Motivational Need	Item numbers	
	Positive pole followed by negative pole	Negative pole followed by positive pole
Achievement	1, 20, 31, 52, 57	19, 25, 40, 78, 85
Deference	2, 81, 82	16, 28, 58, 75
Order	32, 61, 74	43, 60, 79
Exhibition	13, 37, 77	18, 30, 45
Autonomy	9, 12, 50	41, 83, 84
Affiliation	14, 22, 35, 76	7, 65
Succorance	8, 34, 66	48, 67, 73
Dominance	47, 55, 68	15, 36, 49
Abasement	27, 70	10, 39, 53, 54, 62
Nurturance	21, 51, 64	23, 42, 56
Change	11, 17, 59	5, 38, 69
Endurance	33, 46, 71	29, 44, 80
Aggression	3, 24, 63, 72	4, 6, 26

	+ + +	+ +	+	IN BETWEEN OR IRRELEVANT (I)	+	+ +	+ + +	
1. I felt I was achieving something								I felt I was achieving nothing
2. I felt I was being obedient								I felt I was being disobedient
3. I felt I was being belligerent								I felt unable to express my belligerence
4. I felt I had to keep my feelings to myself								I felt I was letting off steam
5. I felt things were monotonous								I felt there was variety in what I was doing
6. I felt unable to express my anger								I felt I was displaying my anger
7. I felt I was doing things on my own								I felt I was co-operating with others
8. I felt I was being helped								I felt I was being hindered
9. I felt indifferent to what others might think of me								I felt concerned about what others might think of me
10. I felt competent								I felt incompetent
11. I felt there was diversity in what I was doing								I felt that everything was the same
12. I felt I was being a bit self-centred								I felt I was being self-denying
13. I felt I was making an impression on others								I felt I was failing to make an impression

	+ + +	+ +	+	OR IRRELEVANT(I)	+	+ +	+ + +	
14. I felt friendly								I felt unfriendly
15. I felt overwhelmed								I felt I was on top of things
16. I felt I was deciding things for myself								I felt I was letting others take decision for me
17. I felt things were changeable								I felt things were stable
18. I felt I was being reserved								I felt I was being a bit ostentatious
19. I felt a bit ashamed of what I was doing								I felt proud of what I was doing
20. I felt I was accomplishing something								I felt I was accomplishing nothing
21. I felt concerned about others								I felt unconcerned about others
22. I felt sociable								I felt unsociable
23. I felt I was being inconsiderate of others								I felt I was being considerate of others
24. I felt I was being hostile								I felt unable to express my hostility
25. I felt I was getting nowhere								I felt I was getting somewhere
26. I felt I was containing my temper								I felt I was being bad-tempered

	++	+	+	IN BETWEEN OR IRRELEVANT (I)	+	+	++	
27. I felt doubtful of myself								I felt self assured
28. I felt I was having my own way								I felt I was giving in to others
29. I felt I was being lazy								I felt I was trying hard
30. I felt I was being ignored by others								I felt I was the centre of attention
31. I felt I was making progress								I felt I was making no progress at all
32. I felt I had everything arranged								I felt I had failed to make arrangements
33. I felt a sense of determination								I felt I lacked determination
34. I felt that other people were being considerate towards me								I felt that other people were being inconsiderate towards me
35. I felt I was being cordial								I felt I was being stand-offish
36. I felt a sense of inferiority								I felt a sense of superiority
37. I felt full of myself								I felt I was being self-effacing
38. I felt things were predictable								I felt things were erratic
39. I felt proud of myself								I felt humble
40. I felt I was failing								I felt I was succeeding

	+ + +	+ +	+	IN BETWEEN OR IRRELEVANT(I)	+	+ +	+ + +	
1. I felt I had to consider other people								I felt I had only myself to consider
2. I felt unsympathetic towards others								I felt sympathetic towards others
3. I felt things were chaotic								I felt things were orderly
4. I felt I was making no effort at all								I felt I was making an effort
5. I felt that others did not notice me								I felt I was attracting the attention of others
6. I felt I was persevering								I felt I was giving in
7. I felt dominant								I felt submissive
8. I felt other people were being mean to me								I felt others were being generous to me
9. I felt I was restraining myself								I felt I was asserting myself
0. I felt I was being self reliant								I felt I was being dependent
1. I felt I was helping others								I felt I was hindering others
2. I felt satisfied with myself								I felt dissatisfied with myself
3. I felt confident								I felt unsure of myself
4. I felt equal to the situation								I felt inadequate

	+ + +	+ +	+	IN BETWEEN OR IRRELEVANT(I)	+	+ +	+ + +	
55. I felt I was being influential								I felt I was being uninfluential
56. I felt I was being a little selfish								I felt I was being unselfish
57. I felt a sense of purpose								I felt aimless
58. I felt I was pleasing myself								I felt I was doing what was expected of me
59. I felt I was doing something different								I felt I was doing the same old things
60. I felt that everything was in a mess								I felt things were running smoothly
61. I felt I had things organised								I felt that everything was disorganised
62. I felt able to cope								I felt unable to cope
63. I felt I was being aggressive								I felt unable to express my aggression
64. I felt I was being kind to others								I felt I was being unkind to others
65. I felt I was keeping myself to myself								I felt I was being gregarious
66. I felt other people were sympathetic								I felt other people were unsympathetic
67. I felt that other people were being selfish								I felt that others were being unselfish towards me

	+ ++	+ +	+	OR IRRELEVANT (I)	+	+ +	+ ++	
68. I felt as if I mattered								I felt insignificant
69. I felt I was doing something routine								I felt I was doing something novel
70. I felt I was at fault								I felt I was blameless
71. I felt I was exerting myself								I felt I was taking my ease
72. I felt I was being defiant								I felt unable to express my defiance
73. I felt other people were being unkind to me								I felt other people were being kind to m
74. I felt I had planned things before starting them								I felt I had failed to plan in advance
75. I felt I was doing what I felt like								I felt I was doing what I was told
76. I felt I was sharing things with others								I felt I was keeping things to myself
77. I felt I was showing off a little								I felt unable to show off
78. I felt I was doing badly								I felt I was doing well
79. I felt I had failed to prepare for what I was doing								I felt I had prepared for what I was doing
80. I felt I wanted to give up								I felt I was being persistent

	+ ++	+ +	+	IN BETWEEN OR IRRELEVANT (I)	+	+ +	+ ++	
11. I felt I was conforming								I felt I was being non-conformist
12. I felt overwhelmed								I felt I was managing quite well
13. I felt constrained by what others wanted								I felt free to do what I wanted
14. I felt constrained by responsibilities								I felt free from responsibilities
15. I felt things were getting the better of me								I felt I was getting the better of things

APPENDIX 5

EXPERIMENT 3 INTERNAL VALIDITY WITHIN SCALE CORRELATIONS

Experiment 3 Internal Validity Within Scale Correlations

Table 5.1 shows the within scale correlations between MNSS items that were significant for all classes of activity. In the case of those needs where more than one pair of items satisfied this condition, the items selected for inclusion in the revised MNSS are marked by an (*). The item numbers quoted refer to the MNSS items used in experiment 3 (see Appendix 4).

TABLE 5.1

Table showing the within scale correlations between MNSS items that were significant at the 0.05 level or better for all classes of activity

Need/ Item Numbers	Class of activity			
	Interesting, Socially Desirable	Interesting, Socially Undesirable	Disliked, Socially Desirable	Disliked Socially Undesirable
Achievement				
1*, 57*	0.5025	0.5474	0.8199	0.4989
20, 52	0.4143	0.3648	0.5892	0.4876
25, 40	0.6229	0.4735	0.7230	0.5246
40, 78	0.3462	0.8298	0.5335	0.6798
52, 78	0.4409	0.5433	0.4917	0.6033
Deference				
2, 75	0.3852	0.4964	0.5187	0.4600
28, 58	0.4227	0.7296	0.4514	0.7145
28, 75	0.6568	0.6341	0.5845	0.6260
28*, 81*	0.6378	0.4296	0.5847	0.4120
58, 75	0.4077	0.7454	0.6141	0.8695
Order				
43*, 60*	0.3878	0.4189	0.7900	0.6241
Exhibition				
30, 45	0.6260	0.6344	0.8105	0.7810
45*, 77*	0.6668	0.5384	0.5735	0.4412

Continued.....

TABLE 5.1 (continued)

Need/ Item Numbers	Class of activity: Interesting, Socially Desirable	Interesting, Socially Undesirable	Disliked, Socially Desirable	Disliked Socially Undesirable
Autonomy				
83*, 84*	0.3074	0.7270	0.5419	0.8334
Affiliation				
14*, 22*	0.3274	0.7008	0.6909	0.5002
Succorance				
34, 67	0.6784	0.3887	0.5757	0.7642
34, 48	0.6875	0.5029	0.6227	0.6360
34*, 73*	0.7946	0.5103	0.5995	0.6044
48, 67	0.4001	0.5570	0.7478	0.6641
48, 73	0.6778	0.6916	0.8751	0.8641
66, 67	0.8887	0.6219	0.7881	0.6936
66, 73	0.8691	0.4387	0.6954	0.6366
67, 73	0.8767	0.7506	0.7541	0.5979
Dominance				
36*, 47*	0.4224	0.5616	0.3617	0.8024
Abasement				
10, 27	0.3392	0.4249	0.3502	0.4710
10, 62	0.4876	0.3619	0.4466	0.6541
27, 53	0.6426	0.6632	0.4726	0.3881
27, 54	0.7077	0.6473	0.6914	0.6172
53*, 54*	0.7374	0.7952	0.7191	0.6252
Nurturance				
21, 42	0.4102	0.4861	0.3760	0.5184
51*, 64*	0.5293	0.4841	0.5966	0.7006
Change				
11*, 69*	0.3459	0.4018	0.7639	0.6749
59, 69	0.5224	0.5528	0.7027	0.4928
Endurance				
33*, 80*	0.4300	0.6468	0.4068	0.5459

Continued....

TABLE 5.1 (continued)

Need/ Item Numbers	Class of activity: Interesting, Socially Desirable	Interesting, Socially Undesirable	Disliked, Socially Desirable	Disliked Socially Undesirable
Aggression				
24, 63	0.5784	0.5102	0.5984	0.4211

APPENDIX 6

SOCIAL DESIRABILITY T-TESTS FOR EXPERIMENT 3

Social Desirability t-Tests for Experiment 3

For each of the 26 items selected as satisfying the internal validity criteria (see page 192 , and Appendix 5) a series of four t-tests was carried out between the scores on the four categories of activity. These t-tests appear in Table 6.1. The item numbers quoted refer to the MNSS items used in Experiment 3 (see Appendix 4).

