EXPOSURE FREQUENCY AND AFFECT

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ABSTRACT

Three experiments were conducted to examine the hypothesis that attitudinal affect is a monotonic function of frequency of exposure. In the first experiment while supporting the frequency-affect relationship a non significant difference between males and females and positive and negative set conditions were obtained. In the second experiment low association value stimuli produced significantly greater increases in affect over exposure than relatively higher association stimuli. Duration of exposure at 2 and 5 second intervals only were shown to enhance evaluative rating while frequency of exposure again showed the predicted increase in affect, in a third experiment. Further inspection of the results of the first and third experiment indicated that whilst most showed greater preference for familiar stimuli there was a group of subjects preferring low exposure stimuli.

In the second part of the study subjects were presented with stimuli at different exposure frequencies and stimulus complexity to test the hypothesis that affect was an inverted U shape function of stimulus complexity with subjects preferring stimuli of medium complexity regardless of exposure frequency. Although the hypothesis was supported marked individual differences were obtained by examining the complexity level at which the increase in positive affect as a function of exposure was most pronounced for each subject.

The results were interpreted as supporting the theory of optimum levels of arousal and it was suggested that not only do the differences in the point of maximum increase in affect over exposure frequency provide a measure of an individual's optimal level but also they reflect a cognitive style of search for novel as opposed to familiar environmental contingencies.

It is suggested that the need for familiar versus novel stimulation

is not only a crucial determinant of an organism's affect arousal but also the distinction underlies many of the more well known and researched cognitive styles.

Some of the factors determining the development of orientations towards familiar versus novel stimulation are discussed together with directions for future research.

PART I

CHAPTER 1

INTRODUCTION

This dissertation deals with repetition and the effect produced on individual motivations. A further consideration is "affect", for it is a ubiquitous aspect of behaviour and has unfortunately been often ignored in a great deal of psychological theory. It is unusual to find research in the field of psychology which is designed to investigate its effects.

The series of experiments in this study were conducted independently with each designed specifically to follow leads suggested by the immediately preceding experiment. Since the original intention of each experiment and the final outcome often differ, the reader is asked to bear with occasional changes in direction. This dissertation has been divided into two parts. The first covers some experiments attempting to delineate the extent of the frequency-affect relationship within the experimental paradigm and which investigate some of the limiting conditions of the relationship. The second part investigates in greater detail the role of arousal in affective responses as a consequence of frequency of exposure and examines in some detail individual differences which were found in the first part of the experimental series.

A brief outline of the content of each chapter is given to provide the reader with a scheme of the total coverage. The present chapter will be concluded with a definition of "affect" in the sense in which it will be used throughout the remainder of the study. Chapter 2 presents a detailed account of most of the experimental literature which bears directly on the major hypothesis that frequency of exposure is a sufficient condition to produce affective increases towards a stimulus. Following this, Chapter 3 outlines the method by which a stimulus set was developed to be used in the experiments. Pertinent characteristics of this stimulus set are investigated not only to provide precisely definable stimulus conditions but also some measures of responses they elicit from subjects. Both the stimulus set and an outline of the general procedure to be used provides the basis on which all subsequent experiments were conducted.

Chapter 4 outlines an experiment in which affective changes were compared when subjects were either male or female, given a positive or negative instructional set, and stimuli were presented at one of five exposure frequency levels. Chapter 5 details an experiment assessing the role of stimulus meaning in the frequency-affect relationship while Chapter 6 presents an investigation into the hypothesis that exposure duration rather than exposure frequency per se is the critical variable for attitudinal enhancement. Finally in the first section of this study, Chapter 7 discusses the findings and some of the implications pointing to the major contributing factors for increases in affect after frequent exposure to a stimulus. It is in this chapter that the research moves in a new direction as a result of data obtained in the previous three experiments.

Part II of the dissertation takes up the issues raised in Chapter 7 where it was suggested that arousal played a dominant role in the frequency-affect relationship. In Chapter 8 a review of the literature is presented with regards to the theoretical explanations for the frequency-affect relationship and their empirical support. This chapter goes on to outline two experiments in which conditions were set up to provide different levels of information uncertainty over frequency of exposure and to assess the differential effects on affective responding. It is here suggested that the experimental conditions provided by the three previous experiments provides a situation in which it is possible to discriminate preferred arousal levels for subjects and that these levels may be obtained by examining the level of maximum affective increase. Subjects' responses are analysed in detail and evidence for orientations towards different amounts of novel stimulation which was clearly demonstrable is extended and summarized in the final chapter where implications for future research are also discussed.

Central to the concern of the present research and theory is the concept of affect. Feelings and emotions are extremely potent elicitors or inhibitors of behaviour. All behaviour at one time or another involves the affective, as well as the cognitive or conative aspects of functioning. Affect is an intervening response between the stimulus which arouses it and the instrumental response elicited as a result of it.

Stimulus ⟶ Affect ⟶ Response

As with sensory processes, affective processes are subject to stimulation conditions such as frequency, recency, intensity, proximity, etc. Affect is bipolar not only by virtue of the oppositional qualities of positive and negative but also by the existence of physiological and psychological states which are receognised as neutral or indifferent. At the same time, however, affective states are undimensional, they are for example, defined along a single continuum of 'pleasant-unpleasant', separated by a neutral zone. This does not, of course, mean that all pleasant and all unpleasant affects are alike. The pleasantness of someone's company differs from the pleasantness of a wine.

Affective states themselves can be ordered with respect to magnitude. Burch (1964) distinguishes four levels of affect in the total affective system. Each differs in terms of the intensity and duration of the subjective experience and the degree of its correspondence to the stimulus-response relationship. The first level Burch identifies is that of mood. It is characterized at its positive extreme, by a general feeling of euphoria. Burch gives it an intensity value of +1 on his 4 point scale, since identifiable stimulus conditions which are responsible for its evocation are generally poorly defined. Level II affects, though of greater intensity (+2), are of a much shorter duration than those for mood. They are of a feeling tone quality such as "like" or "good" or "nice." Although more specific than at the level of mood, feeling tone affects, more often than not, do not have a well defined stimulus-response relationship. Emotions (Level III) are given a +3 intensity by Burch because although having a relatively short duration they have a much more direct stimulus-response adherence. A person can identify the stimulus conditions that lead him to the subjective experience of love even when the major stimulus object is not within his awareness. Finally, the most intense form of affect comes from what Burch calls the "analog unit" in the affective system. At this level, the affect is quite specific for its external reference becomes almost exactly a one to one correspondence. The analog affect associated with the name of a song my mother once sang to me, and that which I am trying to recall, but that is just outside my awareness, is quite specific for that name. Hundreds of song titles may have almost the correct analog but only the right song title belongs to this affect experience in such a way that the match between symbol and analog is just right.

For the present analysis the term "affect" will be used in the feeling tone sense since it is the intention of the study to examine stimulus-affective response relationships which are attributable to specific stimuli but which are not of sufficient impact to be differentiated from one stimulus to another. Often, however, it becomes very difficult to distinguish between an analogue affect and a feeling tone in the experimental situation. Strong idiosyncratic preferences for stimuli may develop extremely rapidly or may require long periods for the associational link to strengthen to the extent that it is distinguishable from other stimulus-affect bonds. Nevertheless, in terms of the experimental context used here, subjects respond in a general way to differences in stimuli. The feeling tone can itself differ in intensity since a subject can often clearly differentiate between objects he likes very much and objects he dislikes intensely.

The reader should, therefore, note the sense in which "affect" will be used lest he assume that because the feeling tone sense is used in the present experimental setting, that it necessarily implies that no analog affective responses will occur. Attitudinal affect may or may not be permanent and only research which attempts to assess long term effects can resolve at what point an affect is a general or a discrete affect unit associated with, and only with, a particular stimulus.

CHAPTER 2

FAMILIARITY AND AFFECT

In science all constancies are precious phenomena and it is not without some frustration that social psychologists must often be content with predictions and measurements which fall short of precision. However, since basic assumptions of social behaviour are ignored precise laws are often overlooked. Those concerned with comparative studies tend to make their main objectives the description of the social organisation of various species while giving less attention to the mechanisms which maintain them.

It is the object of the present study to examine a basic determinant of behaviour which until recently has been overlooked. That is, that familiarity with stimuli in the environment whether physical or social, does have impact of its own on the organism. More specifically, this dissertation investigates in some detail, the proposition that when an organism is repeatedly exposed to a given stimulus object, mere exposure is a sufficient condition for the enhancement of the organisms positive attitude towards that object. As Zajonc (1968) has suggested, *mere* exposure means that the exposure situation allows the stimulus object to be assessable to the organism's perception while being relatively unencumbered by other processes or contingencies such as positive or negative reinforcement, requirement to make particular responses, or other types of stimulation systematically associated with the exposure of the critical stimulus object.

The hypothesis that exposure alone can enhance attitudes towards a stimulus object seems at first to conflict with the old proverbs such as, "*variety is the spice of life*," "*familiarity breeds contempt*," and "*absence makes the heart grow fonder*." However, though it is a common assumption in advertising, the writer could find no evidence for any serious attempt to assess the effects of repeating advertisements on liking products. Not very long ago when there was a great reaction against long hair and mini-skirts, adults particularly, either treated the new fashions as a passing phase, as a protest against the older generation and a result of the "Permissive Society," or openly reacted in an authoritarian and antagonistic manner. Regardless of what antecedents we attribute to the new hair and dress fashions generally the opinions of most were negative. But within the space of three or four years fewer of the older people were appalled by such a mode of dress and more of both the older and younger generation were actually displaying the change to the new styles. Even schools in New Zealand have loosened some of their restrictive rulings with regard to the length of hair for boys and the height of hemlines for girls' uniforms. People seemed to be used to the new look. It is no longer surprising or unexpected. In some way, exposure to the new fashions has changed the attitudes of most of the population from disgust to one of attraction or at least neutrality.

Although the idea of increased liking through mere exposure is not particularly new (Fechner, 1876; James, 1890; Maslow, 1937; Meyer, 1903; Pepper, 1919) experimental evidence for the hypothesis has been conspicuously absent until recently. Most of the studies conducted previous to that of Zajonc (1968) which have obtained a relationship between frequency of exposure and affect were generally either the product of outdated methods or tended to confound mere exposure with a variety of psychologically significant processes which did not necessarily accompany mere exposure and therefore did not give sufficient information as to how potent mere exposure was with regard to attitudinal enhancement.

Interest in the frequency-affect relationship has been revived since Zajonc published his notable monograph in 1968. Here Zajonc presents convincing evidence from both a scholarly review of the literature and a series of studies designed purely for the purpose of providing unequivocal experimental evidence of the relationship. It is the purpose of the present chapter to review the evidence for mere exposure and affective change and to that end, heavy reliance will be placed on Zajonc's paper together with findings from the many studies conducted subsequently.

The majority of empirical support comes from four main areas. Firstly, imprinting in animals has been shown to be a critical variable in the development of attachments. Secondly, a great deal of empirical support for the exposure hypothesis comes from research which shows a strong relationship between word frequency and word meaning. Thirdly, in the area of the arts, both music and visual art for the layman, appear to derive part of their emotional impact from the degree to which the perceiver is exposed to the work. Finally, particularly with regards to work which has followed the Zajonc (1968) paper, a multitude of stimuli, both animate and inanimate, have been used to produce increases in preference as a result of mere exposure.

Imprinting and Exposure Effects in Animals.

It was once believed that imprinting was restricted to certain specific conditions and behaviours, but evidence now shows clearly that it can occur in many species, in a large variety of situations, for many behaviours, at various ages, and to almost any stimulus object (Sluckin, 1965). Early social experience seems to be important for example, in rearing guppies (Lebistes reticulatus) in groups and in isolation, Pinckney and Anderson (1967) found that isolated subjects tended to avoid other fish during the early stages of testing but eventually they increased the amount of time spent near display guppies and behaved like normal fish. Many studies have found that attraction between rats increases over successive experiences (Eckman, Meltzer, & Latane, 1969; Latane & Glass 1968).

However, imprinting does not occur just for animals of the same species, Cairns (1966) used lambs which prior to the experiment lived for several weeks under normal conditions with their mothers and other lambs. The experiment began when the lambs were separated from their small flock for 71 days being confined to live either with a dog in the same cage, a dog in an adjacent cage, a non-maternal ewe, or with a continuously operating television set. At frequent intervals the lambs were given the choice between an empty compartment or one containing the cohabitant. It was clear from the results that when the lambs were given the choice between solitude and company they preferred the latter and this preference increased as a function of the length of the cohabitation period. In addition the lambs affection went equally to dogs, ewes, and television sets. After nine weeks the lambs chose between their cohabitants and a tethered ewe. Generally the choice was for their cohabitant.

Not only is imprinting possible between animals and other species and animals and inanimate objects but also attachments from imprinting has been shown possible between prey and preditor. Melvin, Cloar, and Massingill (1967) imprinted quail chickens to sparrow hawks, and Kuo (1930) kittens to rats. Food preferences, though not free of reinforcing properties, are also easily established by mere exposure. For example, Rabinowitch (1968) fed herring gulls a diet of either fresh earth worms (their normal food), pink catfood, or catfood dyed green, for a five day period, shortly after they had hatched. 90-100% preference for the food experienced during experimental period was obtained.

There are numerous other studies in which animals have been imprinted to objects, in some cases quite alien to their native environment. It is clear that mere exposure exerts a powerful influence on the organism's subsequent approach tendencies and although like imprinting itself maturation is important, familiarity does seem to be essential for the development of strong idiosyncractic preferences in animals. One further study which bears much more directly on the relationship between exposure and affect was conducted by Cross, Halcomb, and Matter (1967). These experimenters placed each of three groups of rats in entirely different environments. The first group of animals lived in a chamber equipped with a speaker, for 52 consecutive days exposed to 12 hours of Mozart's symphonies each day. The second group of rats lived for the same period of time in a similar chamber but were exposed exclusively to music by Schoenberg. A third, control group, was placed in a similar compartment for the same period of time but received no musical stimulation. After a rest period of 15 days all animals were tested for their musical preferences in a chamber equipped with a floor hinge in the centre, suspended over two miroswitches, one on each side of the hinge. The rat's weight was sufficient to lower either one side or the other side of the floor and the activation of the microswitch gave access to the selections of either Mozart on one side of the chamber or Schoenberg on the other side, previously unexposed. The results indicated that without prior training rats preferred Mozart to Schoenberg but it was quite clear for the two experimental groups that preference was a function of prior exposure. Preference for Mozart for animals reared with Mozart was stronger than preference for Schoenberg for animals reared with Schoenberg.

What is important for the purposes of the present study is the fact that very little seems to be required beyond mere exposure to produce differential preferences. As Zajonc (1968) suggests, imprinting seems to exercise a "priority rate" so that once the animal has become attached to one object his attachment to other objects are less likely, that is, after exposure to an object previous approach tendencies to new objects must now compete with the approach tendency already established.