TABLE 6.1

Table showing the social desirability t-tests for Experiment 3

Need	Item Number	t-Tests			
		IS/DS	IU/DU	IS/IU	DS/DU
Achievement	1	t=0.2*	t=4.91*	t=3.47*	t=0.52
	57	t=7.38*	t=3.72*	t=2.33*	t=0.96
Deference	28	t=4.68*	t=1.71	t=1.3	t=4.3*
	81	t=0.95	t=0.08	t=1.34	t=1.99
Order	43	t=2.07*	t=0.38	t=3.46*	t=0.93
	60	t=5.34*	t=1.88	t=2.65	t=0.42
Exhibition	45	t=2.65*	t=0.8	t=0.21	t=1.18
	77	t=2.62*	t=1.7	t=1.09	t=1.84
Autonomy	83	t=5.97*	t=1.75	t=0.37	t=4.37*
	84	t=4.56*	t=1.28	t=0.75	t=4.0*
Affiliation	14	t=5.76*	t=2.21*	t=2.35*	t=0.94
	22	t=5.24*	t=4.81*	t=0.12	t=0.49
Succorance	34	t=3.98*	t=0.32	t=3.48*	t=0.94
	73	t=4.25	t=0.45	t=3.05*	t=1.8
Dominance	36	t=3.51*	t=1.84	t=0.30	t=1.27
	47	t=4.15*	t=1.37	t=0.65	t=1.8
Abasement	53	t=5.41*	t=2.24*	t=1.77	t=0.22
	54	t=5.26*	t=1.82	t=2.48*	t=0.82
Nurturance	51	t=1.98	t=0.44	t=4.3*	t=1.91
	64	t=1.92	t=0.53	t=4.24*	t=0.72
Change	11	t=8.49*	t=2.41*	t=2.78*	t=2.44*
	69	t=6.5*	t=3.12*	t=0.74	t=3.65*

Table 6.1 continued

Need	Item Number	t-Tests			
		IS/DS	IU/DU	IS/IU	DS/DU
Endurance	33	t=8.07*	t=2.7*	t=1.35	t=4.04*
	80	t=6.54*	t=2.05*	t=1.81	t=2.48*
Aggression	24	t=0.75	t=1.56	t=1.16	t=2.85*
	63	t=1.49	t=0.51	t=0.56	t=2.76

* $p<0.05$

IS - Interesting, socially desirable activity ratings

IU - Interesting, socially undesirable activity ratings

DS - Disliked, socially desirable activity ratings

DU - Disliked, socially undesirable activity ratings

APPENDIX 7

THE MOTIVATIONAL NEED SATISFACTION SCHEDULE USED IN EXPERIMENT 4

The motivational need satisfaction schedule used in Experiment 4

The motivational need satisfaction schedule used in Experiment 4 appears on pages 200 to 202 . The motivational needs which the items were designed to reflect can be seen in the following table. This table also shows the order in which the positive (satisfaction) and negative (frustration) poles were presented.

TABLE 7.1

Table showing the items reflecting each need and the order in which the poles were presented

Motivational Need	Item Numbers	
	Positive pole followed by negative pole	Negative pole followed by positive pole
Achievement	16	8
Deference	23	1
Order	20	11
Exhibition	34	2
Autonomy	5	4
Affiliation	27	14
Succorance	6	36
Dominance	12	21
Abasement	24	29
Nurturance	10	28
Change	26	32
Aggression	9	13
Endurance	25, 35	3, 15
Heterosexuality	7, 31	18, 22
Intraception	17, 19	30, 33

NAME:	+++	++	+	In Between (✓) OR Irrelevant (I)	+	++	+++	
1. I felt I was having my own way								I felt I was giving in to others
2. I felt that others did not notice me								I felt I was attracting the attention of others
3. I felt I would welcome distractions								I felt I wanted to avoid distractions
4. I felt constrained by responsibilities								I felt free from responsibilities
5. I felt free to do what I wanted								I felt constrained by what others wanted
6. I felt that other people were being considerate towards me								I felt that other people were being inconsiderate towards me
7. I felt that people of the opposite sex liked me								I felt that people of the opposite sex disliked me
8. I felt I was achieving nothing								I felt I was achieving something
9. I felt I was being aggressive								I felt unable to express my aggression
10. I felt I was helping others								I felt I was hindering others
11. I felt that everything was in a mess								I felt things were running smoothly
12. I felt dominant								I felt submissive
13. I felt unable to express my hostility								I felt I was being hostile
14. I felt unfriendly								I felt friendly
15. I felt I wanted to give up								I felt I was being persistent
16. I felt a sense of purpose								I felt aimless

	+ + +	+ +	+	In Between (✓) or Irrelevant (✓)	+	+ +	+ + +	
17. I felt I was gaining insight into others								I felt unable to gain insight into others
18. I felt misunderstood by people of the opposite sex								I felt understood by people of the opposite sex
19. I felt I was gaining insight into myself								I felt I was failing to gain insight into myself
20. I felt things were orderly								I felt things were chaotic
21. I felt a sense of inferiority								I felt a sense of superiority
22. I felt people of the opposite sex were unattractive								I felt attracted towards a person of the opposite sex
23. I felt I was conforming								I felt I was being non-conformist
24. I felt inadequate								I felt equal to the situation
25. I felt I was trying hard								I felt I was not trying
26. I felt there was diversity in what I was doing								I felt that everything was the same
27. I felt sociable								I felt unsociable
28. I felt I was being unkind to others								I felt I was being kind to others
29. I felt unsure of myself								I felt confident
30. I felt I could not understand others								I felt I understood others
31. I felt I was physically attractive to members of the opposite sex								I felt I was physically unattractive to members of the opposite sex
32. I felt I was doing something routine								I felt I was doing something novel

	+++	++	+	In between (✓) OR Irrelevant (—)	+	++	+++	
33. I felt I was learning nothing about myself								I felt I was learning more about myself
34. I felt I was showing off a little								I felt unable to show off
35. I felt a sense of determination								I felt I lacked determination
36. I felt that other people were being unkind to me								I felt that other people were being kind to me

APPENDIX 8

OVERALL SATISFACTION/FRUSTRATION SCORES FROM EXPERIMENT 4

Overall Satisfaction/Frustration Scores from Experiment 4

Table 8.1 shows each subject's overall satisfaction/frustration scores for each class of activity (interesting, disliked and boring). The overall satisfaction/frustration scores are given both including and excluding the scores on the needs of endurance, heterosexuality and intraception because of the untested nature of these items.

TABLE 8.1

Overall Satisfaction/Frustration scores

Subject Number	Overall Satisfaction/Frustration Scores			Satisfaction/Frustration scores (excluding endurance, heterosexuality and intraception scores)		
	Interesting Activities	Disliked Activities	Boring Activities	Interesting Activities	Disliked Activities	Boring Activities
1	933	-373	-559	698	-166	-449
2	1193	-335	-1251	952	-269	-1085
3	1255	216	-724	864	148	-815
4	473	-247	-1457	154	-171	-1085
5	1786	-278	-221	1148	-319	-445
6	2120	699	-354	1554	420	-458
7	1238	-600	-839	899	-533	-812
8	1598	-834	-741	1380	-786	-591
9	1951	-357	-1102	1072	-692	-468
10	2286	724	-1973	1747	464	-1495
11	1227	-552	-976	796	-391	-558
12	744	-477	-408	667	-373	-177
13	1202	62	-154	871	-51	-95
14	1229	-123	-115	797	-21	-121
15	1745	183	-1493	1304	155	-1363
16	1339	-156	-143	1050	-399	-276
17	1388	-304	-1094	1171	-346	-833
18	1354	-531	-568	904	-461	-449
19	1559	-497	-854	1042	-547	-720

Table 8.1 continued

Subject Number	Overall Satisfaction/Frustration Scores			Satisfaction/Frustration scores (excluding endurance, heterosexuality and intraception scores)		
	Interesting Activities	Disliked Activities	Boring Activities	Interesting Activities	Disliked Activities	Boring Activities
20	1403	65	-473	989	-117	-318
21	594	-410	-340	313	-329	-296
22	1447	-358	-1391	908	-507	-1003
23	1001	-86	-758	782	-226	-770
24	2280	139	-1047	1764	15	-999

APPENDIX 9

THE MOTIVATIONAL NEED SATISFACTION SCHEDULE USED IN EXPERIMENT 5

The Motivational Need Satisfaction Schedule used in Experiment 5

The final version of the motivational need satisfaction schedule that was used inE xperiment 5 appears on pages 208 to 209 . The motivational needs which the items were designed to reflect, and the order in which the positive (satisfaction) and negative (frustration) poles were presented, appear in the following table.

TABLE 9.1

Table showing the items reflecting each need and the order in which the poles were presented

Motivational Need	Item numbers	
	Positive pole followed by negative pole	Negative pole followed by positive pole
Achievement	13	6
Deference	18	1
Order	16	9
Exhibition	28	2
Autonomy	4	3
Affiliation	22	12
Intraception	15	25
Succorance	5	30
Dominance	10	17
Abasement	19	24
Nurturance	8	23
Change	21	27
Endurance	20	29
Heterosexuality	26	14
Aggression	7	11

NAME:	+++	++	+	In Between (✓) or Irrelevant (±)	+	++	+++	SUBJECT:
1. I felt I was having my own way								I felt I was giving in to others
2. I felt that others did not notice me								I felt I was attracting the attention of others
3. I felt constrained by responsibilities								I felt free from responsibilities
4. I felt free to do what I wanted								I felt constrained by what others wanted
5. I felt that other people were being considerate towards me								I felt that other people were being inconsiderate towards me
6. I felt I was achieving nothing								I felt I was achieving something
7. I felt I was being aggressive								I felt unable to express my aggression
8. I felt I was helping others								I felt I was hindering others
9. I felt that everything was in a mess								I felt things were running smoothly
10. I felt dominant								I felt submissive
11. I felt unable to express my hostility								I felt I was being hostile
12. I felt unfriendly								I felt friendly
13. I felt a sense of purpose								I felt aimless
14. I felt misunderstood by people of the opposite sex								I felt understood by people of the opposite sex
15. I felt I was gaining insight into myself								I felt I was failing to gain insight into myself
16. I felt things were orderly								I felt things were chaotic
17. I felt a sense of inferiority								I felt a sense of superiority
18. I felt I was conforming								I felt I was being non-conformist
19. I felt inadequate								I felt equal to the situation
20. I felt I was trying hard								I felt I was not trying
21. I felt there was diversity in what I was doing								I felt that everything was the same

	+++	++	+	In Between (-) or Irrelevant (I)	+	++	+++	
22.I felt sociable								I felt unsociable
23.I felt I was being unkind to others								I felt I was being kind to others
24.I felt unsure of myself								I felt confident
25.I felt I could not understand others								I felt I understood others
26.I felt I was physically attractive to members of the opposite sex								I felt I was physically unattractive to members of the opposite sex
27.I felt I was doing something routine								I felt I was doing something novel
28.I felt I was showing off a little								I felt unable to show off
29.I felt I lacked determination								I felt a sense of determinat
30.I felt that other people were being unkind to me								I felt that other people wer being kind to me

APPENDIX 10

OVERALL SATISFACTION/FRUSTRATION SCORES FROM EXPERIMENT 5

TABLE 10.1

Table showing the overall satisfaction/frustration scores for interesting, disliked and boring school subjects obtained from each person in Experiment 5

Subject Number	Overall satisfaction/frustration scores		
	Interesting School subjects	Disliked School subjects	Boring School subjects
1	781	-375	-803
2	886	-295	-603
3	478	-280	-353
4	835	188	-95
5	1317	-372	-886
6	998	-247	500
7	538	432	-365
8	927	-310	-766
9	392	229	-110
10	600	115	-127
11	590	-5	-304
12	1266	1283	465
13	767	374	-393
14	880	-218	-657
15	235	-266	-660
16	744	72	-454
17	487	-1017	-887
18	453	-315	-410

APPENDIX 11

SUBJECTS' REPLIES FROM EXPERIMENT 6

Subjects' replies from Experiment 6

Table 11.1 lists the replies given by subjects to the following question:

"When do you feel that you are achieving something in your school subjects?"