Word Frequency and Word Value Evidence.

There appears to be quite a remarkable relationship between the frequency with which words are used in language and their evaluative meaning. Zajonc (1968) has summarized a great deal of the evidence which supports the relationship between word frequency and affective connotation. Inspection of word counts for over 30,000 words in the English language by Thorndike and Lorge (1944) reveals that words that are used most often generally refer to good things, whereas words that occur less often mean bad things. "Love," we would agree is more preferable to "hate" and it occurs seven times as often in our written language than "hate." We seem to have more reasons to be "happy" (1,449) and "gay" (418) rather than "sad" (202) and "gloomy" (72). Things are more often "good" than "bad" by a factor of five, while things are almost three times more often "possible" than "impossible." The list of such examples is almost endless and while the correspondence between word frequencies and word meanings do not always faithfully represent reality, they are extraordinarily accurate in representing real values held in common in our culture.

One of the workers to note the generality between word frequency and the evaluative dimension of word meaning was Postman (1953), while Howles and Solomon (1950), in criticising perceptual defense experiments, suggested that so called "taboo" words are particularly infrequent in our written language. Johnson, Thomson and Frincke (1960) appear to be the first to conduct experimental work showing that words with positive meaning have higher frequency counts than words of negative meaning. They have also shown that repeated use of nonsense words tends to enhance their ratings on the good-bad scale of the semantic differential although they did not try to explain the relationship because they were more interested in the implications for the study of word recognition thresholds. However, they did obtain correlations of .64, .40, and .38 between the L-count (Thorndike & Lorge, 1964) and the good-bad scale values for three samples of randomly chosen words.

To examine the relationship more extensively Zajonc (1968) presented a large number of subjects with 154 antonym pairs. Judgements as to which of the pair had the most favourable meaning conformed almost exactly to their frequency counts taken from the L-count. Generally, if the member of a pair was more frequent it was also judged the most favourable. Subject agreement was high with, for example, words like "able," "better," "possible," and "best," being judged as more favourable by 96% of the subjects than "unable," "worse," "impossible," and "worst." though some reversals occurred these were generally at the lower end of the agreement scale. Some words, not usually thought of as having evaluative connotations, also showed high agreement in judged favourability. For example, "on" as opposed to "off," "add" as opposed to "substract," "above" as opposed to "below," and "upward" as opposed to "downward" all showing more than 90% agreement and all most favourable words being those most frequently used in the English language. Apart from a few minor exceptions, as with "war" which has a frequencv count of 1,118 and was least favoured while "peace" has a frequency count of only 472,word frequency and evaluative connotation of words appear to be highly correlated.

Zajonc (1968) also compared some of his antonym pairs to their equivalents in French, German, and Spanish. In 15 of the 44 cases examined the frequency relationship in the antonym pairs was the same in the three foreign languages as they were in English with the more favourable alternative being more frequent. Again, Silverstein and Dienstbier (1968) found ratings of pleasantness for 101 English nouns to be significantly correlated with frequency, as measured by the L-count.

Caution, however, must be expressed with regards to the word usage and word evaluation results because language usage has changed since the L-count was made in 1944 and further as the count is based on written language there is no guarantee that people in the everyday spoken language display the same characteristics. Optimists and pessimists should display vastly different affective content in their spoken language. Nevertheless, on the basis of preference ratings of 555 trait adjectives outlined by Anderson (1964), Zajonc (1968) plotted them against their L-counts obtaining a direct increasing monotonic function of affect across the log frequency of word usage. The correlation between word usage and an affective rating was an impressive .83.

The relationship is not just limited to the meaning of words. It also applies to peoples' attitudes towards things for which the word stands. Zajonc (1968) asked students their attitudes towards countries, American cities, to objects such as trees, fruit, vegetables and flowers. The correspondence between frequency of usage and attraction to the items was high with rank correlations for countries, cities, trees, vegetables, fruit and flowers, of the order of .89, .85, .84, .81, .85 and .89 respectively.

Though we do not usually think of letters of the alphabet as being pleasant or unplesant, Alluisi and Adams (1962) found that some letters are consistently better liked than others and after checking the relationship between the preferences for the letters and the likelihood of their occurrence in English they obtained a correlation of .84. Zajonc (1968) found a similar effect for the first twenty numbers. Preference for numbers was a function of their frequency of occurrence with numbers 1, 2, and 3 being most preferred and 19, 14 and

17 being least preferred.

Finally, Zajonc (1968) suggests that poetry having definite positive or negative tones also conform to the frequency-affect relationship in terms of the average frequency of occurrence of the words used in their construction. Hamid (1971) found, in an informal study conducted with 58 psychology students, that when presented with the four poems, used by Zajonc (1968), and asked to rank the poems in order of preference, preference was related to the average word frequency count. The first two poems were by William Blake:

<u>Infant Joy</u>

"I have no name;
I am but two days old,"
What shall I call thee?
"I happy am,
Joy is my name."
Sweet joy befall thee!

Pretty joy!
Sweet joy but two days old,
Sweet joy I call thee:
Thou dost smile,
I sing the while,
Sweet joy befall thee!

<u>Infant Sorrow</u>

My mother groaned! My father wept;
Into the dangerous world I leapt;
Helpless, naked, piping loud,
Like a fiend hid in a cloud,
Struggling in my father's hands,
Striving against my swaddling bands,
Bound and weary I thought best
To sulk upon my mother's breast.

Clearly the two poems express quite opposite affective qualities. The average frequency for "Infant Joy" is 2,037 while that for "Infant Sorrow" is 1,116. Two formally similar verses, one by Brown and the other by Shelly, were used as the second two poems:

<u>Song</u>. R. Browning

The year's at the spring,
And day's at the morn;
Morning's at seven;

The Hillside's dew-pearled;
The lark's on the wing
The snail's on the thorn;
God's in his heaven —
All's right with the world.

Dirge. P.B. Shelley

Rough wind, that moanest loud
Grief too sad for song;
Wild wind when sullen cloud
Knells all the night long;
Sad storm, whose tears are vain,
Bare woods, whose branches strain,
Deep caves and drear main —
Wail, the world's wrong.

The average frequency of Browning's poem is 1,380 while the poem by Shelly has an average word frequency of 728. Students' ranks for the four poems were added and a coefficient of concordance (W) was computed to test the agreement of preferences for the four poems. The resulting W was .42 which was significant well beyond the .001 level (χ^2=73.08, df = 3). Inspection of the rank totals for each poem showed clearly that there was a strong relationship between the average word frequencies and the ranked preference for the poems with "Infant Joy" being most preferred and Shelley's "Dirge" least preferred. It appears, therefore, that mood tone of the poems is related to the frequency of occurrence in written language of the words used.

As all the research, so far reviewed is correlational, casual directions are still presumptuous. We do not know, for example, whether "on" is more favoured than "off" because it is used more frequently or because it means something phenomenally more pleasant and thus has become more frequently used. We do not know whether potatoes are liked because there are many potatoes or many potatoes are produced because they are attractive vegetables. For this type of material it would seem more logical to assume that it is liking which determines frequency of usage. Yet this does not help us and apparently contradicts the hypothesis that frequency alone enhances an attitude towards an object. Would we say that the number of 2 and the letter B are used more frequently because they are "better" than other numbers or letters?

Evidence from Music and Visual Art.

Except for the few studies carried out with animals (e.g. Cross, Halcomb, and Matter, 1967) most of the evidence for the frequency affect relationship has been correlational. Prior to the Zajonc's (1968) research bearing more directlv on the attitudinal effects of mere exposure, evidence may be found primarily in the area of aesthetics and particularly from studies in musical appreciation. As early as 1903 Meyer found that his students indicated greater preferences for musical pieces on the last of twelve to fifteen repetitions. Playing their students jazz and classical records once a week for twenty five weeks Moor and Gilliland (1924) found an increased liking for classical records while there was no change for jazz music. Numerous other studies report similar results (Downey and Knapp 1927; Krugman, 1943; Verveer, Barry and Bousfield, 1933; Washburn, Child and Abel, 1927; Alpert, 1953; Mull, 1957)and generally it can be concluded that when an individual listens to an unfamiliar musical work his enjoyment will be a function of the number of times the work is presented.

Two more recent studies, Edmonston (1966) and Lieberman and Walters (1968) have used the semantic differential as a more refined measure of the effect of musical training on attraction to musical pieces. For example, Lieberman, and Walters (1968) selected nine musical pieces representing various historical periods and different modes of musical expression. Pieces such as Brahm's Symphony No. 1, Fourth movement, excerpt (189 sec.), Stravinsky, Dedication and Part 1 from his "Canticum Sacrum" (134 sec.) and Schubert, String Quartet, "Death and the Maiden," excerpt (174 sec.) were played to 32 high school students for 10 repeated sessions. Ratings on 16 semantic differential scales on the tenth as compared with the first session, showed a significant increase for 7 of the scales. All but one of the musical pieces showed significant increases on at least two of the six evaluative scales while the change for the nine selections combined was significant for all six evaluative scales. It is notable that only one of the other non evaluative scales showed a significant change, this was the scale of meaningful - meaningless. It must be noted that Lieberman and Walters (1968) used subjects who had already expressed their preference for popular music. This fact together with the evidence presented by Edmonston (1969) suggests that evaluative ratings for music are positively related to familiarity rather than to formal musical training since in the latter study significant changes were obtained for the non trained listener only. While prior experience, therefore, is a limiting condition on the exposure effect, initial novelty appears to play a major role in determining the extent to which attitudinal enhancement, after mere exposure, is operative.

In obtaining aesthetic judgements of unusual colour combinations Pepper (1919) found that repetition resulted in more positive judgements. Maslow (1937) presented his subjects for four days in succession with fifteen paintings by such great masters as Rembrandt, Cezanne, Van Gogh, Degas and Picasso. The paintings were presented again six days later interspersed with 16 paintings by the same artists but not previously shown. The familiar paintings were more liked and seen as more beautiful than the new paintings. Over a number of experimental sessions Maslow (1937) found the repetition increased students' preferences for objects in their experimental work space such as rubber bands, paper clips, pens, pencils, etc. As with the paintings subjects preferred Russian girls' names already exposed to those completely new. The same subjects participated in all sessions sitting in the same chairs at each session. When asked towards the end of the experiment if they would like to change seats the subjects preferred to remain where they were.

Although both of the two previous studies suggest that previous exposure to objects in the visual arts results in attitudinal enhancement there is some contrary evidence. Krugman and Hartley (1960) obtained ambiguous results when their subjects were exposed to famous paintings at various frequencies. Cantor (1968) and Cantor and Kubos (1969) obtained preferences for novel as opposed to familiar (presented six times) using abstract figures from the Barron-Welsh Art Scale. For 11 year old and 5 year old children liking was not related to prior exposure and there was a distinct preference for the novel stimulus. Although the results conflict with the findings of Edmonston (1969) in the area of musical preference, the shape of the function is indeterminant because only two exposure levels were measured.

Much of the research evidence from the musical and visual arts, though fairly consistent, is far from conclusive since the experiments lacked rigor, the repeated exposure situations were often ambiguous, group administration of the experimental manipulation was used, subjects were required to make responses in the presence of peers, there was a general failure to expose stimuli under the same conditions for all subjects, and the lack of counterbalancing of materials and exposure sequences, all of which operate to lessen the validity of results with regard to the exposure hypothesis. In these studies, therefore, although repetition does appear to increase liking there is not sufficient evidence to justify the conclusion that mere exposure enhances the attraction towards an object.

Evidence from Social and Other Inanimate Objects.

Most of the studies to be reviewed in this section have been conducted since Zajonc's (1968) paper. Nearly all of them involve some direct experimental manipulation of frequency of presentation and therefore, bear much more directly on the hypothesis under consideration in the present study.

The study by Johnson, Thomson and Frincke (1960), already outlined, found the frequency-affect relationship for Turkish words under varying frequencies of exposure. Becknell, Wilson and Baird (1963) and Munsinger (1964), although not completely excluding a semantic factor of pronounciation in their experiments, both obtained increased preferences for nonsense syallables following frequent exposure. With the specific aim of examining the frequency-affect relationship, however, Zajonc (1968) conducted two experiments using unfamiliar stimuli. In the first experiment he presented his subjects with Turkish words previously used by Johnson, Thomson and Frincke (1960) and in the second Chinese ideographs were used. Subjects were exposed to sets of these stimuli for 2 seconds at exposure frequencies of 1, 2, 5, 10, and 25 constituting 86 trials altogether. Position of a given stimulus in the sequence of trials were determined at random and the subjects were asked to rate the meaning of the words (Turkish or Chinese) in terms of their 'goodness' or 'badness,' at the completion of the 86 presentations. Both experiments clearly showed affective meaning for the stimuli was a direct increasing monotonic function of the log frequency of exposure. Subsequent research has substantiated these results for both sets of stimuli (e.g. Zajonc and Rajecki, 1969; Harrison and Zajonc, 1970).

In a field study Zajonc and Rajecki (1969) varied the exposure of five Turkish words in two campus newspapers. Results from both a group administered questionnaire and a postal questionnaire overwhelmingly supported the frequency-affect relationship.

In an attempt to demonstrate the effects of exposure on interpersonal attraction and because the use of Turkish words and Chinese characters is still subject to the criticism that semantic factors may be operative Zajonc (1968) exposed students in a third experiment to photographs of twelve graduating senior students' faces. Subjects were told that the experiment dealt with the problem of "visual memory" and following exposure frequencies identical to those used in the experiments on Turkish words and Chinese characters, subjects were asked to rate on a 7 point scale how much they might like the man in each of the photographs. Though not as clearly monotonic as in the two previous studies, the results were still impressive with increasing preference for the photograph which had been exposed more often. Wilson and Nikajo (1965) had previously found preference for photographs a function of frequency of presentation. It can therefore be concluded that mere exposure operates not only for words and works of art, but also strong effects are produced for social stimuli.

Harrison (1969) conducted a series of studies to examine more extensively the relationship between preference for social groups, and other persons and the familiarity of subjects to the groups and persons. In the first study he obtained the ratings of 240 students for liking and familiarity both being found to be a function of the recency of the public figure rated. In other words the more historically recent the public figures the more they were liked and the more they were seen as familiar. In a second experiment Harrison obtained likeability ratings for religious, political, ethnic and occupational groups for which he had already derived an objective familiarity index by the frequency of occurrence in the English language of the words from the Thorndike and Lorge (1944) word count. The correlation between preferences for social groups and subjects liking for the group was low (-.18), though significant, suggesting in comparison to the first study that subjective estimates of familiarity are better predictors of likeability than frequency counts, at least those based on the Thorndike and Lorge (1944) word count.