TABLE 11.1

Subjects reasons for feeling a sense of achievement at school

Subject Number	Reply given
1	Writing good essays, that is getting good marks for exams.
2	Getting good marks.
3	When parents and teachers congratulate me for good marks and results.
4	When I've enjoyed myself and passed, not necessarily getting good marks.
5	When teacher says its good - get good marks.
6	Good marks for homework.
7	When I feel I've worked - not just getting a good mark.
8	When you get good exam results.
9	When I get good essay and exam marks.
10	When you get a good mark or the teacher says something nice about you.
11	When I get praise from teachers.
12	When teacher praises you.
13	When I get good marks.
14	When I understand it and can put it into practice.
15	When I like and enjoy a subject.
16	When I get good results or the teacher praises me.
17	When I am enjoying it.
18	When I get an essay back that I've put a lot of work into and it gets a good mark.

APPENDIX 12

THE REASONS EXTRACTED BY THE TWO JUDGES FOR PEOPLE'S INTEREST, DISLIKE, OR BOREDOM WITH THEIR SCHOOL SUBJECTS IN EXPERIMENT 7

The reasons extracted by two judges for people's interest, dislike or boredom with their school subjects

Transcripts of the reasons given by people for their interest, dislike or boredom with their school subjects were given to two judges, who were asked to write down the distinctly different reasons given by each person for their interest, dislike or boredom. The reasons extracted by the two judges can be found in Table 12.1. Each person gave his reasons for interest in two school subjects (I(1) and I (2)), his dislike of two school subjects (D(1) and D(2)) and his boredom with two school subjects (B(1) and B(2)).

TABLE 12.1

The reasons extracted by two judges for people's interest, dislike or boredom with their school subjects

Person number/ class of school subject		Reasons extracted Judge 1	Judge 2
1.	I(1)	Wide range Well put over Broadened outlook	Wide ranging Good teacher Interesting
	I(2)	Empathised with work Put over well	Good teacher Good books
	D(1)	Monotonous	Monotonous
	D(2)	Disciplined teacher Badly presented material	Teacher old fashioned Monotonous
	B(1)	Hard Repetitive	Hard Repetitive
	B(2)	Very Hard Frustrating when couldn't do it Teacher didn't make it interesting	Hard Frustrating Teacher didn't help
2.	I(1)	Teacher had time for all Friendly class Different from other subjects Generally enjoyed it	Friendly Different Small class Went out
	I(2)	Treated like adults Friendly class Field trips Saw relevance of it Understood it	Adults Friendly Went out Relevant Understood it
	D(1)	Disliked teacher (strict) Made me look small	Disliked teacher Teacher strict

Table 12.1 continued

Person number/ class of school subject		Reason extracted Judge 1	Judge 2
2.	D(1)		Teacher made me feel small
	D(2)	Disliked teacher Pace too slow Made me feel small	Teacher bad Slow class Teacher made me feel small
	B(1)	Couldn't do it Couldn't concentrate	Couldn't do it Couldn't concentrate
	B(2)	Not stimulating Treated like kids	Treated like children Just copying
3.	I(1)	Good at it Independence Different	Could do it Independent learning Different
	I(2)	Liked finding out about people Could relate it to self Different from other subjects	Liked it Relevant Different
	D(1)	Found it difficult Little guidance Strict teacher	Hard Unhelpful teacher Teacher strict
	D(2)	Too difficult Little guidance Strict teacher	Hard Unhelpful teacher Teacher strict
	B(1)	Couldn't understand Monotonous	Didn't understand Teacher monotonous
	B(2)	Chaos in class Irrelevant	Teacher bad Irrelevant
4.	I(1)	Good relationship with teacher Understood it Comparisons made Class friendly	Good teacher - pupil relationship Understood it Friendly class Interesting All facts
	I(2)	Understood it well Independence Friendly groups Group discussion Good explanation Friendly teacher Good at it	Understood Worked independently Friendly class Good discussion I was good at it Teacher good Enjoyed books
	D(1)	Confusing Did things wrong Teacher talked about peripheral things Only CSE so not important	Confused Got it wrong Teacher irrelevant Didn't care about it

Table 12.1 continued

Person number/ class of school subject		Reasons extracted Judge 1	Judge 2
4.	D(2)	Didn't wish to continue it Classes chaotic Couldn't understand Not explained	Didn't care Chaotic class Didn't understand Not explained
	B(1)	Couldn't get into it Wasn't bothered with it Teacher very strict	Didn't get into it Not bothered Teacher strict Teacher didn't explain Didn't understand
	B(2)	Couldn't understand Didn't bother since no intention of following it	Didn't understand Not bothered Teacher changed methods
5.	I(1)	Knowledge of others Good relationship with rest of class Teacher lively	Good relationship Teacher good and lively Liked it
	I(2)	Well organised teacher Comes easily Friendly class	Easy Good at it Organised Friendly class Liked it Liked teacher Hard work
	D(1)	Couldn't do it No interaction with teacher Chaos in class	Couldn't do it Teacher strange *Chaotic and disorganised*
	D(2)	Got dirty Missed friends Hated being bad at it Didn't like people	Messy Not with friend Hated to fail Bad vibes Not good
	B(1)	Not exciting Teacher very strict	Not exciting Teacher strict Didn't like books
	B(2)	No point to it Didn't like teacher No opportunity of scope	Irrelevant Teacher sarcastic Didn't like essays
6.	I(1)	Good communication with teacher Relevant Helped self understanding Good at it	Good teacher - pupil relationship Good at it Teacher made it interesting Interesting books Liked writing essays

Table 12.1 continued

Person number/ class of school subject		Reasons extracted Judge 1	Judge 2
6.	I(2)	Relevant Self understanding Good relation with teacher Good at it	Relevant Good teacher-pupil relationship Good at it Interesting
	D(1)	Too feminine Meaningless Couldn't do it	Feminine Meaningless Couldn't do it
	D(2)	Meaningless Disliked teacher Not good at it Felt inferior to peers	Silly Teacher got cross Not good at it Inferior
	B(1)	Couldn't do it Disliked teacher	Couldn't do it Teacher shouted
	B(2)	Couldn't grasp it Didn't like peers	Couldn't do it Didn't like group Didn't like teacher
7.	I(1)	Find out about other people Varied General Good at it	Find out about others Varied I was good at it Learning new things Good teacher
	I(2)	Good at it Increased outlook on life Easy to understand	Good at it Increased outlook on life Not difficult Teacher good Liked books
	D(1)	Hard Wasn't good at it Annoying	It was hard Not good at it Found it annoying Didn't want to do it Had to have it
	D(2)	Hard work Made me angry	Hard Angry Not good at it Teacher cross if didn't understand
	B(1)	Always changing teacher Irrelevant	Changed Teacher Irrelevant Unsettled Uninteresting
	B(2)	Never did anything Monotonous	Did nothing Monotonous

Table 12.1 continued

Person number/ class of school subject		Reasons extracted Judge 1	Judge 2
8.	I(1)	Varied Discussion work Humerous General	Varied Discussion Humerous Teacher interesting Different
	I(2)	Could see goals Freedom of choice within subject Lessons well planned	Know what was going on Free choice Well organised Teacher makes us work Relevant
	D(1)	Teacher strict Made to feel inferior	Teacher strict Felt inferior Scared to go to lessons Didn't oral work
	D(2)	Teacher talked down to kids	Teacher made us feel like kids
	B(1)	No interest from teacher Chaos in classes	Teacher not have much to do with you Chaotic classes Textbook work
	B(2)	Monotonous	Monotonous Not for young people
9.	I(1)	Relate to it Stimulating Like reading	Relevant Made me think Likes reading More out of theatre
	I(2)	Relate to it Like the parts of it	Relevant Felt I knew it Interesting Fun
	D(1)	Too difficult Can't relate to it Get nothing from it	Too difficult Couldn't relate to it Got nothing from it
	D(2)	Teacher arrogant Wasn't good at it Irrelevant	Disliked teacher Wasn't good at it Irrelevant
	B(1)	Didn't want to bother with it	Didn't like subject matter Irrelevant
	B(2)	Didn't like teacher Irrelevant	Teacher made a fool out of me

Table 12.1 continued

Person number/ class of school subject		Reasons extracted Judge 1	Judge 2
10.	I(1)	Friendly teacher Enthusiasm Creative	Teacher helpful Teacher made it interesting Teacher was enthusiastic and it was catching Teacher good Enjoy making stuff I was good at it
	I(2)	Liked it Relevant Friendly class Entertaining	Liked subject Relevant Friendly class Interesting
	D(1)	Not good at it Didn't get on with people in my group Teacher unfriendly Waste of time	Not good at it Didn't get on with others in the group Teacher unfriendly Waste of time Didn't do much
	D(2)	Couldn't do it Hated lecturer Didn't like others in class Not creative	I was hopeless at it Hated teacher Disliked othersin class All exercises never made anything
	B(1)	Couldn't do it No supervision	Couldn't do it Teacher left us alone a lot Didn't really do anything
	B(2)	Didn't do much	Didn't do anything Teacher fussy
11.	I(1)	Kept aware Self teaching Stimulating Stretching Good at it	Teacher kept you aware all the time Worked yourself Made you think A challenge I was good at it Not dictated at Asked own opinions Books good
	I(2)	Positive feedback Self responsibility Could make a contribution Good at it	See own work improve Teacher constructive criticism Teacher gives you responsibilit You could make a great contribution I was good at it Good teacher