Further evidence on the relationship, between familiarity and affect comes from a study by Hamid (1972). Fifty two students were asked to name 24 persons whom they either liked, disliked, or neither liked nor disliked, whom they knew well or very little, who were male or female, and who were either young or old. A week later they were asked to rate their 24 names on 7 point familiarity and liking scales. The plot of liking against the seven intervals of familiarity is presented in Figure 1. A positive monotonic function was obtained, those persons named that were most familiar being also most liked. The resulting product moment correlation coefficient was .82 which was significant well beyond the .001 level. The results are not unexpected since it would be predictable social behaviour for a person to expose himself more to people he liked. Nevertheless, people often are forced through various social circumstances to be exposed frequently to others whom they do not like. Perhaps, the names of such persons do not spring easily to mind or more likely these people are avoided outside the forced contact and therefore are not named.

In a third experiment by Harrison (1969) extremely high correlations between familiarity for first names and the likeability for that name were obtained, correlations being .87 for men's names and .83 for women's names. Finally, Harrison found that when subjects rated public figures of 1965 as opposed to 1966 for likeability, the latter were ranked as more relevant to the subjects' lives with greater variability in the subject's preferences for the latter group, which suggests that when the social stimulus has relevance to the individual the strength frequency-affect relationship is markedly altered.

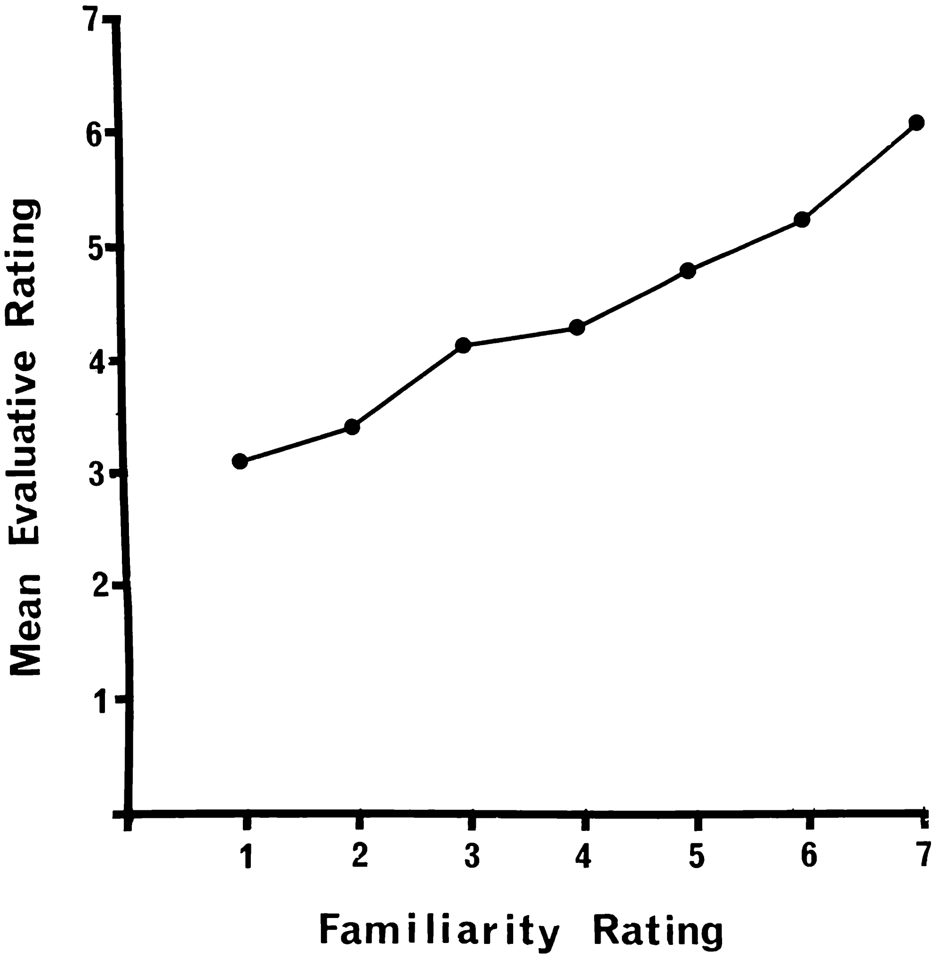


Fig. 1. Changes in ratings of liking as a function of rated familiarity of persons.

Generally, therefore it can be concluded both for social and non social stimuli that frequency has a potent affect on preference but that prior experience, for example, previous associations for words and relevance to the subject's psychological space, has a marked effect on the degree to which mere exposure is operative.

It is the purpose of the present series of studies to examine further the relationship between frequency and affect. Most of the studies reviewed above suffer from weaknesses in the type of stimuli presented to subjects since prior experience plays a major role in evocation of preference responses. The major problem of research in the area is to obtain a set of stimuli with precisely definable physical characteristics and at the same time providing a stimulus situation in which there is very little likelihood of subjects ever having had experience with them, that is, a stimulus set where prior experience is minimal. It is central to the major hypothesis under consideration that mere exposure alone is a sufficient condition in the enhancement of attitudes towards stimuli, therefore, it is paramount that prior experience is not confounded within the exposure effects. The present series of experiments, therefore, utilised a set of stimuli, namely random shapes, which have precisely definable characteristics while at the same time with which subjects would have had no previous direct experience, and for which connotative meaning has a low probability of occurrence.

Apart from the affirmation of findings from the studies reviewed it was the intention of the present series of experiments to extend the knowledge of the relationship through the use of a set of stimuli which provide optimum conditions for attitudinal enhancement through frequency of exposure.

CHAPTER 3

GENERAL METHOD

Subjects

The subjects for all experiments were drawn from three consecutive years of the introductory psychology intake at the University of Waikato. The sample sizes from 1970, 1971, and 1972 were 132, 144, and 196 with 74, 76, and 98 males, 58, 68, and 98 females, and with mean ages of 21.3, 20.1, and 21.8 years respectively.

The 1970 subjects constituted the stimulus standardization sample while the 144 subjects of the 1971 sample constituted the pool from which random samples were taken (without replacement) for Experiments I, II, and III and the 1972 sample was the pool from which random samples (without replacement) for Experiments IV and V were taken.

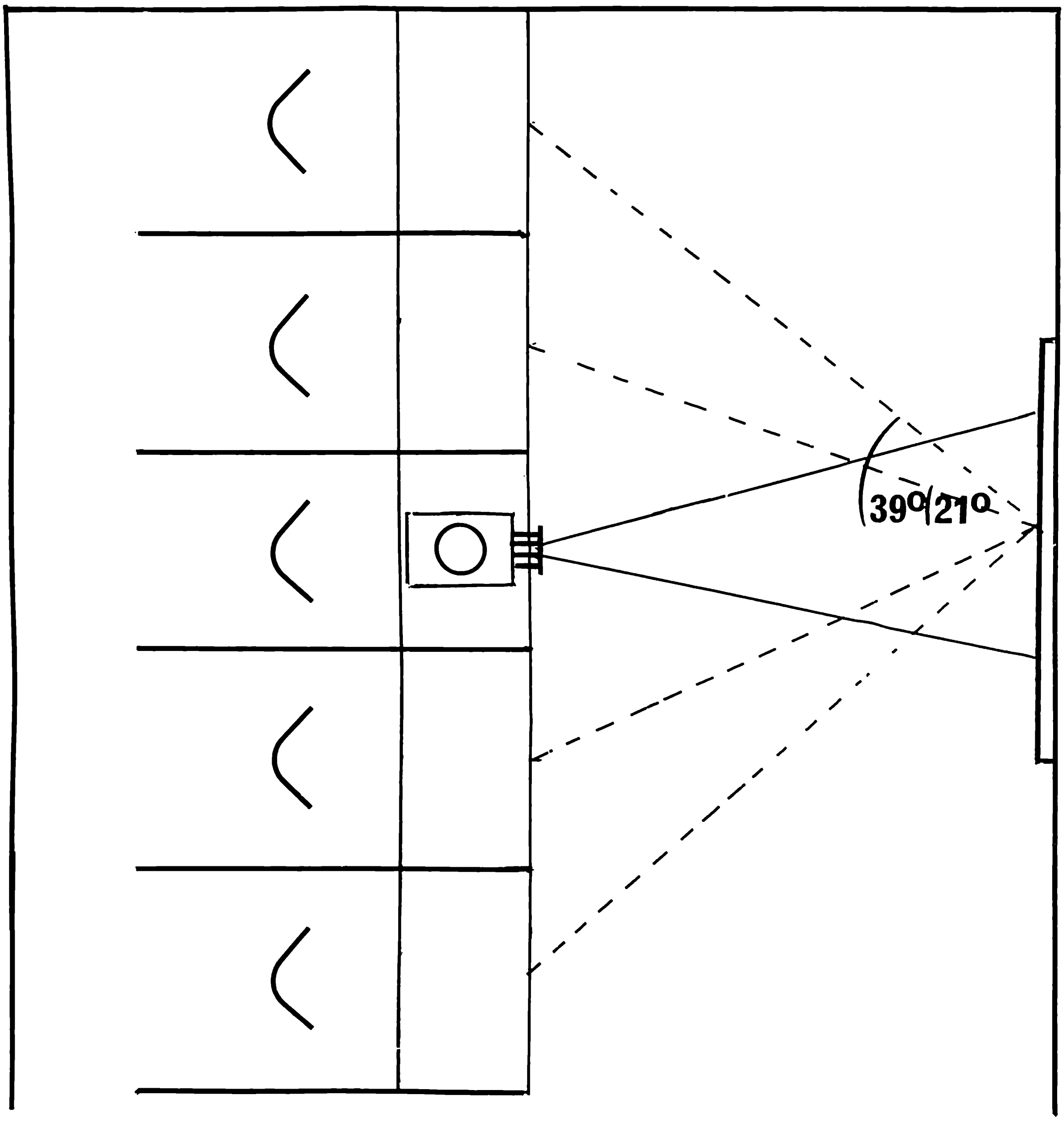
Apparatus

The stimulus materials for all experiments were presented by means of a 35 mm random access Carousel projector (ES2500C) with a tachistoscopic shutter, coupled to a Decade timer that permitted exact control of exposure duration. The projector was fitted with a 60 mm lens and was situated 6 ft. from a 6 X 4 foot white painted screen, the stimuli being projected at seated eye level. The stimulus projection on the screen measured 2 X 2 foot with on and off brightnesses from the viewing booths of 10 and .22 foot-lamberts respectively.

The experimental room contained four viewing booths (Figure 2). The visual angle subtended by the stimulus projections for the seated subjects in the inner and outer positions were 21° and 39° respectively. The average brightness of the booths when the room was darkened was .1 foot-lamberts.

Standardization of the Stimuli

As the major dependent variable of the present study was affective judgement it was felt necessary to minimise the differential stimulus



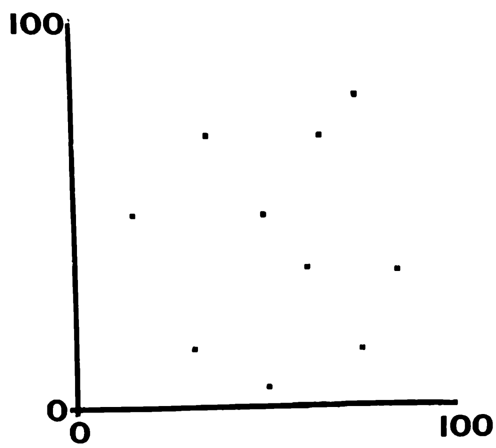
Scale: 1 inch = 2 foot

Fig. 2. Schematic diagram of the experimental room.

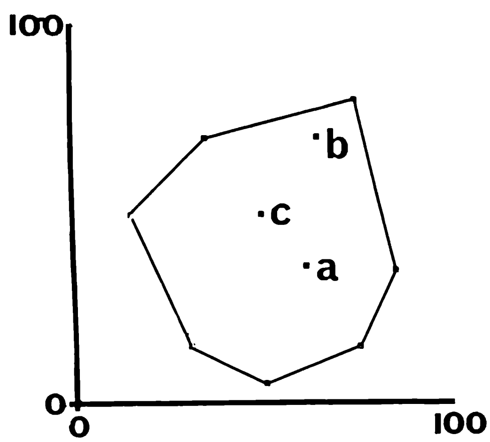
effects due to the attribution of meaning to specific stimuli. Random shapes were chosen because not only can their physical properties be specified in probabilistic terms but also subjects are very unlikely to have had any prior experience with such stimuli. The role of meaning in perception is well attested and therefore it was felt necessary to specify some of the relevant stimulus characteristics prior to experimentation in order that stimulus effects were not confounded within experimental treatments.

The use of random shapes is now common place in the experimental literature and yet few researchers have attempted to control for stimulus differences. Vanderplas and Garvin (1959a, & 1959b) however, have standardized a set of 180 random shapes for association value, meaning content and complexity. These researchers found that just as verbal material vary in association value so too do the random shapes. Since it was expected in the present study that specific meaning differences may influence stimulus preference it was felt necessary to control association value. For example, a shape which reminds most subjects of a "horse" is more likely to receive higher evaluative ratings than one which reminds them of a "spider".

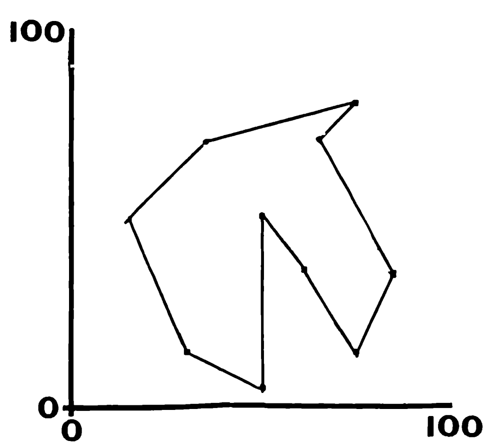
Sets of random shapes were, therefore, developed from a modified procedure of Munsinger and Kessen (1964). A 100 X 100 matrix was drawn on graph paper. Pairs of numbers between 0 and 100 were selected from a table of random numbers to constitute the coordinates of the random shapes. A pencil mark was placed at each coordinate (Figure 3a) and a line was drawn connecting the external points to form a convex polygon (Figure 3b). Next, the remaining internal points were assigned letters at random; each internal point was taken in alphabetical order into a randomly chosen segment of the surrounding polygon by connecting up the internal point to the two coordinates of the external segment (Figure 3c). Lines connecting



a. Selection of random coordinates



b. Connection of peripheral points



c. Connection of internal points

Fig. 3. Illustration of the three basic stages used in generating random shapes.