Table 12.1 continued

Person number/ class of school subject		Reasons extracted Judge 1	Judge 2
11.	D(1)	Strict teacher Didn't understand Petty teacher Couldn't relate to subject	Teacher disliked Didn't understand Irrelevant
	D(2)	Overload Couldn't do it Irrelevant	More I learned the more I forgot Couldn't do parts Irrelevant
	B(1)	Too difficult Couldn't relate to it	Couldn't do it Irrelevant
	B(2)	Not good at it	Couldn't do it
12.	I(1)	Good at it Self expression Eager to learn Like composing	I'm good at it Express myself Want good command of lingo Enjoy learning about writers Like writing own material Like reading Like words
	I(2)	Eager to learn Relevant Teacher interesting Good at it	Want to find out more Relevant Teacher very interesting Was good at it Found it easy Like subject
	D(1)	Demoralised Not easy Time dragged	Demoralising Not good at it Long lessons therefore time dragged Monotonous Felt inferior
	D(2)	Couldn't relate to parts Sarcastic teacher Not enough work Irrelevant No supervision	Parts uninteresting Sarcastic teacher Not enough Homework Not pushed by teacher Stuff irrelevant to O level syllabus
	B(1)	Bad presentation Monotonous Couldn't understand	Bad presentation Monotonous Couldn't ask questions therefore not understand Teacher not much good
	B(2)	Forced to do it Class not interested	Forced to do the subject by family

Table 12.1 continued

Person number/ class of school subject		Reasons extracted Judge 1	Judge 2
12.	B(2)	Monotonous	Classmates not interested Monotonous
13.	I(1)	Challenge Entertaining Stimulating Good at it	A challenge Amusing classmates Teacher makes you think I knew a lot about it Like detective work
	I(2)	Good interaction with teacher Relevant	Good teacher Relevant
	D(1)	Wanted to do something else	Wanted to do something else
	D(2)	Unnecessary Too much work Unfriendly teacher	Irrelevant Lot of work Teacher strict and unfriendly
	B(1)	Too complicated No class control Irrelevant	Too complicated Teacher couldn't control class Irrelevant Didn't understand
	B(2)	Teacher monotonous	Monotonous Teacher a hypocrite Manners not geography
14.	I(1)	Relevant Like plants Good teacher	Relevant Teacher good Good teacher-pupil relations
	I(2)	Good at it Different Insight into others	I was good at it Something different Interesting
	D(1)	Not interested	Not interested Irrelevant
	D(2)	Unrelated Irrelevant	Couldn't do bits Irrelevant Just another subject
	B(1)	Couldn't do it No supervision	Couldn't do it Teacher spent no time with us Bad teacher-pupil relations
	B(2)	Couldn't do it Bad teacher	Couldn't do it teacher hopeless
15.	I(1)	Self knowledge - put together Approachable teacher	Interested in subject Teacher-pupil relations good
	I(2)	Different things each week Stimulating	Different Something to think about

Table 12.1 continued

Person number/ class of school subject		Reasons extracted Judge 1	Judge 2
15.	I(2)	Could discuss material Good relationship with teacher	Good teacher Enjoyed the reading
	D(1)	Disliked teacher No intra class interaction Felt being picked upon	Disliked teacher
	D(2)	Hated teacher Teacher said we were stupid Singled me out Not good at subject	Hated teacher Not good at subject
	B(1)	Repetitious Irrelevant	Repetitive Irrelevant Didn't do anything
	B(2)	Repetitious	Repetition
16.	I(1)	Very general Good at it Friendly teacher	Varied and General Good at it Liked teacher Good teacher-pupil relations
	I(2)	Enables travel Good at it Covers lots of topics Different	Good at it Wide topic Different Ambition
	D(1)	Not relevant Snooty teacher	Irrelevant Disliked teacher No good at it
	D(2)	Couldn't do it Sequential work	Couldn't do it Sequences Uninteresting
	B(1)	Repetitious No challenge	Not a challenge Disliked teacher Couldn't do it
	B(2)	Seemed pointless Bad teacher	No point to it Teacher bad
17.	I(1)	Can use imagination Communication with everyone Teacher had good relationship Was good at it	Could use imagination Everybody participated Good teacher-pupil relations I was good at it I like writing
	I(2)	Came alive Stimulating Relevant Contrast Good at it	Teacher dynamic personality Made me think Relevant to me Something different I could do it

Table 12.1 continued

Person number/ class of school subject		Reasons extracted Judge 1	Judge 2
17.	I(2)		Got good marks
	D(1)	Saw no point in it Couldn't do it Strict and sarcastic teacher	Irrelevant Couldn't do it Teacher disliked
	D(2)	Bad organisation No class control	Lessons a shambles Teacher couldn't control class Didn't learn anything
	B(1)	Monotonous Told it was monotonous Seemingly irrelevant	Monotonous Irrelevant It was just dictation
	B(2)	No thinking involved No point to it Soporific	Didn't have to think Irrelevant Everyone asleep Didn't do anything Didn't like subject
18.	I(1)	Try different things Positive feedback Independence Relevant	Immediate feedback Independence Relevant Liked it
	I(2)	Expressive teacher Related to real life	Expressive Good teacher Not too much work
	D(1)	Repetitious Teacher unco-operative Unstimulating Disliked teacher	Repetitive Teacher restricting Avoided questions Just write in class
	D(2)	No encouragement Frustrating No guidance	No encouragement Frustrating Told not good
	B(1)	Saw no purpose	Irrelevant
	B(2)	No understanding Teacher unhelpful	Didn't understand Teacher strict and unhelpful

APPENDIX 13

THE NUMBER OF REASONS EXTRACTED BY THE TWO JUDGES FOR PEOPLE'S INTEREST, DISLIKE OR BOREDOM WITH THEIR SCHOOL SUBJECTS IN EXPERIMENT 7

TABLE 13.1

Table showing the number of reasons extracted by the two judges for each subject's interest, dislike or boredom with his school subjects

Subject Number	Number of Reasons extracted								
	Interesting School Subjects			Disliked School Subjects			Boring School subjects		
	Judge1	Judge2	Mean	Judge 1	Judge2	Mean	Judge1	Judge2	Mean
1	5	5	5	3	3	3	5	5	5
2	11	9	10	6	5	5.5	8	6	7
3	8	7	7.5	6	4	5	5	4	4.5
4	6	6	6	3	7	5	4	3	3.5
5	6	6	6	5	4	4.5	5	4	4.5
6	8	6	7	4	4	4	7	3	5
7	13	8	10.5	10	8	9	7	6	6.5
8	14	9	11.5	6	7	6.5	3	3	3
9	10	7	8.5	9	8	8.5	5	3	4
10	8	5	6.5	6	6	6	3	3	3
11	10	7	8.5	5	3	4	5	3	4
12	10	7	8.5	9	5	6.5	5	4	4.5
13	10	8	9	7	7	7	5	4	4.5
14	7	6	6.5	7	7	7	3	3	3
15	10	6	8	8	7	7.5	6	5	5.5
16	12	11	11.5	8	8	8	8	5	6.5
17	6	6	6	6	6	6	4	4	4
18	9	9	9	6	5	5.5	4	4	4

APPENDIX 14

CATEGORISATION OF THE REASONS EXTRACTED BY THE TWO JUDGES FOR PEOPLE'S INTEREST, DISLIKE OR BOREDOM WITH THEIR SCHOOL SUBJECTS IN EXPERIMENT 7

A Categorisation of the Reasons Extracted by the Two Judges for People's Interest, Dislike or Boredom with their School Subjects in Experiment 7

The reasons extracted by the two judges for people's interest, dislike or boredom with their school subjects were categorised. Diagrams 14.1 to 14.6 show these categorisations. Where a number in brackets appears after a reason, for example, 'Friendly class (6)', this means that this reason was extracted on six occasions. The categorisations of reasons extracted for boredom, interest and dislike appear separately.

DIAGRAM 14.1

Categorisation of the reasons extracted by judge number 1 for interest in school subjects

Relationships in class

With peers
Friendly class (4)
Class friendly
Friendly groups
Good relationship with rest of class
Communication with everyone

With teacher
Treated like adults
Teacher had time for all
Good relationship with teacher
Good communication with teacher
Teacher had good relationship
Friendly teacher (3)
Teacher lively
Good interaction with teacher
Good relationship with teacher
Approachable teacher

Ability
Good at it (15)
Was good at it
Comes easily

Understood
Understood it
Understood it well
Easy to understand

Autonomy
Independence
Independence
Independent
Self responsibility
Self teaching

Change

Within subject
Varied
Try different things
Varied
Different things each week

From other subjects
Contrast
Different (3)
Different from other subjects
Different from other subjects

Diagram 14.1 continued

Relevance

General	To self	To others
Relevant (8)	Self understanding	Insight into others
Related to real life	Helped self understanding	Knowledge of others
Saw relevance	Could relate to self	Find out about other people
Empathised with work	Self knowledge	Liked finding out about people
	Relate to it	
	Relate to it	Increased outlook on life
		Broadened outlook

Teaching

Teacher	Method	Content
Well put over	Discussion work	Covers lots of topics
Put over well	Group discussion	Enables travel
Good explanation	Could make contribution	Very general

Teaching

Teacher	Method	Content
Expressive teacher	Could discuss material	Like composing
Positive feedback (2)	Self expression	Wide range
Teacher interesting	Field trips	Like plants
Well organised teacher		General
Good teacher		Creative
Lessons well planned		General
		Like reading

Enthusiasm	Amusement	Effort
Eager to learn (2)	Entertaining	Stretching
Enthusiasm	Humerous	Challenge
Stimulating (5)	Entertaining	

Unclassified

Could see goals
Can use imagination
Liked it
Generally enjoyed
Like the parts of it
Freedom of choice within subject
Kept aware
Comparisons made

DIAGRAM 14.2

Categorisation of the reasons extracted by judge number 1 for disliked school subjects

Relationships in class

With peers

Didn't like people
Missed friend
Didn't get on with people in my group
No intra class interaction
Didn't like others in the class

With teacher

Strict teacher (3)
No Interaction with teacher
Disliked teacher (5)
Disciplined teacher
Teacher talked down to kids
Teacher unfriendly
Teacher arrogant
Hated teacher
Sarcastic teacher
Petty teacher
Unfriendly teacher
Teacher unco-operative
Snooty teacher
Strict and sarcastic teacher
Hated teacher

Ability

Couldn't do it (6)
Not good at it (2)
Hated being bad at it
Wasn't good at it (2)
Not good at subject
Couldn't do bits