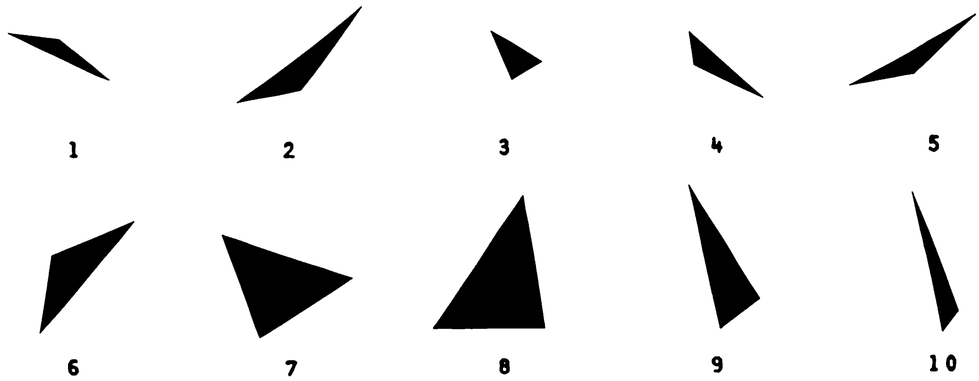
segments were not permitted to cross and new random coordinates were selected if a point fell on a straight line between two other points. The procedure generated random shapes.

The back of the graph paper was then painted black and the shapes were cut out and pasted on 15 X 13 cm. white cards. Finally the cards were photographed to produce 35 mm. slide transparencies of black shapes on a clear background.

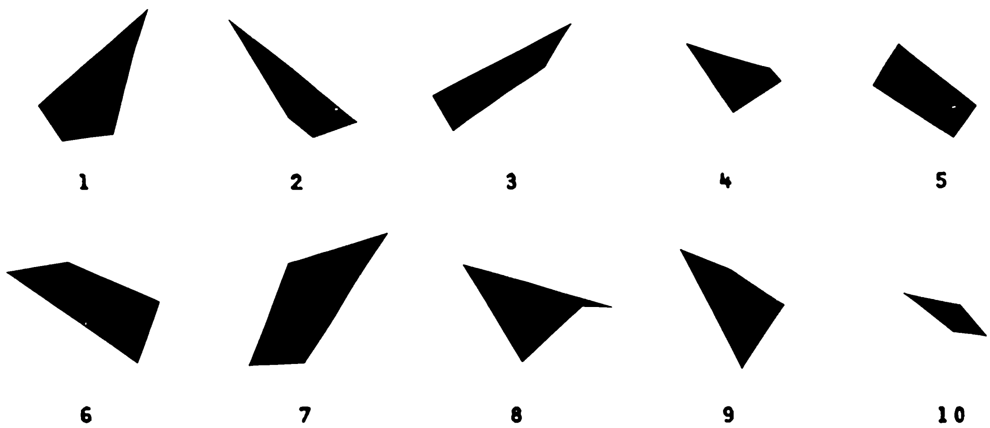
Ten of each of 3, 4, 5, 6, 8, 10, 13, 15, 20 and 30 independent turn shapes were generated with a further 16 for the 10 sided polygons. The random shapes used in the study are presented in Figure 4.

The association value of the 116 random shapes was measured by projecting the 35 mm. slides on a screen for 3 seconds. After each presentation the subject was asked to write in a booklet provided, "Yes", if the shaped reminded him of some object, if possible to name the object, and to rate the shape on two 9 point graphic rating scales dimensioned for pleasantness-unpleasantness and complexity-simplicity of shape. Four measures were therefore obtained. (1) association value: which was the percentage of subjects responding with a "Yes" or verbal content word; (2) content value: which was the proportion of the total association value responses which were words or phrases denoting associations with objects or situations; (3) affective value: which was the rating of pleasantness from 1 to 9; and (4) complexity level: which was the rating of complexity from 1 to 9.

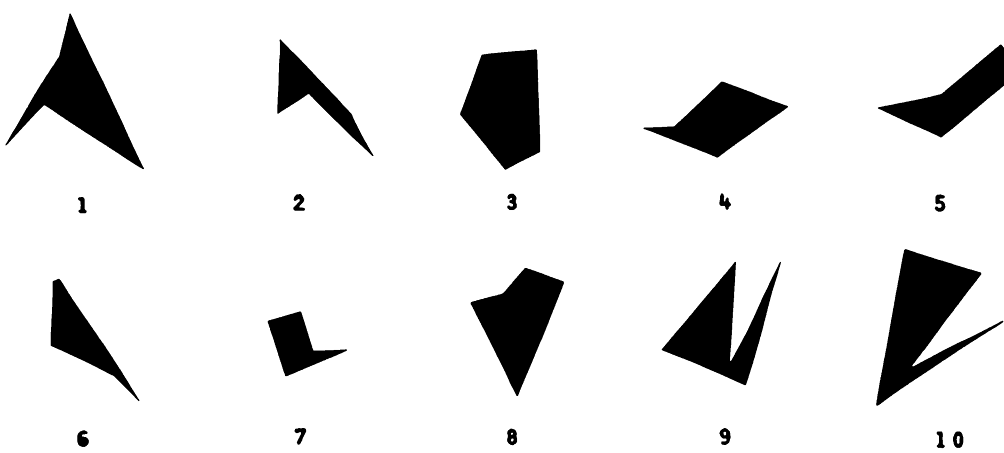
The range of association values were between 13% and 48% with a mean of 29%. Though a good Gaussian distribution was not obtained there was an excess of scores at the low end of the association scale replicating Vanderplas and Garvin's (1959a) results. The shapes tended to be homogeneous with respect to association value being in the low to medium range when compared to those of nonsense syllables and the Vanderplas and Garvin (1959a) figures. None of the shapes



The scaled three-pointed shapes

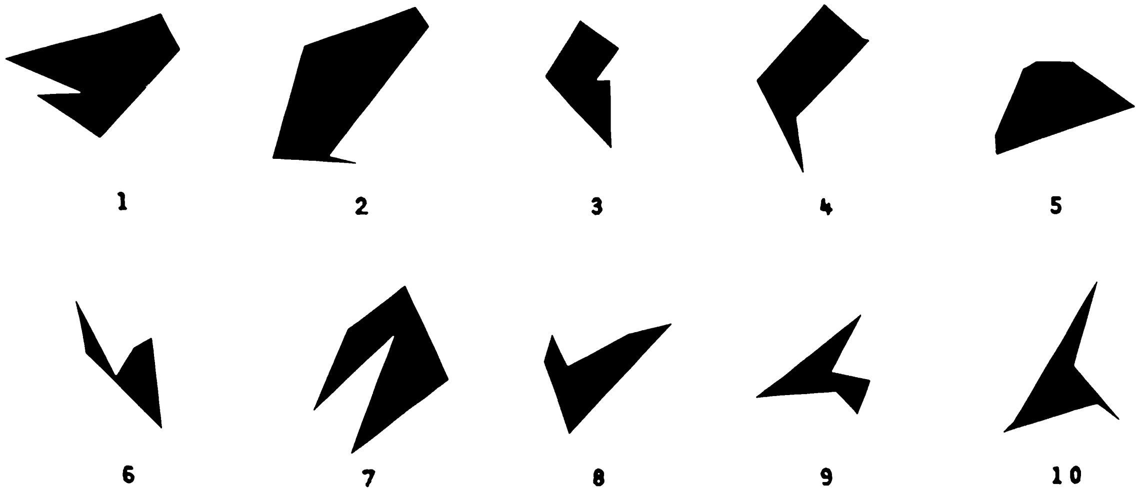


The scaled four-pointed shapes

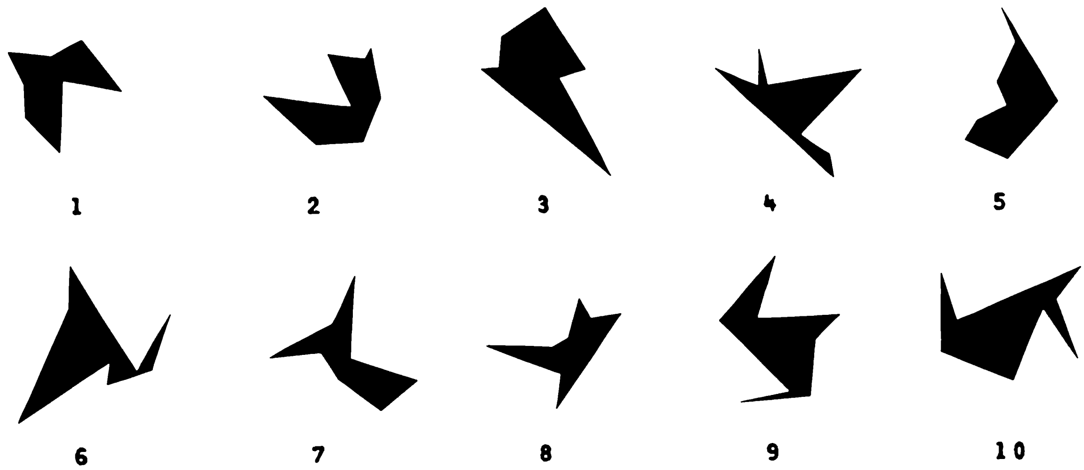


The scaled five-pointed shapes

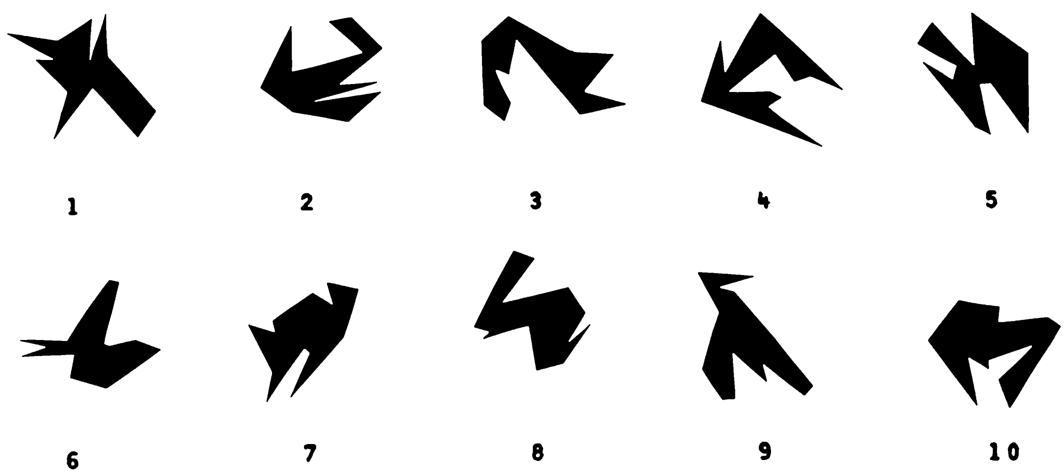
Fig. 4 The random shapes generated for the experimental series.



The scaled six-pointed shapes

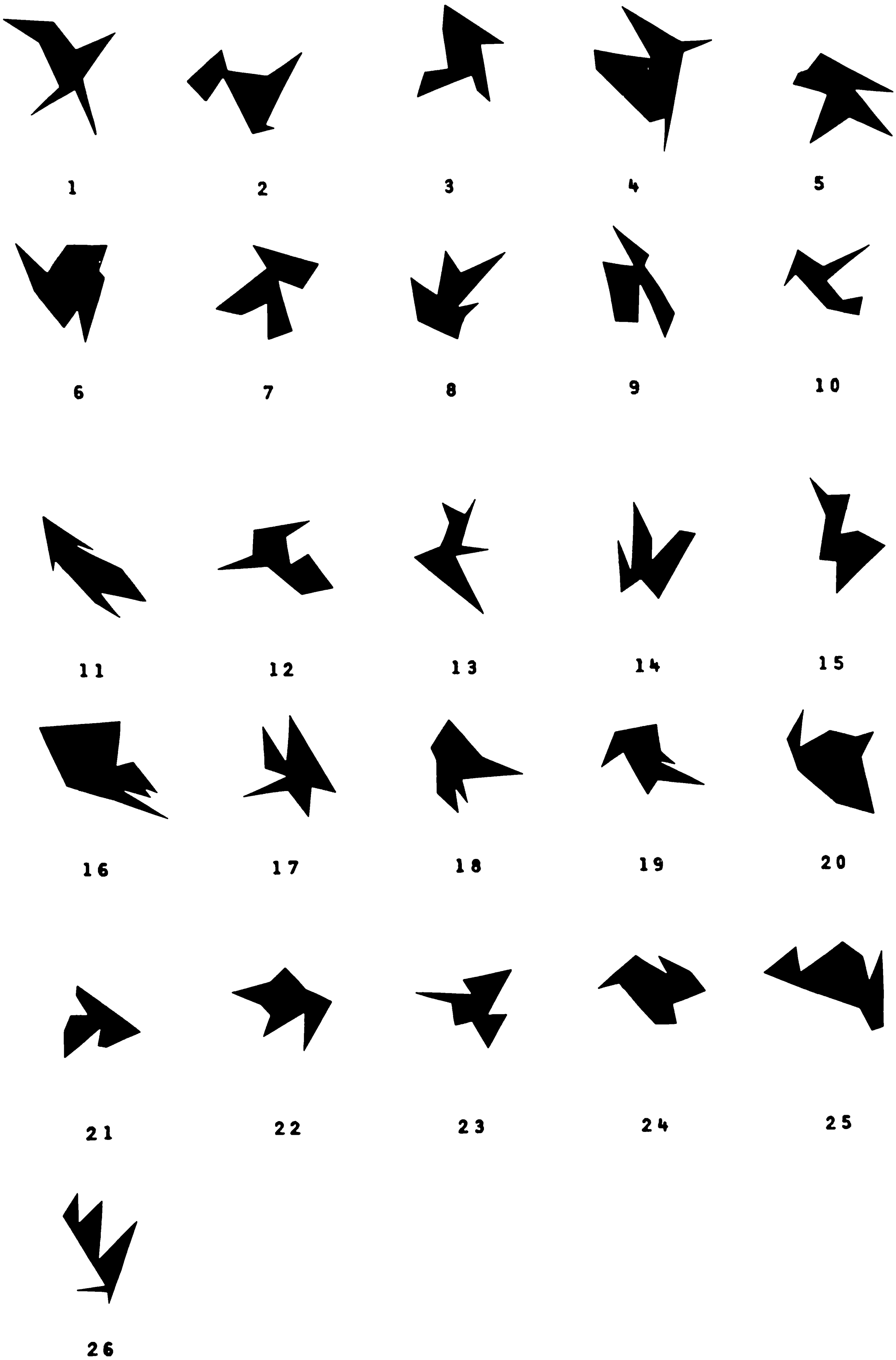


The scaled eight-pointed shapes



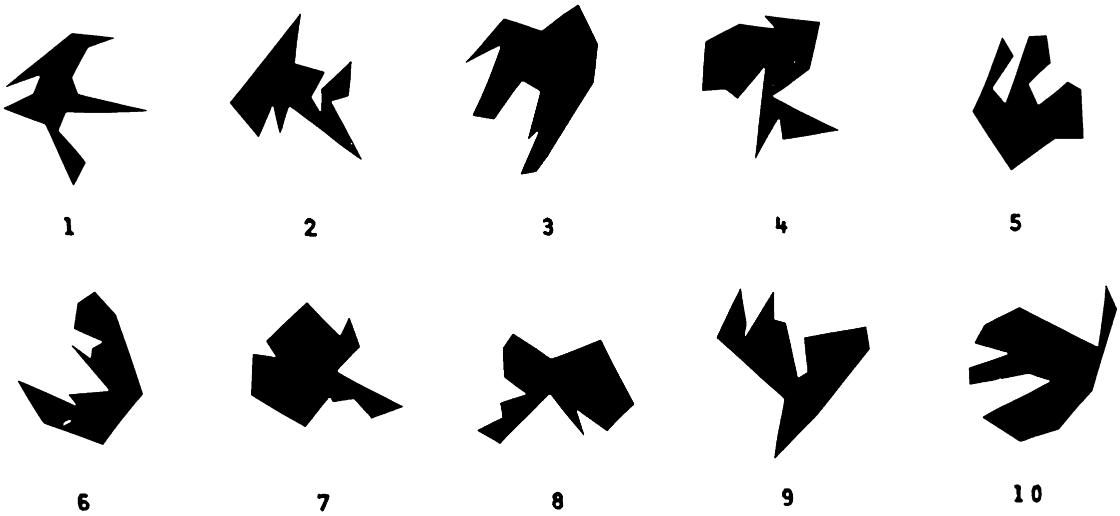
The scaled thirteen-pointed shapes

Fig. 4 (cont.) The random shapes generated for the experimental series

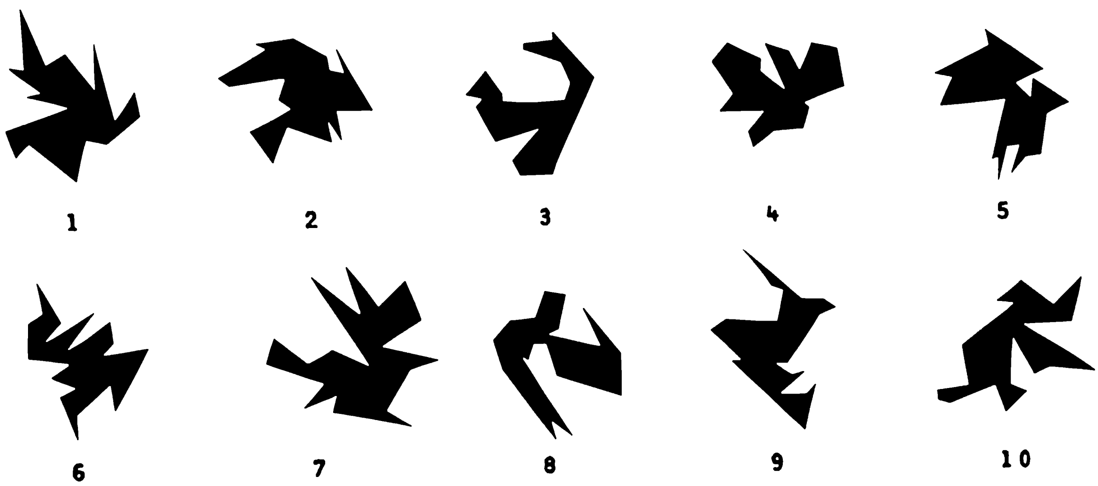


The scaled ten-pointed shapes

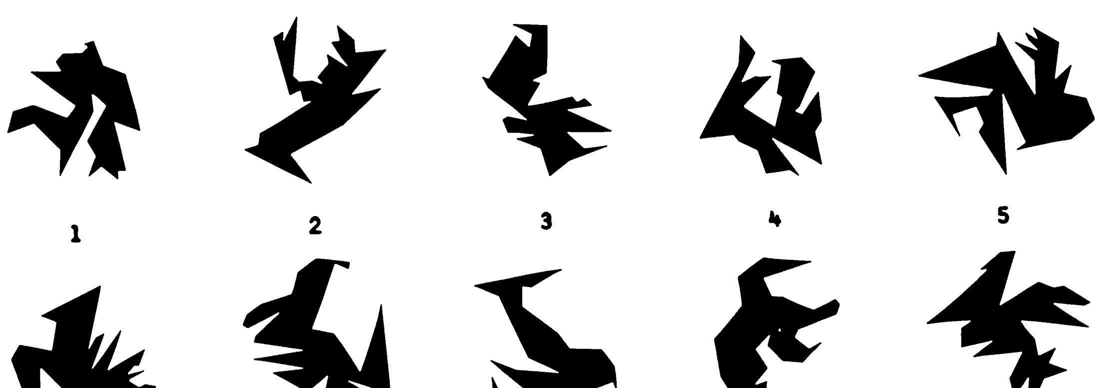
Fig. 4. (cont.) The random shapes generated for the experimental series



The scaled fifteen-pointed shapes



The scaled twenty-pointed shapes



The scaled thirty-pointed shapes

Fig. 4. (cont.) The random shapes generated for the experimental series

evoked meaning responses from a majority of the subjects or received more than 38 content responses. Further, the variation in content for any particular shape was great and where content scores were relatively high few agreements between subjects were found. The only major exception was shown for the eight point shape number 1 (Figure 4, page 30) which not only received a relatively high association value but also was named by 29 of the subjects as a "bird".

Table 1 gives the association values and evaluative ratings for each of the 116 random shapes. It can be seen by inspection that there is generally an inverse relationship between association value and complexity. As in the Vanderplas and Garvin (1959a) study, higher associations were produced by the lower complexity shapes. A Friedman two-way analysis of variance by ranks was applied to the data to test the hypothesis that association value was not differentially affected by the complexity level of the stimulus. A random sample of 10 of the ten point figures was drawn so that there were 10 equal group sizes representing each of the 10 complexity levels. The analysis yielded a X_r^2 value of 498.23 which was significant well beyond the .001 level (df=9), therefore, the alternative hypothesis that association value was differentially affected by the complexity of the stimuli was accepted. Further, it was quite obvious that the relationship was an inverse one since the mean rank scores of association value from the three to thirty point shapes in order of complexity were 2.8, 1.7, 2.2, 4.7, 6.0, 4.2, 6.7, 8.1, 8.8 and 9.9 respectively (low ranks indicating high association values). Therefore, the associative meaning of the shapes appeared to be a function of the shapes complexity with subjects finding it increasingly difficult to make an associative response to the high complexity figures. The exception to this inverse function appeared for the three and ten point shapes. For triangles it was clear that there was very little difference

TABLE 1

Association Value and Evaluative Rating of Random Shapes for Ten Levels of Shape Complexity

Stimulus number	3 point		4 point		5 point		6 point		8 point		10 point[3]		10 point[4]		10 point[5]		13 point		15 point		20 point		30 point	
	A[1]	E[2]	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E
1	42	5.1	44	4.2	48	5.5	42	3.9	40	4.9	46	4.9	35	4.8	22	3.8	44	4.5	38	3.5	35	3.5	32	3.4
2	42	5.3	43	4.9	46	4.6	40	5.0	37	3.7	41	4.3	34	4.9	21	4.2	35	4.1	33	4.3	30	4.1	26	3.6
3	39	4.6	42	5.3	41	5.3	39	5.3	35	3.1	40	4.4	33	5.0	21	3.7	35	3.6	30	3.7	28	3.8	22	2.7
4	38	4.3	42	4.7	38	4.0	36	4.8	32	3.3	39	4.4	31	4.0	19	4.1	31	4.9	30	4.4	24	4.3	20	4.1
5	37	4.9	37	4.3	38	4.1	34	4.6	29	4.8	39	4.3	30	4.2	18	4.0	28	3.3	28	5.1	23	3.1	20	2.6
6	36	4.7	36	5.5	34	4.9	31	5.7	27	4.8	37	4.7	27	4.6	15	3.8	27	3.5	25	3.3	20	3.8	19	3.8
7	33	4.6	34	4.7	33	5.2	28	4.5	26	3.8	37	4.2	25	4.5			21	5.0	23	3.9	17	3.7	15	4.3
8	32	3.8	32	5.1	29	4.8	25	5.9	26	4.6	36	4.1	24	4.7			18	3.8	18	4.5	17	2.9	14	2.4
9	29	4.8	27	4.8	25	5.6	22	5.8	19	5.0	36	4.9	24	4.1			18	3.5	15	2.8	16	3.3	14	3.9
10	20	5.0	25	4.5	23	4.3	19	5.7	17	4.5	36	4.2	23	4.3			17	3.1	13	2.7	15	2.5	13	2.3

1 Association value in percentages

2 Mean evaluative rating

3 Numbered consecutively from 1-10

4 Numbered consecutively from 11-20

5 Numbered consecutively from 21-26

between stimuli in association value, few subjects put a word to the stimuli and yet because of their familiarity with the stimuli the association value was in the middle range for the complexity series. The 10 ten point shapes selected at random for the Friedman analysis contained slightly more higher association values than was characteristic for the total sample of 26 ten point shapes, thus the higher rank score could be due to sampling error.

The relationship between meaning and evaluation for the stimuli was examined by correlating the association value scores with the mean evaluative ratings for the series of shapes under each complexity level. The resulting Rho coefficients ranged from -.45 to +.65 with a mean of +.19. Except for the ten and twenty point shapes none of the correlations were significant. Overall then though there was a slight trend for association to be positively correlated with evaluation it was not sufficient to justify the conclusion that the subjects' rating of affect for the stimuli is significantly influenced by the meaning they attribute to them although to some extent idiosyncratic preferences may be derived from meaning attribution.

Finally, it was felt necessary to examine the relationship between subjective complexity and the objective criterion of complexity on which the generation of stimulus sets was based. Stimulus complexity for the purpose of this study was defined by the number of independent turns of the random shapes, a shape with a large number of such turns being defined as more complex than one having few turns. The assumption behind this definition is that the more complex shape will provide more information to the subject by virtue of the number of points. Subjective complexity also has this informational criterion as its base since people generally conceive of a complex situation as containing more elements than a simple one. Accordingly it was predicted that there would be a high positive correlation between stimulus complexity and the subjective rating of complexity.

Figure 5 shows a plot of the meaning ratings for complexity over the 10 stimulus complexity levels. It is quite clear from the plot that there is a strong positive relationship between the two complexity measures as predicted. The plot shows an almost perfect fit except for those shapes of complexity level 15 and above. For these there seemed to be a disproportionate increase in complexity rating indicating a more marked recognition of increased informational content for these shapes in the judgement series.

In summary, then, 116 random shapes representing 10 stimulus complexity levels were generated and compared for association value, evaluative rating, and complexity rating by 132 first year psychology students. The shapes were found to be relatively homogeneous with respect to meaning range with association value an inverse function of stimulus complexity. Evaluation of the stimuli increased only marginally with increasing stimulus complexity while complexity rating was a positive monotonic function of stimulus complexity.

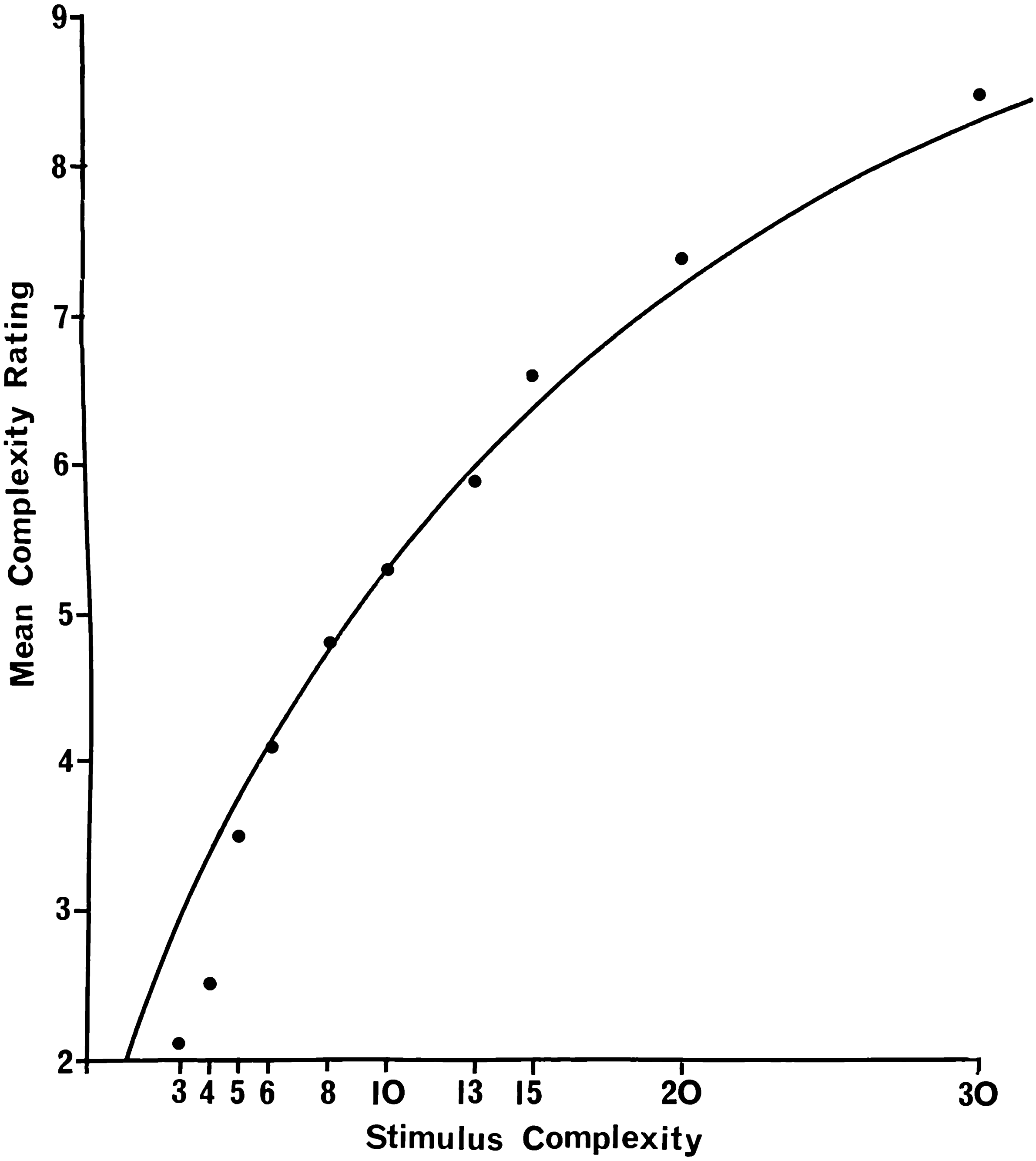


Fig. 5. Mean complexity rating as a function of shape complexity (defined by the number of independent points in a shape.