Autonomy

Confusing
Too difficult (2)
Didn't understand
Couldn't understand
Did things wrong
Found it difficult
Not easy

Felt inferior to peers

Made me feel small
Made me look small
Made me feel inferior

Change

Within subject

Monotonous
Repetitive

From other subjects

Relevance

General

Only CSE not important
Meaningless (2)
Irrelevant (5)
Waste of time
Unnecessary
Get nothing from it
Not relevant
Saw no point in it

To self

Couldn't relate to subject
Couldn't relate to parts
Can't relate to it

To others

Diagram 14.2 continued

Teaching

Teacher	Method	Content
Not explained	Sequential Work	Got dirty
Chaos		Not creative
Little guidance		Too feminine
Teacher talked about peripheral things		Unrelated
Classes chaotic		
No supervision		
Badly presented learning material		
No class control		
No encouragement		
Bad organisation		
No guidance		
Teacher had to explain things		
Teacher said we were stupid		

Enthusiasm	Amusement	Effort	
Unstimulating		Too much work	Not enough work
Demoralised		Hard	Pace too slow
Annoying		Hard work	
Frustrating		Overload	
Made me angry			

Unclassified

Time dragged
Wanted to do something else
Singled me out
Felt being picked upon
Didn't wish to continue it
Not interested

DIAGRAM 14.3

Categorisation of the reasons extracted by judge number 1 for boredom with school subjects

Relationships in class

With peers

Didn't like peers

With teacher

Teacher very strict (2)
Disliked teacher
Didn't like teacher (2)
Treated like kids

Ability

Couldn't do it (5)
Frustrating when couldn't do it
Not good at it
Couldn't grasp it

Couldn't understand
Too difficult
No understanding
Too complicated

Autonomy

Change

Within subject

Monotonous (6)
Repetitive (4)

From other subjects

Relevance

General

No point to it (2)
Irrelevant (5)
Saw no purpose
Seemingly irrelevant
Seemed pointless

To self

Couldn't relate to it

To others

Teaching

Teacher

Chaos in class
Teacher didn't make it interesting
Chaos in classes
No supervision
Teacher monotonous
No class control
Bad teacher
No supervision
Teacher unhelpful
Bad presentation
Bad teacher
Told it was monotonous
No interest from teacher

Method

Content

No opportunity of scope

Diagram 14.3 continued

Effort
Never did anything
Didn't do much
No challenge
No thinking involved

Amusement
Hard
Very hard

Enthusiasm
No excitement
Wasn't bothered with it
Wasn't bothered since no intention of following
Not stimulating
Didn't want to bother with it

Unclassified
Soporific
Forced to do it
Couldn't get into it
Class not interesed
Couldn't concentrate
Always changing teacher

DIAGRAM 14.4

Categorisation of the reasons extracted by judge number 2 for interest in school subjects

Relationships in class

With peers

Friendly class (4)
Friendly (2)
Good relationships

With teacher

Good teacher-pupil relationship
Teacher dynamic personality
Liked teacher (2)

Ability

I could do it (2)
I was good at it (9)
Good at it (6)
Found it easy
I'm good at it
Got good marks

Understood (2)
Understood it
Felt I knew it
I knew a lot about it
Know what was going on

Autonomy

Independence
Worked yourself
Teacher gives you responsibility
Independent learning
Worked independent

Change

Within subject

Varied and general
Varied (2)

From other subjects

Different (6)
Learning new things
Something different (2)

Relevance

General

Relevant (12)

To self

Relevant to me

To others

Increased outlook on life

Teaching

Teacher

Teacher good (11)
Teacher made it interesting (2)
Teacher enthusiastic and it was catching
Teacher helpful
Immediate feedback
Expressive
Teacher kept you aware all the time
Teacher very interesting
Teacher interesting
Teacher makes us work
Well organised
Teacher constructive criticism
Teacher good and lively

Method

Everybody participated
Went out
Express myself
Asked own opinions
Not dictated at
You could make a great contribution
Discussion
Small class
Good discussion

Content

Wide ranging
Want good command of lingo
Like words
All facts
Went out
Liked the books
Liked subject (2)
Enjoyed the reading
Enjoyed books
Enjoy learning about writers
Interested in subject
Like writing own material
Interesting books
Find out about others
Likes reading

Diagram 14.4 continued

Teaching

Teacher
Organised

Method

Content
Books good
Like detective work
Wide topic
Like reading
Enjoy making stuff
I like writing
Good books
Liked writing essays
More out of theatre

Enthusiasm
Want to find out more

Amusement
Amusing classmates
Fun
Humerous

Effort
A challenge
Hard work

Not too much work
Not difficult
Easy

Made me thing (3)
Teacher makes you think
Something to think about

Unclassified
Interesting (6)
Adults
Liked it (4)
Could use imagination
Free choice
See own work improve

DIAGRAM 14.5

Categorisation of the reasons extracted by judge number 2 for dislike of school subjects

Relationships in class

With peers

Didn't get on with others in the group
Disliked others in class
Not with friends
Bad vibes

With teacher

Disliked teacher (6)
Hated teacher (2)
Teacher strict (3)
Sarcastic teacher
Teacher unfriendly
Teacher got cross
Teacher strange
Teacher strict and unfriendly
Teacher old fashioned
Teacher made us feel like kids

Ability

Couldn't do it (5)
Not good at it (6)
Not good at subject
Couldn't do parts
Wasn't good at it
I was hopeless at it
Couldn't do bits
Got it wrong
Not good
Hated to fail

Autonomy

Dependent on teacher

Didn't understand (2)

Felt inferior
Inferior
Teacher made me feel small

Change

Within subject

Monotonous (3)
Repetitive

From other subjects

Just another subject

Relevance

General

Irrelevant (9)
Stuff irrelevant to O level syllabus
Meaningless
Got nothing from it
Teacher irrelevant

To self

Couldn't relate to it

To others

Teaching

Teacher

No encouragement
Teacher couldn't control class

Method

All exercises, never made anything

Content

Feminine
Messy

Diagram 14.5 continued

Teaching

Teacher	Method	Content
Lessons a shambles	Just write in class	Oral work
Teacher restricting	Long lessons therefore time dragged	
Avoided questions		
Told not good	Sequences	
Not pushed by teacher		
Teacher cross if didn't understand		
Chaotic class		
Chaotic and disorganised		
Not explained		
Unhelpful teacher		
Teacher bad		

Enthusiasm	Amusement	Effort	
Didn't care (2)		Hard (2)	Didn't do much
Demoralising		Too difficult	Slow class
Frustrating		It was hard	Didn't learn anything
Angry		Lot of work	Not enough homework
Didn't want to do it			
Found it annoying			

Unclassified

Had to have it
Silly
Not interested
More I learned to more I forgot
Wanted to do something else
Parts uninteresting
Uninteresting
Confused
Scared to go to lesson

DIAGRAM 14.6

Categorisation of the reasons extracted by judge number 2 for boredom with school subjects

Relationships in class

With peers

Didn't like group

With teacher

Bad teacher pupil relationship
Teacher not have much to do with you
Teacher strict (2)
Teacher fussy
Disliked teacher
Teacher sarcastic
Didn't like teacher
Teacher shouted
Teacher a hypocrite
Treated like children

Ability

Couldn't do it (9)

Teacher made food out of me

Autonomy

Didn't understand (5)
Too complicated

Change

Within subject

Monotonous (6)
Repetitive (2)
Repetition

From other subjects

Relevance

General

Irrelevant (10)
No point to it

To self

To others

Teaching

Teacher

Teacher not much good
Bad presentation
Teacher spent no time with us
Teacher left us alone a lot
Chaotic classes
Teacher strict and unhelpful
Teacher bad
Teacher hopeless
Teacher couldn't control calss
Teacher monotonous
Teacher didn't help
Teacher didn't explain

Method

Couldn't ask questions therefore not understand
Textbook work
It was just dictation
Teacher changed - new methods
Copying

Content

Didn't like subject matter
Not for young people
Didn't like subject
Manners not geography
Didn't like essays
Didn't like books

Diagram 14.6 continued

Enthusiasm	Amusement	Effort	
Not exciting		Hard (2)	Didn't really do anything
Not bothered (2)			Didn't do anything (3)
Frustrating			Didn't have to think
			Did nothing
			Not a challenge

Unclassified

Everyone asleep
Couldn't concentrate
Classmates not interested
Changed teacher
Waste of time
Forced to do subject by family
Unsettled
Didn't get into it
Uninterested

APPENDIX 15

THE SUBJECT SELECTION QUESTIONS USED IN EXPERIMENT 8

SUBJECT SELECTION SHEET

Name ..... Age .....

Male/Female

Are you a member of a motorbike club?	YES/NO
Have you ever been a member of a motorbike club?	YES/NO
Do you own a motorbike?	YES/NO
Have you ever owned a motorbike?	YES/NO
Would you like to own a motorbike?	YES/NO
Do you like talking about motorbikes?	YES/NO
Do you like looking at motorbikes?	YES/NO
Do you find motorbikes interesting?	YES/NO
or	
Do you find motorbikes boring?	YES/NO

Category: Interested ..... Bored .....

APPENDIX 16

THE SELECTION OF THE SUPPLIED CONTRUCTS USED IN EXPERIMENT 8

Selection of the supplied constructs used in Experiment 8

In order to determine what constructs to supply to subjects in Experiment 8, ten people, who were not motorcycle experts or enthusiasts, were asked to list the terms which they used to think about motorcycles.

Subjects were asked:

"What do you think about motorcycles?"

and their replies can be seen in Table 16.1

TABLE 16.1

The terms which subjects said they used when thinking about motorcycles

Subject Number	Sex M/F	Terms given
1	M	Noisy, Dangerous, Uncomfortable, Romantic, Unreliable
2	M	Dangerous, Uncomfortable, Fun, Noisy
3	M	Noisy, Pleasant, Dangerous, Fast, Economical
4	M	Noisy, Convenient, Pollute the atmosphere, Economical
5	M	Exciting, Pleasant, Dangerous, Fast, Economical
6	F	Look nice, exciting, Fun, Dangerous
7	F	Dangerous, Exciting, Prestigeous
8	F	Dangerous, Economical, Fast, Easy transport
9	F	Frightening, Cheap
10	F	Fun, Dangerous, Cheap, Independent, Flashy, Out of the ordinary.