CHAPTER 4

EXPERIMENT I

The major object of the experiment was to test the hypothesis that mere exposure increases liking for random shapes. Apart from the correlational evidence for the relationship between frequency of exposure and attitudinal affect, previous studies have used stimuli for which prior characteristics that may affect the preference ratings such as meaning, evaluation, and complexity, were unspecified. Increased affect as a function of frequency has been found using Chinese characters (Zajonc, 1968; Suefeld, Epstein, Buchanan & London, 1971) and Turkish words (Zajonc, 1968; Zajonc & Rajecki, 1969) but neither the effects of prior experience nor stimulus complexity were eliminated, except through experimental design. Further, requiring the subjects to guess the evaluative connotations of these type of stimuli is essentially different from asking subjects to state whether they liked them or not since, from the subjects' point of view, the meaning of the stimuli is already known to those who can read the language. The use of nonsense syallables (Johnson, Thomson & Frinke, 1960; Becknell, Wilson & Baird, 1963) does not preclude semantic factors because liking could be dependent on ease of pronounciation (Wilson & Becknell, 1961; Zajonc, 1968) and some letters of the alphabet have been found to be consistently better liked than others e.g. liking has been found to correlate .84 with frequency of occurrence in English (Alluisi & Adams, 1962). Studies of musical preference after repeated exposure (e.g. Lieberman & Walters, 1968) and phobic objects such as snakes (Litvak, 1969) also do not preclude the part played by prior experience with the stimuli.

Reich and Moody (1970) attempted to control for the stimulus characteristics of familiarity and complexity, but again prior experience would affect both dimensions and it is almost impossible to assess the dimensions objectively for stimuli such as a rubber nipple (familiar stimulus) and a wall brace (novel stimulus). Finally, Cantor (1968) and Cantor and Kubose (1969) used a selection of figures from the Barron-Welsh Art Scale. These figures were standardized for complexity and while the familiarity phase of their experiment consisted of six exposures evidence for the monotonic increase in affect after repeated exposure is not available from the data since they measured affect only on the first and last exposures.

Although most of these studies have demonstrated the increase in liking for more frequently exposed stimuli they have generally failed to establish information level, evaluation, and meaning of the stimuli prior to exposure. The random shapes generated for the present study provide a stimulus set with just these dimensions specified. Complexity (or information) level can be controlled by using shapes with the same number of points; prior meaning can be minimised by selecting those shapes of lowest association value; and finally, as random shapes have been shown to be relatively neutral affectively differences in initial evaluation are minimal. Hypothesis Ia of the present study was therefore that the ratings of affect for random shapes would increase as a monotonic function of the log frequency of exposure.

Reich and Moody (1970) found a sex difference in increased affect for common and novel stimuli after 20 exposures. Females showed greater attitude enhancement for novel stimuli while males shown the greatest positive shift for common stimuli. These results together with the fact that response tendencies in rating behaviour appear to differ between the sexes (Hamilton, 1968; Parsonson, 1969) suggest that the frequency-affect relationship may be due in part to categorization biases subjects bring into the judgement situation. Females may tend to prefer novel stimuli (random shapes) and with the tendency to make more extreme judgements would show a marked decrease in affect over exposure frequency than males. On the other hand Lynn (1962) and Wallach and Caron (1959) provide evidence which suggests that differences in sex socialization puts a premium on particular orientations to a set of stimuli. Females tend to be oriented more to concrete (familiar) elements of a stimulus situation. Females being less positively disposed towards the unfamiliar and abstract random shapes would show initially more neutral or negative ratings of the stimuli. If however, frequency of exposure enhances evaluation of the shapes, then given the more extreme rating behaviour we would expect a correspondingly greater affective increase. Since both the theoretical and empirical evidence for sex difference are contradictory a null hypothesis was taken for a sex difference test. It was hypothesised (Hypothesis Ib) that over all levels of frequency of exposure, males and females would not differ significantly in increased affect for random shapes. It was expected, however, that females would exhibit more negative ratings initially but more positive ratings at the highest level of exposure than males, given the tendency for extreme response by females.

Finally, the major dependent variable of the present experimental series (affective rating) is particularly prone to demand characteristics of the situation (Orne, 1962) since not only do the subjects bring into the laboratory evaluative expectations of science and "men of science" but also as the presentation situation can be ambiguous and confusing subjects become extremely sensitive to cues given by instructions. Suefeld, Epstein, Buchanan and London (1971) found instructional set particularly potent for the frequency-affect relationship. While previous researchers had asked their subjects to rate stimuli for "goodness", "likeability", etc., Suefeld, et. al. obtained an inverted U shape function instead of the usual monotonic function when subjects were asked to rate the stimuli on a "badness" scale. For the present experiment therefore a positive and negative set condition was induced and it was hypothesised (Hypothesis Ic) that there would be a significant decrease in the frequency-affect relationship under a negative as opposed to a positive instructional set condition.

METHOD

Subjects

Thirty subjects were selected at random from the pool of the 1971 first year psychology intake of 144 students with the limitation that 15 of each sex were represented. The age of the males ranged from 18 to 24 years with a mean age of 20.2 years while the age of the females ranged from 18 to 25 years with a mean of age of 20.8 years. All subjects had University Entrance qualification and 23 were in their first year of university having spent the previous year in the seventh form at high school.

Design

The experiment took the form of a 2 X 2 X 6 factorial design with repeated measures on the second two factors (Winer, 1962, pp.317). The first factor was that of subject sex there being 15 of each sex represented in the experiment. The second factor constituted two levels of instructional set where subjects were asked to rate two sets of stimulus figures, one for liking and other for dislike. The third factor consisted of six levels of frequency of exposure i.e. 1, 2, 5, 10, 15 and 25 stimulus exposures. The dependent variable was evaluative rating on a 9 point graphic rating scale. Male and female subjects were therefore required to rate two sets (positive and negative set) of six random shapes which had been exposed at six frequency levels.

Stimuli

Twelve ten point random shapes were chosen from the standardized sample generated for the present research. These were chosen on the basis of low association value (Table 1), rather than evaluative rating since most shapes were rated at the neutral point for preference. Low association stimuli, it was assumed, would be initially less likely to evoke connotations which would affect the attribution of approach-avoidance responses due to specific stimulus characteristics.

The level of complexity of the random shapes was selected at ten since it had been found (Munsinger & Kessen, 1964) that it was this level of complexity which was within the average processing capacity of university students. Complexity levels above or below ten tend to be above or below the subjects' judgemental capacity and are likely to affect the preferences subjects have for stimuli (Baltes & Wender, 1971).

Procedure

The subjects were seated in the experimental booths and the experimenter read the following instructions:

> We are interested in developing a number of new items for an important research project. This research aims to discover some of the adverse effects of advertising. As you are no doubt aware, the continual bombardment on us by commercial agencies has a profound effect on our lives and as yet the results of such "brainwashing" techniques are unclear. Young children are particularly prone to conditioning from advertising.
>
> With this in mind I would like you to assist me in standardizing some patterns to be used in this research. For this purpose you will be presented a series of patterns on the screen in front of you. Your task is merely to attend to these patterns at first. You will be asked later to give your impressions of the patterns. Each pattern will be presented on the screen for only a brief exposure. Therefore, it is vital that you look at the screen when the stimulus is presented. I will give you the signal "Ready", just before the pattern is shown so that you will know

when it is coming. Focus on the cross in the centre of the screen in order not to miss the pattern.

As the task requires concentration be careful to attend when the signal is given. You cannot ask questions during the series so do you have any questions now?

When a question was asked the instructions were reread.

The stimuli were then presented to the subjects for 1 second with a mean interstimulus interval of 9.78 seconds. Two of each of the twelve ten point shapes were assigned at random to one of six frequency levels i.e. 1, 2, 5, 10, 15 and 25,constituting two presentation series of 58 trials each. Subjects received different stimuli at the varying frequency levels to control for specific stimulus effects.

The presentation series took an average of 10 minutes to complete. After each series the subjects were given a booklet with the instructions for rating the stimuli (Appendix 1) and followed by six pages of 9 point graphic rating scales for evaluation on a like-dislike continuum. The two presentation series differed with respect to instructional set by requiring the subjects to rate one series of stimuli for liking and the other set for dislike thus providing a positive and a negative set. The order of presentation of the sets were randomized for each subject.

When the subjects had read the rating instructions following each presentation series the 6 stimuli were shown again in random order for one second after each of which the subjects rated them on the six scales. Finally the experiment was terminated by the experimenter asking the subjects what thoughts or reactions they had had during the experiment, especially with regards to experimental hypotheses, explained the purpose of the experiment, asked the subjects not to communicate to other students about the nature of the experiment, and thanked them for their participation.

RESULTS AND DISCUSSION

The results of the three-way analysis of variance with repeated measures on the second two factors (cell ns of 15) are presented in Table 2. Hypothesis Ia was supported since it was quite clear that exposure frequency produced a highly significant differential affect on affective ratings of the random shapes ($F=8.8$, $df=5/140$, $p<.001$). Inspection of the plot of total means over log frequency in Figure 6 shows that affective increases as a direct monotonic function of the log of exposure frequency. Initially affective ratings were negative but increased to a positive rating at frequency 5 and leveled off at the maximum frequency level of 25 exposures. The rate of attitude enhancement tends to decrease as the higher exposure frequencies are reached with maximum increase in affect occurring at about 10 stimulus presentations. Affective increase operates as a logrithmic function of frequency of exposure with an increasing number of stimulus presentations required to produce the amount of affective increase brought about by lower frequencies in the series (Zajonc, 1968).

No significant changes in ratings were produced as a function of sex differences of the subjects and therefore Hypothesis Ib was accepted. Scheffe's test for post hoc comparisons by t-tests on the differences between the means of males and females for one and 25 exposures was used to test the prediction that females make more extreme ratings of affect at the two end points of the frequency scale. Neither tests were significant at the .05 level, the F' for one and 25 exposures being -1.1 and 1.5 ($df = 5/140$) respectively. However, given the conservative nature of the Scheffe test and the fact that the values were in the predicted direction there is some evidence for the fact that females rate stimuli more negative initially and more positive finally than males. This suggests that

TABLE 2

Analysis of Variance of Affective Ratings of Random Shapes for Experiment I

Source	SS	df	MS	F
Between Subjects	193.95	29		
Sex	.80	1	.80	1
Error A	193.14	28	6.9	
Within Subjects	1754.92	330		
Set	.03	1	.03	1
Sex X Set	3.40	1	3.40	1
Error B	105.16	28	3.76	
Frequency	249.35	5	49.87	8.77***
Sex X Frequency	26.75	5	5.35	1
Error C	795.82	140	5.68	
Set X Frequency	14.59	5	2.92	1
Sex X Set X Frequency	34.68	5	6.94	1.85
Error D	525.14	140	3.75	
Total	1948.86	359		

***$p < .001$

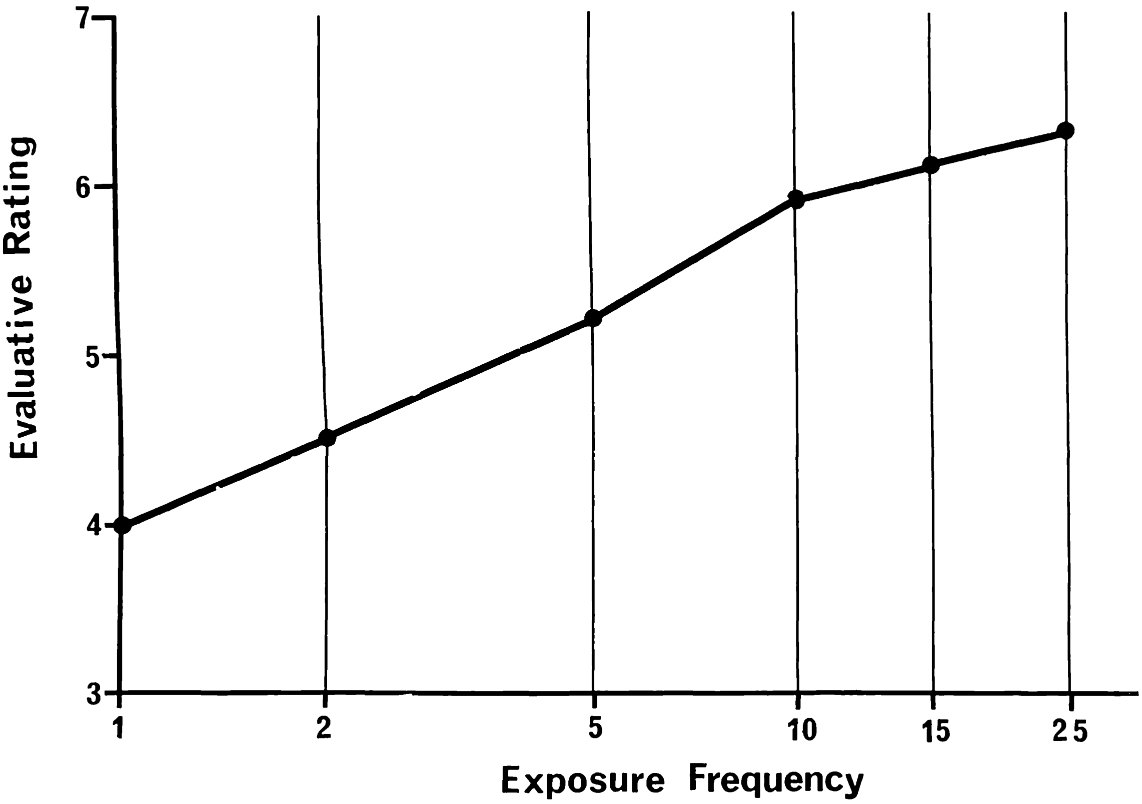


Fig. 6. Changes in evaluative rating of random shapes as a function of the logarithm of frequency of exposure for Experiment I.

females are more negatively disposed to novel stimuli but that the effect of attitude enhancement due to exposure is more pronounced, that is, females show a greater total change in affect than males. This fact together with evidence that though the predicted set effect occurred for males the reverse occurred for females may account for the small (but significant) triple interaction occuring in the data (see Table 2).

Neither the set main effect nor any of the interactions were significant. Accordingly Hypothesis Ic, that there would be a significant decrease in the frequency-affect relationship under a negative as opposed to a positive instructional set was rejected. Lack of significant sex or set effects may be due to the effect of insufficient numbers of subjects for cell frequencies but further research would be required to test this.

It is quite surprising that the set effect was not obtained in the present study since in the Suefeld, Epstein, Buchanan, and London (1971) study the trend was quite marked. There are, however, important differences between their study and the present experiment which may account for the discrepancy. Suefeld, et. al, used Chinese characters to which were complex stimuli. Apart from gross difference in configuration of these stimuli discriminability would tend to be low and consequently set effects are more likely to dominant due to the ambiguity of the rating situation. Further, subjects were required to rate the probable "goodness" or "badness" of the characters' meaning rather than their own personal preferences for the stimuli as was required in the present study. Again set effects would dominate through the absence of other cues with regard to the meaning of the stimuli. In believing that the Chinese characters actually had some prior meaning, subjects are also faced with the possibility of being right or wrong. Although there may be ambiguity in the present stimulus situation, subjects were specifically instructed that there were no right or wrong answers and that it was their own personal impressions which were required (see Appendix 1).

In summary, then a monotonic increase in affect as a logrithmic function of frequency of exposure has been demonstrated for random shapes of medium complexity. Moreover this relationship appears to be relatively unaffected by either sex of the subject or the instructions on which the affective responses are based.

On questioning the subjects after the completion of the experiment none produced evidence of having guessed the experimental hypotheses and their general remarks towards the experiment were favourable. However, when subjects were told that preference would be bound to familiarity many denied persistently that this had occurred for them. This was surprising considering the significance of the frequency effect obtained. The subjects may have been completely unaware of the frequency influence on the preferences. More damaging to the experiment, however, would be the possibility that the experimenter may have been cueing the subject in some way and that the subjects were aware of the purpose of the experiment.

The experiment obviously had something to do with frequency of exposure but in order not to invalidate the experiment, subjects may have been acting as "good" guinea pigs (Orne, 1962) and denying the fact that frequency had had any effect.

In order to establish whether the subjects had been cued by the experimenter, a senior student, naive with regards to the experimental hypothesis, conducted an experiment with ten first year students identical to the previous experiment except that the subjects never saw the experimenter and could only hear him reading the instructions. An analysis of variance yielded a significant effect for frequency of exposure ($F=20.0$, $df=9/46$, $p<.001$). The means were remarkably similar to those found for the previous experiment even though only ten subjects were used. It was therefore concluded that the frequency-affect relationship found in Experiment I was unlikely to be due to the effect of the experimenter.

CHAPTER 5

EXPERIMENT II

At the completion of Experiment I subjects were asked for their reactions and thoughts with regards to the experiment. None mentioned a preference for familiar shapes and when it was suggested to them many denied such a response. The only consistent reaction (13 out of 30) was that subjects tended to make a greater number of associations for the more frequently exposed stimuli. This response was not surprising since subjects were often bored during the experimental series and building associations to stimuli, while relieving boredom, would provide reinforcing properties in the stimulus situation which would account, in part, for increased affect for the more frequently exposed stimuli. Such associations are more likely to be due to the experimental series rather than to the stimuli themselves since the stimuli were of relatively low association value initially and each subject received different stimuli at the same frequency level. It is possible that frequency derives its affective potency to some extent from the development of associations to other objects with which the subject is familiar. It was therefore the aim of Experiment II to determine the extent to which meaning modifies the frequency-affect relationship.

Harrison (1967, 1968) suggests that frequent exposure to initially novel stimuli reduces response competition by increasing the relative strength of one of the response tendencies. Munsinger and Kessen (1964, 1966) use a similar construct of "cognitive uncertainty" suggesting that novel random stimuli provide a stimulus situation of relatively high cognitive uncertainty. Frequent exposure would act to reduce cognitive uncertainty. It is not altogether clear how response competition or cognitive uncertainty is diminished but there is some evidence that associative meaning may aid the individual in their reduction and consequently their associated negative affect.

Past experience may be used to categorize stimuli, that is, a stimulus may look like something with which a subject is already familiar. Subjects may use certain dimensional characteristics, in the case of random shapes, such as jaggedness, size or weight. They may merely use memory. On whatever basis meaning is established it is clear that both lower thresholds (Hershenson & Haber, 1965; Kristofferson, 1957) and greater preference (Munsinger, 1964) are found for stimuli which are most meaningful.

Given the importance of meaning in a situation of high uncertainty and the reinforcing properties of meaning in such a situation it was predicted (Hypothesis II) the greater the initial amount of meaning for stimuli the greater the change in increased affect with increasing exposure. If a stimulus initially produces more meaning responses, response competition or cognitive uncertainty will be reduced and the associated positive affect increased.

METHOD

Subjects

Ten subjects were selected at random from the 1971 first year psychology pool who had not been used in Experiment I.

Design and Procedure

The basic design of the experiment was a 2 X 5 analysis of variance design with repeated measures on both factors (Winer, 1962 pp.289-290) and 10 observations in each cell. The first factor was represented by two meaning levels of the stimuli. A high meaning condition was established by selecting the 5 ten point random shapes with the highest association values given by the standardization sample (Figure Nos. 1 - 5) while for the low association condition the 5 ten point random shapes with the lowest association value (Figure Nos. 22 - 26). Of course the distinction between the two sets is only relative and it may be possible to further distinguish high and low values even with the low value set here defined. The second factor was that of exposure frequency represented by 1, 2, 5, 10 and 15 exposures of 1 second each.

The procedure used was identical to that used in Experiment I. Subjects were presented with a random series of stimuli at five frequency levels. Stimuli for each frequency level and order of high versus low meaning condition were both randomized across subjects. Subjects then rated each of the ten stimuli on 9 point graphic rating scales of liking.

RESULTS AND DISCUSSION

The results of the analysis of variance are presented in Table 3. Again a significant main effect for frequency of exposure was obtained where, regardless of initial meaning, affect increased as a logrithmic function of frequency of exposure. There was also a significant interaction between meaning and exposure frequency. Examination of the means (Figure 7) showed that generally while affect increased with increasing exposure, low meaning stimuli produced a greater affective increase than high meaning stimuli. This would account for the significant interaction found between meaning and frequency ($F=2.9$, $df=4/8$, $p<.05$). Besides the fact that low meaning stimuli received the lowest ratings after one exposure, thus supporting the standardization results, it appears that they also gain more positive affect from mere exposure. Hypothesis II that initial high meaning for stimuli enhances the frequency-affect relationship must be rejected. Initial meaning does seem to significantly affect the degree of change which occurs over increasing exposure frequency. The assumption behind the derivation of Hypothesis II was that meaningful stimuli after one exposure are more preferred

TALLE 3

Analysis of Variance of Affective Ratings of Random Shapes for Experiment II

Source	SS	df	MS	F
Subjects	17.21	9	1.9122	
Meaning (M)	.25	1	.25	1
Frequency (F)	40.46	4	10.1150	2.6551*
M X F	44.41	4	11.1025	2.9145*
Pooled Error	308.58	81	3.8096	
Total	410.91	99		

*$p < .05$

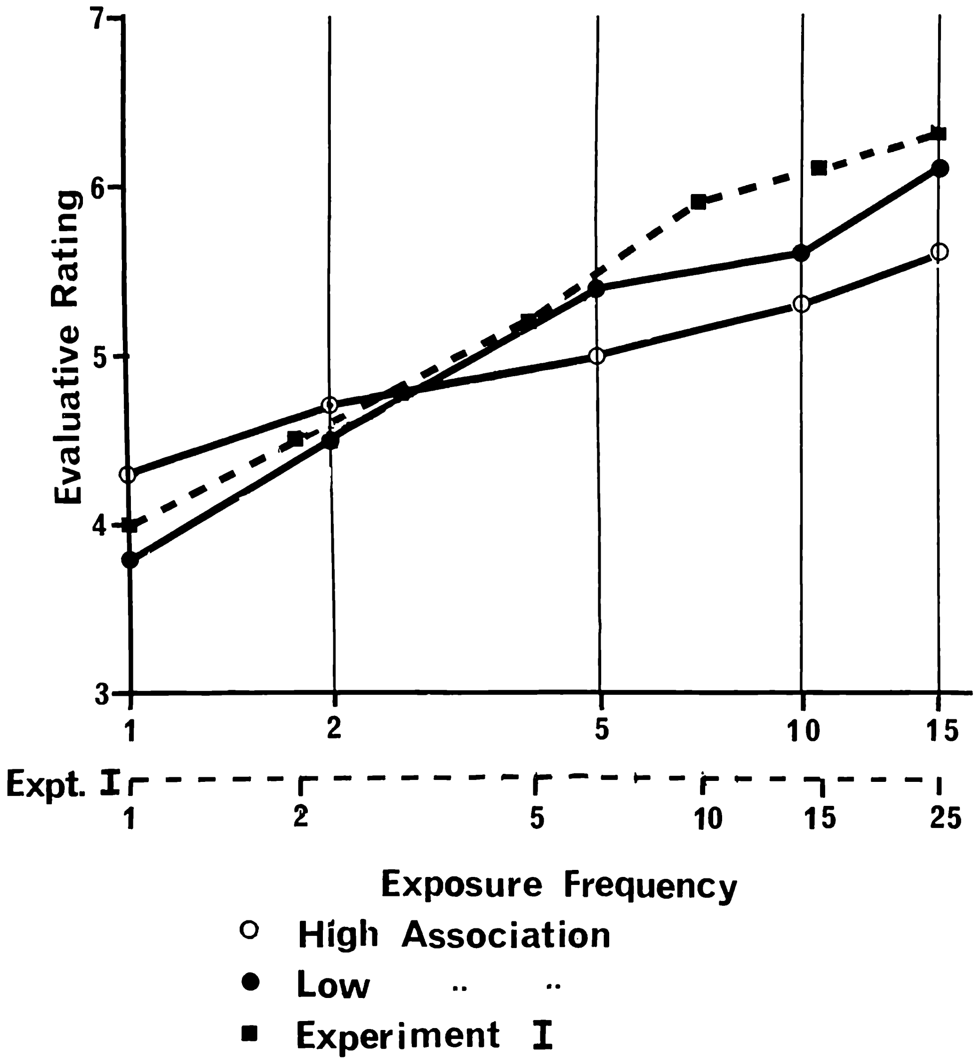


Fig. 7. Changes in evaluative rating for two association levels of random shapes as a function of the log of frequency for Experiment II. The dotted line shows the results of Experiment I with the exposure frequencies scaled for comparison

and that subsequent exposure builds up a greater number of approach tendencies to the stimuli through the reinforcing properties of attributed meaning and its concomitant reduction of stimulus uncertainty. Stimulus meaning was relatively low even for the set defined as "high meaning" stimuli for the present purpose. Perhaps initial meaning responses inhibit increases in affect.

Their weak strength may interfere with the building of stable responses and meaning fluctuations may occur throughout the exposure series. An unfamiliar stimulus though producing relatively high cognitive uncertainty may evoke fewer competing responses than one for which a weak meaning response has been established. This interpretation is in line with the evidence presented by Harrison (1968) and Matlin (1970). Using word association latency as an index of response competition both found stimuli producing mild latencies (those which elicit a number of weak incompatible response tendencies) are not as well liked after repeated exposure as stimuli to which only a single response has been associated. For the present study the relatively short time for which all stimuli were exposed may mean that little time is available to build up alternative meaning responses for low association value stimuli while stimuli for which there are weak associative meanings may actually produce confusion over a short period the consequence of which would be less affective increase. It does appear from the results that random shapes of lower association value produce greater positive shifts in affect with increasing exposure.

Finally, the values of the increases in affect obtained in both Experiments I and II are considerably higher than any other study which has so far been carried out on the frequency-affect relationship. In the present experiment evidence for the difference in the rate of the increase in affect due to initial meaning suggests that the difference is due to greater control of previous experience in the use of random shapes. In a situation where prior experience is at a minimum it is predicted (Zajonc, 1968) that mere exposure will show its greatest effect. It appears, therefore, that while providing precision in informational control, the presentation of random shapes provides a stimulus situation in which frequency effects are operating at a close to maximum level.

Though increased affect with increasing frequency has been shown clearly in both experiments the maximum number of exposures were not large. It has been argued (Jakobovits, 1968) that it is possible that after excessive exposure stimulus satiation will produce a decrease in affect. Zajonc, Swap, Harrison and Roberts (1971), found that even after 81 exposures to Chinese characters the attitudinal enhancement had not reached asymptote. However, the level of favourability evoked by 81 presentations was not very different from that evoked by the same stimuli at 9 and 27 exposures in two further experimental series (Zajonc, et. al., 1971). It appears, therefore, that the exposure effect is limited with affective ratings varying, not as a function of absolute exposure frequency, but rather in terms of the relative differences in frequency between stimuli.

Although the maximum frequency difference between Experiment I (25 exposures) and Experiment II (15 exposures) was small, a comparison was made to examine the range of scores for the two experiments.. The results of both experiments were plotted on Figure 7 with the abcissas coterminal at their end points, and calibrated on a log scale proportionally for each experiment. Although the means for Experiment II are lower a striking similarity occurred in the shape function for the two sets. These results support Zajonc, Swap, Harrison and Roberts' (1971) contention that subjects tend to use the rating scales in a relative manner distributing their ratings across the entire scale and therefore, any differences between stimuli are in part a function of the rating series and not the stimulus characteristics per se. It follows (Zajonc, Swap, Harrison & Roberts, 1971) that the exposure effect can only be demonstrated by a within subject analysis. The relative nature of the affective increase following frequent exposure is not surprising since it is well known in adaptation-level theory (Helson, 1964) and attitudes change (Sherrif, Sherrif and Nebergall, 1965) that judgements are made in relation to the anchors provided by the preceding stimulus series. Nevertheless the frequency-affect relationship does not appear to be affected by increasing the maximum number of exposures in a stimulus series.

CHAPTER 6

EXPERIMENT III

While attitudinal affect seems to be clearly a function of mere exposure, as yet there is insufficient evidence to suggest how the relationship is established. The potency of exposure frequency has its counterpart in the area of perception where recognition is enhanced with increasing exposure (Haber, Hershenson, 1965; Haber, 1969). Ignoring the possibility of interstimulus interval rehearsal, commonly the assumption is made that given several repetitions of a stimulus which is to be later recalled, the effect on memory is equivalent to that of one long exposure of the stimulus. That is, the effects of frequency and exposure duration are thought to be mediated by the strength of the memory trace alone. Though the conceptual leap from the learning process to the motivational consequence may be tenuous the total-time hypothesis suggests that mere exposure to stimuli and its associated increased affect can be established either by increasing the number of exposures of a stimulus or by increasing the time in which the stimulus is made available to the subject.

Harrison and Zajonc (1970) examined the role of response competition on the frequency-affect relationship presenting stimuli at five exposure frequencies under two exposure-duration conditions (2 and 10 seconds per exposure). While obtaining the predicted relationship of decreased response latency for both exposure frequency and duration, affective ratings though clearly related to exposure frequency were not consistently related to exposure duration. Further Litvak (1969) found no differences in affective ratings, after exposure to a live snake for 10 as opposed to 50 seconds, while an increase in affect for frequency of exposure was obtained. It appears therefore, that while exposure duration acts to increase the likelihood of a dominant response the effects do not systematically operate on the subsequent reward value of the stimulus.

Again in the area of perception Haber (1969) has shown that repetition alone increases the probability of seeing words, independent of changes in the duration of exposure. However, as in the Harrison and Zajonc (1970) study a long exposure was superior to one or more shorter ones with regards to perceptual clarity and, therefore, the probability of a correct or dominant response.

It was the object of the present experiment to test the relationship between frequency and duration of exposure and affective ratings for the set of random shapes. On the basis of previous findings it was predicted (Hypothesis III) that duration of exposure will not significantly affect attitudinal enhancement towards a stimulus.