APPENDIX 17

THE SUPPLIED CONSTRUCT GRID USED IN EXPERIMENT 8

TABLE 17.1

The supplied construct grid used in Experiment 8

CONSTRUCT	1	2	3	4	5	6	7	CONTRAST
Convenient								Inconvenient
Unconventional								Conventional
Comfortable								Uncomfortable
Messy								Clean
Economical								Uneconomical
Unreliable								Reliable

APPENDIX 18

THE REASONS EXTRACTED BY THE TWO JUDGES FOR PEOPLE'S INTEREST OR BOREDOM WITH THE TASK IN EXPERIMENT 8

The reasons extracted by two judges for people's interest or boredom with the task in Experiment 8

Transcripts of the reasons given by subjects for their interest in, or boredom with, the task of construing motorcycles were given to two judges. The judges were asked to write down the distinctly different reasons given by each person for their interest or boredom. The reasons extracted by Judge 1 can be seen in Table 18.1, and those extracted by Judge 2 can be seen in Table 18.2. Subjects 1 to 13 found the task interesting and subjects 14–24 found it boring.

TABLE 18.1

The reasons extracted by Judge 1 for subjects interest or boredom with the task of construing motorcycles.

Subject Number	Reasons	Number of Reasons
1.	1) Liked to think about bikes 2) Want to get one 3) Relevant in view of a purchase	3
2.	1) Like looking at bikes 2) Relevance in view of purchase 3) Find them pleasing 4) Like mechanical things because they're mysterious 5) Like a sense of power 6) Fun part of personal history 7) Exciting	7
3.	1) Associated with being socially radical and therefor unconventional 2) Sexual 3) Associated with outdoor life 4) Make me laugh 5) Great variety 6) Sparked off my imagination	6
4.	1) Repetative 2) Like looking at bikes 3) Like talking about bikes 4) Express what I could do with bikes 5) Relevant to me	5
5.	1) Atitude towards bikes 2) Looking at different bikes 3) Increase in knowledge of bikes 4) Sense of speed 5) Sense of excitment 6) Find them pleasing	6

Table 18.1 continued

Subject Number	Reasons	Number of Reasons
6.	1) Peculiarities of bikes 2) Curiosity about the experiment 3) Enjoy thinking of criteria	3
7.	1) Like looking at pictures of bikes 2) Fasinated by development of bikes 3) Identification with bikes 4) Cheap enjoyment 5) Feeling of control 6) Initiated my imagination	6
8.	1) Like looking at bikes 2) Personally constructive 3) Variety of bikes 4) It was a challenge 5) Initiated imagination 6) Character aspect induces interest 7) Pleasurable means of travel	7
9.	1) Caused me to think about bikes 2) Novelty 3) Pictures pleasing to look at 4) Enjoyed making decisions about bikes	4
10.	1) Enjoyed looking at bikes (good machinery) 2) Variety 3) Pleasant to look at 4) Preferred occupation 5) Enjoyed thinking about bikes 6) Sparked off my imagination	6
11.	1) Enjoy psychological experiments 2) A challenge 3) Enjoy thinking about a given topic 4) Like bikes 5) Sparks off imagination 6) Sense of power 7) Exciting	7
12.	1) Like doing psychological experiments 2) Novel pictures 4) Taxing task	3
13.	1) Novel task 2) Involved a non-mechanical aspect 3) Variety of pictures 4) Interesting task of comparison	4

Table 18.1 continued

Subject Number	Reasons	Number of Reasons
14.	1) Repetitive	1
15.	1) Not interested in bikes/mechanical items 2) Don't understand mechanical things	2
16.	1) Repetitive 2) Bikes are uninteresting 3) Cannot relate to bikes	3
17.	1) Uninterested in bikes 2) Lack of personal relevance	2
18.	1) Repetitive 2) Uninterested in bikes	2
19.	1) Uninterested in bikes 2) Pictures looked alike after a while 3) Associated with boredom in conversation	3
20.	1) Monotonous 2) Unintriguing	2
21.	1) Repetitive 2) Lengthy 3) Uninterested in bikes	3
22.	1) Uninterested in bikes 2) Inconvenient	2
23.	1) Repetitive	1
24.	1) Not interested in bikes 2) Monotonous 3) Personal prejudice against bikes	3

TABLE 18.2

The reasons extracted by Judge 2 for subjects interest or boredom with the task of construing motorcycles

Subject Number	Reasons	Number of Reasons
1.	1) Personal relevance in general terms 2) personal relevance in the specific sense of decision making	2
2.	1) Enjoy looking 2) Personal relevance 3) Mechanical mystery 4) Evoke sense of power 5) Evoke feeling of excitement 6) Fun to be with them and so transference to experiment	6
3.	1) Unconventional 2) Phallic 3) Outdoor 4) Humerous 5) Variety	5
4.	1) Personal relevance 2) Enjoy looking 3) Enjoy talking	3
5.	1) Like looking 2) Find out more 3) Evoke feeling of speed 4) Evoke feeling of excitement 5) Interested in knowing attitudes	5
6.	1) Different types 2) Envious 3) Fun	3
7.	1) Exciting 2) Interest in development of bikes 3) Personally relevant 4) Evoking feeling of control 5) Use imagination 6) Enjoyable	6
8.	1) Enjoy thinking 2) A challenge 3) Variety made it interesting 4) Imagination	4
9.	1)Made me think 2) Novel	

Table 18.2 continued

Subject Number	Reasons	Number of Reasons
9.	3) Variety 4) Pictures 5) Decide	5
10.	1) Enjoy looking 2) Imagine 3) Variety 4) Prefer to work 5) Enjoy thinking 6) Novel thing to do	6
11.	1) Curious about experiment 2) Enjoy thinking 3) Challenge 4) Like bikes 5) Power 6) Exciting 7) Adventurous 8) Glamerous 9) Imagination 10) Like psychology	10
12.	1) Like experiments 2) Novel 3) Taxing	3
13.	1) Different 2) Nice not to be mechanical 3) Could do it 4) Varied	4
14.	1) Repetitive	1
15.	1) Don't like mechanics 2) Not interested in bikes	2
16.	1) Repetitious 2) Functional and uninteresting 3) Irrelevant 4) Unimaginative	4
17.	1) Not interested 2) Useless 3) Irrelevant	3
18.	1) Repetitive 2) Not interested 3) Unattracted to bikes	5

Table 18.2 continued

Subject Number	Reasons	Number of Reasons
18.	4) Inconvenient 5) Dangerous	
19.	1) Look same 2) Uninterested 3) Uncomfortable 4) Boring	4
20.	1) Monotonous 2) Don't intrigue me	2
21.	1) Repetitions 2) Too long 3) Uninterested 4) Impractical	4
22.	1) Uninterested 2) Don't know about them 3) Inconvenient	3
23.	1) Repetition	1
24.	1) Uninterested 2) Bike monotonous 3) Predujiced against	3

APPENDIX 19

TABLES SHOWING THE NUMBER OF CONSTRUCTS USED, CATEGORY USAGE SCORES AND TOTAL DISCREPANCY SCORES FOR SUBJECTS IN EXPERIMENT 8

Abbreviations used in Tables 19.1 and 19.2

Subjects' ratings of interest in the task:

SI : slightly interesting

RI : reasonably interesting

VI: very interesting

Subjects' ratings of boredom with the task:

SB : slightly boring

RB: reasonably boring

VB: very boring

TABLE 19.1

Number of constructs used, category usage scores and total discrepancy scores for subjects who were interested in the task in Experiment 8

Subject Number	Interest Rating	ELICITED CONSTRUCTS				SUPPLIED CONSTRUCTS	
		Number of constructs used	Total category usage score	Mean category usage score	Total discrepancy score	Total category usage score	Total discrepancy score
1	RI	21	55	5.9	114	35	74
2	RI	21	42	4.9	119	28	74
3	SI	19	47	5.0	118	29	74
4	RI	19	60	6.6	108	41	73
5	VI	14	49	5.2	111	33	75
6	RI	21	48	5.3	91	30	69
7	RI	14	48	5.2	117	30	68
8	SI	13	44	4.9	131	29	68
9	VI	21	46	5.4	123	32	77
10	RI	21	42	4.9	130	29	74
11	RI	21	42	4.9	133	30	88
12	SI	18	46	5.2	111	35	67
13	RI	21	44	4.9	104	31	78

TABLE 19.2

Number of constructs used, category usage scores and total discrepancy scores for subjects who were bored with the task in Experiment 8

Subject Number	Boredom Rating	ELICITED CONSTRUCTS				SUPPLIED CONSTRUCTS	
		Number of constructs used	Total category usage score	Mean category usage score	Total discrepancy score	Total category usage score	Total discrepancy score
14	VB	16	41	4.5	143	29	69
15	RB	9	38	4.2	103	21	61
16	RB	14	47	5.3	127	27	80
17	RB	13	42	4.5	131	28	85
18	VB	12	42	4.6	106	27	62
19	SB	13	34	3.8	130	25	88
20	RB	16	43	4.6	121	27	75
21	SB	18	39	4.3	134	26	90
22	RB	16	41	4.6	132	26	82
23	VB	12	40	4.2	133	20	94
24	SB	17	41	4.2	118	22	88

APPENDIX 20

INSTRUCTIONS GIVEN TO SUBJECTS IN EXPERIMENT 9

The Instructions given to subjects in Experiment 9

Introduction

Would you mind if I told you exactly what I am doing after we have done the experiment?

I promise you that there is nothing devious about it, and there are no right or wrong answers - it is totally your opinions that I want.

Eliciting constructs and rating for grid 1

What I am going to ask you to do is to look at a series of photographs of people who you do not know, I don't know them either.

We'll start with these three.

(1st three photographs placed in front of subject)

Now what I want you to do is to imagine that you are just about to meet these three people for the first time and I want you to consider what you think they would be like.

What sort of people you think they would be.

Right, now I want you to tell me any way in which you think one of them would be different from the other two. Think about what they would be like - any way in which one of them would be different in your opinion.

(construct ---------- given and recorded)

What do you think is the opposite of ----------?

(construct ========== given and recorded)

Now I want you to look at 10 photographs of people.

(10 photographs placed in front of the subject (S))

Again consider what you think these people would be like, and I want you to rate each of them out of 10 for how ---------- you think they would be. Give them 10 out of 10 if you think they would be very ---------- and 1 out of 10 if they would be very ========== in your opinion. Marks in between if you think they would be in between. You may give more than one of them the same mark if you think they would be equally ----------. I want you to hand me the pictures one at a time and give each one his or her mark

(photographs handed to the experimenter (E) and ratings recorded)

Good. Now I want you to look at another three photographs.

(3 photographs placed in front of S)

Again imagine that you are about to meet these people for the first time and consider what you think they would be like. Now I want you to tell me a way in which you think one of these people would be different from the other two.

(construct ---------- given and recorded)

What do you think is the opposite of ----------?

(construct ========== given and recorded)

Right, now I want you to look at all 10 photographs again and give each one a mark out of 10 for how ---------- you think they would be. Give 10 out of 10 if you think they would be very ---------- and 1 out of 10 if you think they would be very ==========. Just like last time, I want you to hand me the pictures one at a time and give each one his or her mark.

(pictures handed to E and ratings recorded)

This procedure was repeated until 6 constructs had been elicited and all the photographs rated on each.

Boredom/Interest rating

Now I want you to tell me did you find that interesting or boring? Did you find it boring or interesting?

(response recorded)

Now how interesting (I)/boring (B) did you find it: very, reasonably or slightly?

(degree of B/I given and recorded)

2nd Grid

Right now I am going to ask you to rate a different set of photographs on the constructs you have already given me.

The same procedure was used as previously - but no eliciting, only rating on the already elicited constructs)

3rd Grid

Repeat as before with a different set of constructs.

Second Boredom/Interest rating

Questions as before but with one addition at the end:

Were you more interested/bored with the last section that with the first?

APPENDIX 21

BOREDOM/INTEREST RATINGS, CATEGORY USAGE SCORES AND TOTAL DISCREPANCY SCORES FROM EXPERIMENT 9

Boredom/Interest ratings, total category usage scores and total discrepancy scores from Experiment 9

Tables 21.1 and 21.2 show the boredom/interest ratings given by subjects the total discrepancy scores and the total category usage scores for the 'bored or decrease in interest' and 'constant or increase in interest' groups respectively. Those subjects who were considered to be dubious cases (see page 112) are marked with a (*). The abbreviations used in Tables 21.1 and 21.2 are as follows:

VI - very interesting

RI - reasonably interesting

SI - slightly interesting

SB - slightly bored

RB - reasonably bored

VB - very bored

TABLE 21.1

Table showing the boredom/interest ratings, total discrepancy scores and total category usage scores for the 'bored or decrease in interest' group of subjects in Experiment 9

Subject Number	Boredom/Interest ratings		Total Discrepancy scores		Total category usage scores	
	After Grid 1	After Grid 3	Grid 1	Grid 3	Grid 1	Grid 3
1*	VI	SI	162	168	34	32
2	SI	SB	145	126	43	42
3	RI	SB	100	93	24	18
4	RI	SB	135	135	26	25
5*	SB	VB	96	96	32	28
6	RI	VB	125	136	44	40
7	RI	SB	149	133	34	36
8	RI	RB	188	175	33	35
9*	RI	SI	115	114	36	31
10	SI	RB	142	157	45	41
11	SI	SB	96	81	37	33
12	RI	SB	134	153	42	38
13	RI	VB	122	112	43	41

Table 21.1 continued

Subject Number	Boredom/Interest ratings		Total Discrepancy scores		Total category usage scores	
	After Grid 1	After Grid 3	Grid 1	Grid 3	Grid 1	Grid 3
14*	VI	RI	142	147	37	41
15	RI	RB	83	70	35	28
16	VI	SB	139	169	38	32

TABLE 21.2

Table showing the boredom/interest ratings, total discrepancy scores and total category usage scores for the 'constant or increase in interest' group of subjects in Experiment 9

Subject Number	Boredom/Interest ratings		Total Discrepancy scores		Total Category Usage scores	
	After Grid 1	After Grid 3	Grid 1	Grid 3	Grid 1	Grid 3
17	RI	RI	92	89	32	33
18	RI	VI	138	130	44	43
19	VI	VI	131	147	40	43
20*	SB	SB	99	134	32	40
21	RI	VI	128	136	37	40
22*	SB	SI	117	94	38	34
23	SI	RI	141	162	33	36
24	RI	VI	130	117	44	37
25	RI	RI	114	126	32	34
26	RI	VI	191	164	27	31

APPENDIX 22

THE REANALYSIS OF THE MNSS DATA: NUMBER OF MOTIVATIONAL CONSTRUCTS SATISFIED, FRUSTRATED OR CONSIDERED IRRELEVANT TO THE ACTIVITIES RATED IN EXPERIMENTS 4 AND 5

The n umber of motivational constructs satisfied, frustrated or irrelevant to the activities rated in Experiments 4 and 5

Tables 22.1 and 22.2 show the number of MNSS motivational constructs that were satisfied, frustrated or considered irrelevant to the activities rated in experiments 4 and 5. In experiment 4 three interesting, three disliked and three boring activities were rated. Consequently, the figures appearing in Table 22.1 are the total number of motivational constructs satisfied, frustrated or considered irrelevant to the three activities in each class. Similarly in Experiment 5 two interesting, two disliked and two boring activities were rated, so the figures in Table 22.2 are the total number of constructs satisfied, frustrated or considered irrelevant to the two activities in each class.

TABLE 22.1

Table showing the number of constructs satisfied, frustrated or considered irrelevant to the interesting disliked and boring activities rated in Experiment 4

Subject	Interesting Activities			Disliked Activities			Boring Activities		
Number	No. of Const. Satis.	No. of Const. Frustr.	No. of Cont. Irrele.	No. of Const. Satis.	No. of Const. Frustr.	No. of Const. Irrele.	No. of Const. Satis.	No. of Const. Frustr.	No. of Const. Irrele.
1	37	8	27	14	35	23	13	28	31
2	46	8	18	15	45	12	15	41	16
3	41	11	20	21	14	37	7	37	28
4	41	11	20	19	24	29	18	43	11
5	37	17	18	22	27	23	14	27	31
6	52	8	12	25	27	20	18	43	11
7	48	21	13	27	39	6	19	45	8
8	35	13	24	22	33	17	10	28	34
9	37	15	20	26	33	13	28	35	9
10	49	10	13	34	19	19	22	29	21
11	41	13	18	17	32	23	19	35	18
12	49	10	13	15	39	18	14	28	30
13	47	18	7	25	42	5	22	30	20
14	30	22	20	25	34	13	14	43	15
15	45	15	12	25	26	21	22	39	11
16	40	10	22	19	37	16	17	36	19

Table 22.1 continued

Subject	Interesting Activities			Disliked Activities			Boring Activities		
Number	No. of Const. Satis.	No. of Const. Frustr.	No. of Const. Irrele.	No. of Const. Satis.	No. of Const. Frustr.	No. of Const. Irrele.	No. of Const. Satis.	No. of Const. Frustr.	No. of Const. Irrele.
17	37	14	21	23	29	20	17	26	29
18	17	53	2	31	33	7	13	46	13
19	46	10	16	20	33	19	15	43	14
20	43	11	18	13	29	30	15	26	31
21	49	11	12	25	30	17	18	25	29
22	45	9	18	24	34	14	17	27	28
23	49	13	10	27	30	15	14	49	9

TABLE 22.2

Table showing the number of constructs satisfied, frustrated or considered irrelevant to the interesting, disliked and boring activities rated in Experiment 5

Subject	Interesting activities			Disliked Activities			Boring Activities		
Number	No. of Const. Satis.	No. of Const. Frustr.	No. of Const. Irrele.	No. of Const. Satis.	No. of Const. Frustr.	No. of Const. Irrele.	No. of Const. Satis.	No. of Const. Frustr.	No. of Const. Irrele.
1	24	7	29	4	15	41	3	14	43
2	42	5	13	19	27	14	13	32	15
3	40	11	9	19	35	6	13	43	4
4	23	10	17	13	25	22	6	20	34
5	34	5	21	18	8	24	13	20	27
6	36	8	16	16	39	23	10	34	16
7	35	7	18	17	28	15	28	14	18
8	25	7	28	32	14	18	8	37	29
9	33	6	21	20	23	17	14	32	18
10	41	9	10	17	37	6	12	32	16
11	26	9	25	21	14	25	12	22	26
12	28	4	28	17	13	30	15	18	27
13	29	6	25	14	28	18	19	18	23
14	42	16	2	42	16	2	34	23	3
15	37	7	16	25	13	22	10	27	23
16	42	9	9	23	29	8	16	34	10
17	21	10	29	18	24	18	7	32	21
18	24	11	25	12	37	11	12	35	13

APPENDIX 23

THE TRIPLETS OF NUMBERS USED IN EXPERIMENT 10

TABLE 23.1

Triplets of numbers used in the low mental load condition in Experiment 10

5 4 4	1 4 6	3 2 1	3 3 2
1 4 6	6 2 3	3 2 4	4 3 5
6 2 5	2 4 3	6 4 3	4 4 6
2 4 2	1 6 1	1 4 5	4 1 5
2 3 4	1 3 2	2 2 2	4 5 1
3 2 5	4 3 5	6 5 6	2 2 5
6 5 5	1 3 6	3 2 1	1 4 6
4 3 5	6 5 5	1 6 1	
6 3 2	5 2 1	6 5 2	
4 2 1	6 6 4	1 5 4	
6 2 6	2 1 3	2 4 1	
6 5 3	5 4 4	3 3 5	
1 5 5	1 5 5	6 1 5	
2 3 6	5 4 4	4 2 1	
4 5 3	3 5 4	6 2 6	
2 3 3	3 1 4	6 5 1	
4 5 3	4 5 4	1 2 1	
3 1 3	2 3 3	1 6 6	
5 5 6	2 2 6	5 4 2	
2 3 1	2 1 6	2 6 1	
4 5 5	1 4 5	6 4 1	
3 6 5	5 3 2	6 3 6	
3 1 2	3 4 1	5 4 3	
6 6 4	2 1 6	6 4 4	
1 2 5	6 5 2	1 2 2	
2 3 6	6 3 6	4 4 4	
3 2 2	4 5 4	5 1 5	
2 4 6	1 3 2	5 1 4	
1 3 3	6 4 5	2 1 6	
4 5 1	5 3 2	4 5 5	
2 6 5	3 1 5	1 2 2	
5 2 6	2 3 1	5 3 4	

TABLE 23.2

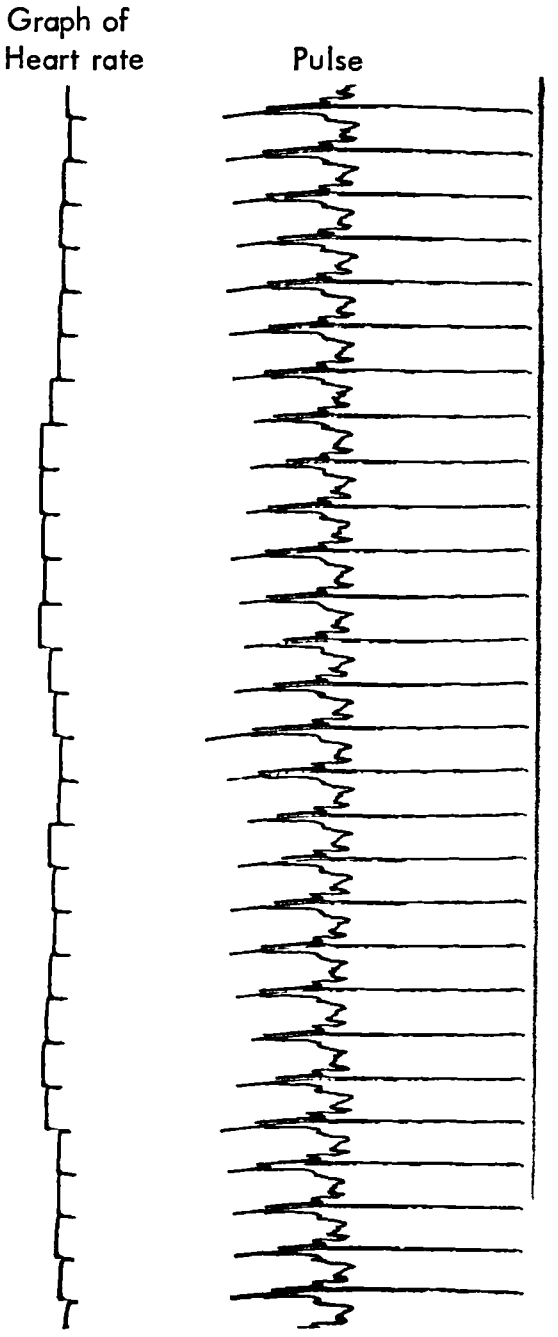
Triplets of numbers used in the high mental load condition in Experiment 10

15 14 14	11 14 16	13 12 14	14 13 15
11 14 16	16 12 13	16 14 13	14 14 16
16 12 15	12 14 13	11 14 15	14 11 15
12 14 12	11 16 11	12 12 12	14 15 11
12 13 12	11 13 12	16 15 16	12 12 15
13 12 15	14 13 15	13 12 11	11 14 16
16 15 15	11 13 16	11 16 11	
14 13 15	16 15 15	16 15 12	
16 13 12	15 12 11	11 15 14	
14 12 11	16 16 14	12 14 11	
16 12 16	12 11 13	13 13 15	
16 15 13	15 14 14	16 11 15	
11 15 15	11 15 15	14 12 11	
12 13 16	15 14 14	16 12 16	
14 15 13	13 15 14	16 15 11	
12 13 13	13 11 14	11 12 11	
14 15 15	14 15 14	11 16 16	
13 11 13	12 13 13	15 14 12	
15 15 16	12 12 16	12 16 11	
12 13 11	12 11 16	16 14 11	
14 15 15	11 14 15	16 13 16	
13 16 15	15 13 12	15 14 13	
13 11 12	13 14 11	16 14 14	
15 16 14	12 11 16	11 12 12	
11 12 15	15 16 12	14 14 14	
12 13 16	16 13 16	15 11 15	
13 12 12	14 15 14	15 11 14	
12 14 16	11 13 12	12 11 16	
11 13 13	16 14 15	14 15 15	
14 15 11	15 13 12	11 12 12	
12 16 15	13 11 15	15 13 14	
15 12 16	12 13 11	13 13 12	

APPENDIX 24

A SAMPLE OF THE POLYGRAPH OUTPUT USED IN EXPERIMENT 10

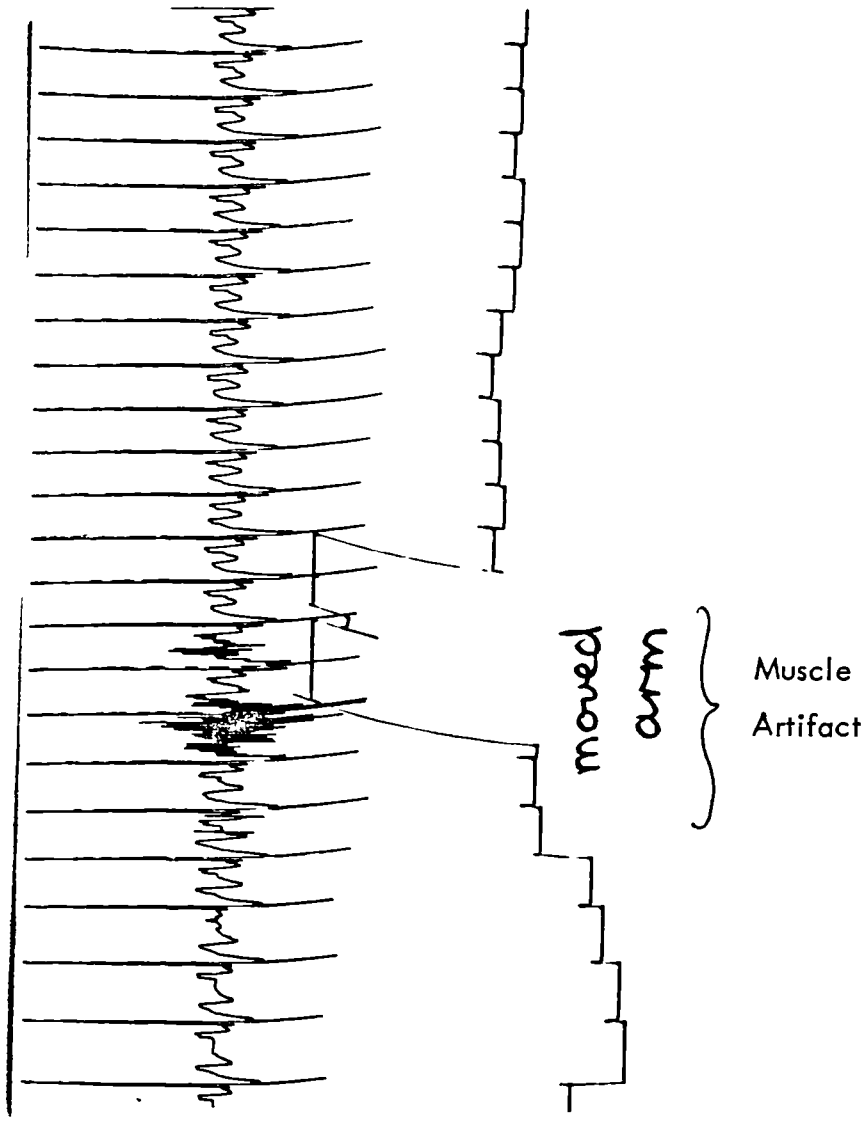
Sample of the Polygraph output used in Experiment 10



APPENDIX 25

AN EXAMPLE OF MUSCLE ARTIFACT FROM EXPERIMENT 10

An Example of Muscle Artifact from Experiment 10



APPENDIX 26

HEART RATE MEASURES FROM EXPERIMENT 10

TABLE 26.1

Table showing Heart Rate (HR) Measures from each subject in the low mental load condition in Experiment 10

Subject Number	Mean HR for last min resting	Mean HR for first min of exp.	Mean HR for first 4 mins of expt.	Mean HR for last 4 mins of expt.
1.	75.38	77.35	75.91	71.99
2.	82.22	99.63	94.69	82.85
3.	88.24	90.30	89.02	85.66
4.	85.17	86.36	87.10	87.45
5.	70.54	87.65	80.84	71.49
6.	92.20	100.43	99.00	98.86
7.	70.29	80.48	74.22	86.12
8.	85.54	99.73	97.51	82.74
9.	73.64	86.41	85.60	80.37
10.	71.98	73.68	73.56	74.57
11.	89.08	86.39	87.28	87.21
12.	72.71	74.74	74.57	73.27
13.	79.53	80.87	80.97	78.43
14.	84.25	86.67	87.89	86.28
15.	74.68	80.36	78.05	76.09
16.	85.18	80.66	83.36	85.00

TABLE 26.2

Table showing Heart Rate (HR) Measures for each subject in the high mental load condition in Experiment 10

Subject Number	Mean HR for last min resting	Mean HR for first min expt.	Mean HR for first 4 min expt.	Mean HR for last 4 mins expt
1.	63.47	72.56	74.32	73.32
2.	97.36	108.86	107.87	93.56
3.	88.69	101.16	100.69	96.81
4.	74.76	79.63	78.65	83.35
5.	71.00	80.66	76.79	71.82
6.	88.05	113.87	106.95	98.65
7.	81.52	82.57	82.28	81.34
8.	81.96	98.69	96.29	87.06
9.	78.62	98.04	85.86	70.43
10.	80.10	81.93	84.79	82.23
11.	79.63	79.46	78.91	79.64
12.	65.60	67.88	66.59	68.28
13.	94.69	103.00	100.04	94.40
14.	80.64	88.42	87.97	86.49
15.	72.29	90.13	93.63	79.93
16.	88.85	99.11	94.52	88.53

APPENDIX 27

HEART-RATE VARIABILITY MEASURES FROM EXPERIMENT 10

TABLE 27.1

Table showing Heart-Rate variability (HRV) measures for each subject in the low mental load condition in Experiment 10

Subject Number	HRV for last min resting	HRV for first min of expt	Mean HRV for 1st 4 mins of Expt	Mean HRV for last 4 mins of Expt
1.	1.973	3.769	3.709	3.665
2.	2.653	2.721	3.103	3.497
3.	3.834	4.430	4.229	4.077
4.	3.177	4.029	4.063	5.084
5.	4.129	9.709	7.425	3.995
6.	5.548	8.368	7.923	8.992
7.	5.985	7.245	8.323	8.873
8.	5.254	5.933	6.600	6.279
9.	9.361	5.864	5.251	7.173
10.	4.561	5.822	3.196	3.676
11.	4.612	3.670	4.608	6.255
12.	4.267	3.196	3.430	3.960
13.	7.163	5.943	5.505	4.984
14.	2.967	4.945	4.124	4.906
15.	8.111	4.460	6.147	6.238
16.	4.456	4.364	4.650	4.559

TABLE 27.2

Table showing Heart-Rate Variability (HRV) measures for each subject in the high mental load condition in Experiment 10

Subject Number	HRV for last min resting	HRV for first min of expt.	Mean HRV for 1st 4 mins of expt	Mean HRV for last 4 mins of expt
1.	2.803	4.613	4.120	2.831
2.	2.768	7.588	4.529	3.094
3.	2.705	6.238	4.520	3.897
4.	4.180	5.372	5.544	3.881
5.	5.863	5.572	4.978	3.339
6.	4.419	7.025	8.058	6.871
7.	8.620	7.547	7.391	7.614
8.	4.288	7.815	7.656	6.163
9.	4.036	5.494	5.118	5.706
10.	4.106	6.536	5.086	3.377
11.	9.529	4.797	5.605	6.148
12.	2.792	5.086	4.531	3.672
13.	6.283	5.878	5.685	4.507
14.	4.132	5.636	5.932	4.122
15.	9.725	8.664	6.968	5.560
16.	6.852	6.471	6.276	4.883