METHOD

Subjects

Twenty subjects were selected at random from the pool of 1971 first year psychology students who had not already participated in Experiments I or II.

Design

The experiment took the form of a 2 X 6 factorial design with repeated measures on both factors (Winer, 1962, pp.209-290). The first factor constituted exposure mode and was represented by either repeated exposures (frequency) or one exposure (duration) of each stimulus. The second factor was that of exposure time being represented by 1, 2, 5, 10, 15 and 25 seconds. The 12 ten-point random shapes with the lowest association values from the standardization sample were used as stimuli for the present experiment. Nine-point graphic rating scales of like - dislike were used to obtain the dependent measure of affect.

Order of exposure mode and the allocation of the 12 stimuli to the two conditions of six exposures was randomized for each subject.

Procedure

The procedure was identical to that used in Experiments I and II except that since there was a 10 second delay between stimulus presentations for the frequency manipulation there would be 520 seconds more experimental time than the six stimulus exposures required for the duration condition. In order not to confound total presentation time for the two exposure mode conditions presentation time was equalized by increasing the exposure interval between stimuli for the duration condition. Although interstimulus interval time would provide opportunity for rehearsal the inhibitory effects operating in nearly 2 minutes between stimuli is likely to counteract such effects.

The subjects rated each of the 12 random shapes following the completion of both exposure mode conditions.

RESULTS AND DISCUSSION

From the analysis of variance of the affective ratings of random shapes (Table 4) it can be seen that although exposure mode alone produced no significant differential influence both the main effect of presentation time and interaction between exposure mode and presentation time significantly ($p < .001$) affected liking for the stimuli. A plot of the mean ratings over the log frequency for both exposure modes given in Figure 8 indicates that although the effect of exposure mode is markedly different, the difference between the exposure frequency condition and the exposure duration condition is masked by the interaction of the modes over presentation time. While, once again, affect increases as a log function of frequency of exposure for the duration condition there tends to be an inverted U shaped function with marked

TABLE 4

Analysis of Variance of Affective Ratings of Random Shapes for Experiment III

Source	SS	df	MS	F
Subjects	96.66	19	5.09	
Exposure Mode (EM)	5.74	1	5.74	2.3
Time (T)	64.09	5	12.82	5.13***
EM X T	125.41	5	25.08	10.03***
Pooled Error	532.06	209	2.50	
Total	823.96	239		

***$p < .001$

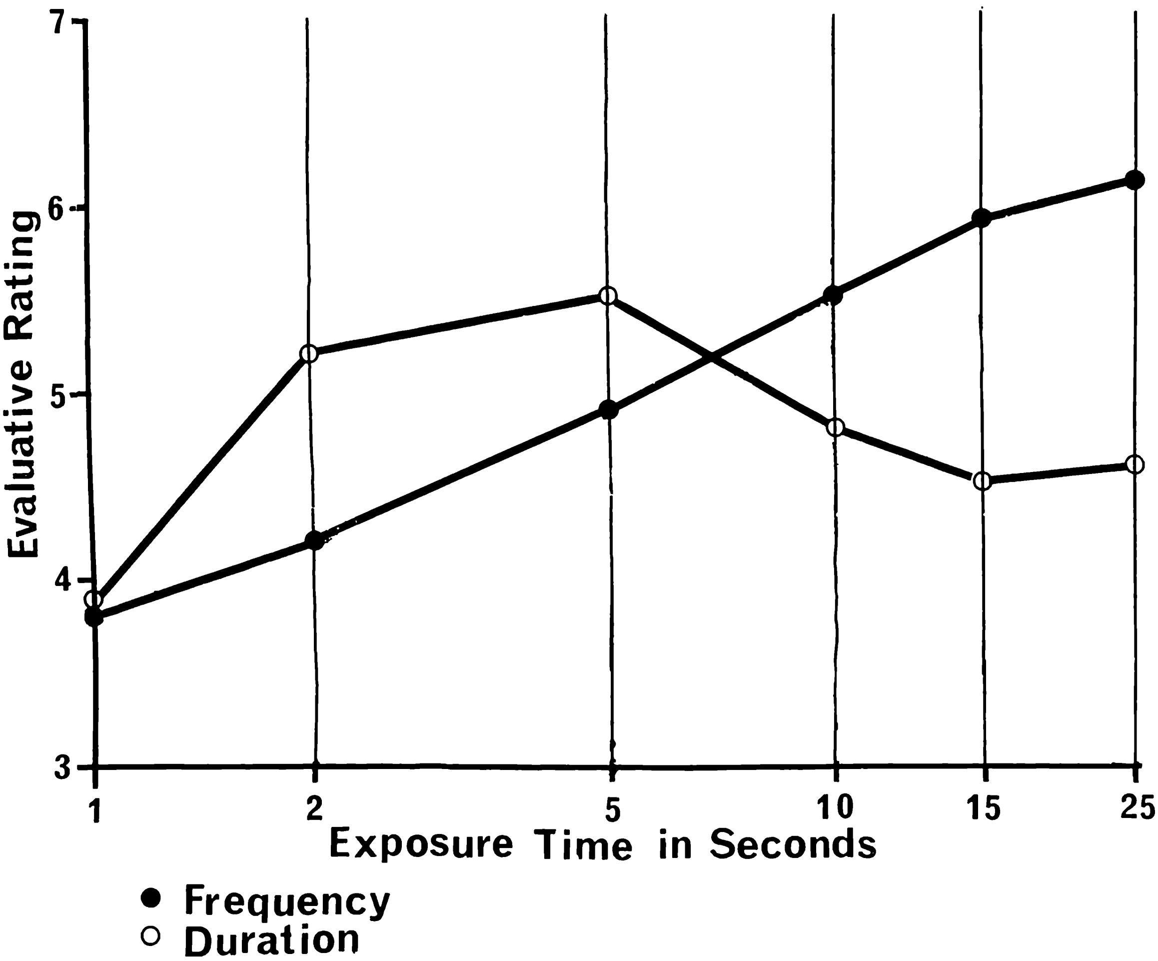


Fig. 8. Changes in evaluative rating of random shapes as a log function of exposure duration and exposure frequency

attitude enhancement at low exposure times reaching asymptote at about 5 seconds and decreasing for longer exposures (10 - 25 seconds). Exposure duration, therefore does affect stimulus preference significantly but not in a simple unitary manner thus Hypothesis III must be rejected on the present evidence.

Exactly how stimulus preference is affected by exposure duration is unclear but it is possible that stimuli gain their associated affective responses through their successful classification in the subjects conceptual frame. At low and medium exposure durations subjects are presented with novel information which is within or just beyond their processing capacity. The successful classification through the building of associative meaning or successful recognition for stimuli of medium difficulty may present a high reward situation and stimulus preference would be more likely to increase. Exposure durations well within processing capacity, though providing greater opportunity for stimulus processing, would also increase the likelihood of response such as boredom or inattention, which in turn would provide a negative reinforcement condition and decrease the preference for stimuli of long exposures.

In the present experiment the 2 and 5 second exposure durations produced a greater increase in affect than when stimuli were exposed twice and 5 times for one second. Scheffe's test (F') for post hoc multiple t-test comparisons was used to test the significance of the two exposure times. The test yielded an F' of 2.83 (df=5/209) for the 2 second exposure time which was significant at the .05 level while the F' for the 5 second exposure time though in the predicted direction (F'=1.02, df=5/209) was not significant. There is some evidence, therefore, to suggest that it is at the relatively low exposure times only that duration operates to enhance attitudinal affect.

This result is not unexpected since the memory process is rapid and usually takes a subject less than two seconds to process a stimulus, such as a word, into memory. The subject then stops processing the stimulus until other stimuli are received (Hintzman, 1970). Exposure duration would, therefore, have little affect beyond short exposures since during any interval exceeding the minimum processing time, the consolidation mechanism is essentially inactive. Given the unfamiliarity and relative complexity of random shapes, processing time may be extended beyond two seconds with subjects attaining maximum processing within a five second interval. Certainly the processing time on the memory trace together with the assumption of the associated reward value of successful classification would explain the disproportionate increase in affect for the 2 and 5 second exposures in the present study.

It is well known in learning theory (e.g. Lawrence & Festinger, 1962) that learning takes place most rapidly when the learner has to "work" at the task, when there are gaps that he has to bridge himself by chance guessing or reasoning and when he has the opportunity to test his experience again and again in varying contexts. Repetition appears to reactivate the traces of earlier messages. The individual has to "work" more under repeated exposure because as there are more presentation trials he is more often searching his memory and linking the association made with past experience. After a certain number of repeated exposures there is a breakthrough in learning and a message, whether correct or incorrect in terms of the objective stimulus, has been delivered.

It might also be predicted that at the relatively low exposure times response competition would be high and where maximum processing is occurring maximum response competition is operating. From the present experiment therefore, the two and five second exposure times would produce the conditions for maximum response competition. An examination of the data from Harrison and Zajonc (1970) showed that it is precisely between 2 and 10 seconds exposure that maximum response competition occurs.

The monotonic increase in affect with logrithmic increases in frequency suggests that frequency operates through summation of affect at each exposure level. Young (1968) in experiments with preference in animals concludes that hedonic processes tend to summate algebraically. Thus for the present experiment a one second exposure though not providing sufficient time to process a random shape does provide a time in which the subject will be fully attentive. The cumulative effects up to 25 one second exposures means that most of the 25 seconds is being utilized in the processing of stimuli and the associated reward effects are likely to be additive. For exposure duration, however, any period beyond some optimum value might engender boredom, irritation and lapses in attention, so that not all time would be effectively spent. The subject may subsequently attach these negative motivational consequences to the stimuli.

CHAPTER 7

DISCUSSION

The results from the experiments so far outlined provide strong support for the hypothesis of Zajonc (1968) that mere exposure is a sufficient condition for attitudinal enhancement towards a stimulus. In all three experiments it was found that affective ratings for random shapes increased as a function of the number of exposures.

One of the major differences, between the results found in the present series and those conducted by other researchers in the area is the fact that generally a much higher level of affective rating was obtained at the maximum exposure frequency than has been previously found. It will be remembered that a 9 point rating scale was used with 5 being the neutral position. Inspection of all the plots so far presented (Figures 5, 6, and 7) shows that initial ratings are somewhere between 3.5 and 4.5, that is, the stimuli tend to be rated as neutral or slightly negative. The ratings at the maximum exposure frequency for each experimental series are in the region of 6 or greater. It can be assumed that this level represents definite positive ratings. On the other hand an inspection of the ratings obtained by Zajonc, Swap, Harrison and Roberts (1971), using Chinese ideographs, shows that while initial ratings are within the region of 2.5 - 3.0, their ratings after maximum exposure are of the order 3.5 - 4.0 which on the basis of the 7 point scale they used are in the neutral or slightly negative region. Although it cannot be concluded that a rating of 4 on a 7 point scale is necessarily neutral or negative since we do not know the precise response characteristics of the subjects and how they are actually using the scale points to make the evaluative judgements, it is quite clear from the comparison that in the present series of experiments the amount of affective change is far greater, being of the order of 2.5 scale points (for a 9 point scale) as opposed to 1.0 scale point (for a 7 point scale) and with ratings at high exposure frequencies being well above the midpoint for the scale. One possible explanation of the difference lies in the difference between Chinese ideographs and the random shapes as meaningful stimuli. Subjects find it particularly difficult to make associations to the random shapes and the stimulus sets obtained for the experimental series initially evoke a neutral affective rating. It would appear, therefore, as suggested by Zajonc (1968) that the frequency-affect relationship is particularly marked when the stimuli and the stimulus situation are neutral initially. Zajonc (1968) also proposed that the exposure effect is particularly pronounced when the subject is exposed to novel stimuli and this would most certainly be the case for random shapes. Therefore, the combination of initial neutrality and novelty would operate to produce conditions for maximum frequency effects.

In Experiment II it was found that for the set of random shapes, although frequent exposure of both relatively high and low association shapes produced a monotonic increase in evaluative ratings, the effect was greatest for stimuli of lowest initial association value. This result provides further support for the large affective increases found in the present study. It suggests that the lower the initial stimulus meaning, the more the effects of frequency of exposure are free to operate. Low association-value stimuli appear to provide the subject with stimulus conditions with both maximum novelty and minimum interference through prior meaning. Further, the interpretation that stimuli gain their increased affect through exposure from the reduction in response competition associated with them is in accord with the differences found between high and low association stimuli. Relatively high association stimuli used in Experiment II may initially evoke weak response tendencies which compete over the presentation series to produce a less than maximum increase in affect, whereas the low association stimuli with little or no response tendencies associated with them produce greater affective increases over exposure since a response would be more likely to be retained over the short period in which the experimental series was run. Thus weak meaning, interferes with and reduces the magnitude of the attitudinal enhancement while little or no meaning (although not necessarily concommitant with absolute neutrality) provides a situation in which conditions for affective increase are virtually optimal.

Although duration of exposure has some effect on the degree of liking for a stimulus, the results of Experiment III showed that the effect operates at a maximum of 5 seconds. Longer durations of exposure tend to produce inattentiveness and boredom in the subjects. Exposure to a stimulus for 10 seconds or more may produce adaptation with a subsequent decrease in alertness, whereas for stimuli exposed frequently at 1 second for 10 or more exposures, with frequent stimulus change over the presentation series, alertness is more likely to be maintained. In terms of the experimental situation, therefore, short but frequent exposure provides a variation in stimulation for the subjects, variation is arousing and if not too intense, produces pleasant feelings. It may be that the variation due to stimulus change in the experimental situation has its own reward potential over the presentation series.

The possibility of variation, with its arousing properties and its reward potential operating in the present experimental paradigm is important. Many repetitions, of a variety of stimuli at brief exposures may enhance attitudes towards the stimuli due to the arousal potential in the experimental situation. On the other hand, for some subjects the reverse may occur where frequent presentation of the same stimulus creates boredom and results in negative evaluation of stimuli associated with boredom. On questioning the subjects at the completion of all three experiments and examining the profiles of their ratings over frequency, it was evident that some subjects found the repetitive nature of the experimental series boring. To investigate this effect further, the results from subjects in Experiments I and III were compared.

Since there were no sex or set effects in Experiment I the results for the positive set alone were used. The results for the frequency of exposure condition were used from Experiment III. Taking the exposure levels 1, 2, 5, 10, 15 and 25, the ratings for the first three and last three exposure levels were added for each subject in both experiments. Subjects who obtained a higher total on the first as opposed to the last three exposure levels were taken out of both experiments and grouped together as a High Novelty Preference group. All other subjects in the two experiments constituted a High Familiarity Preference group being characterised as having a higher total rating in the second half of the frequency levels than in the first.

A total of eleven subjects from the two experiments show a decrease in affect over frequency of exposure, six from Experiment I and five from Experiment III. The means and standard deviations for the six frequency levels for both groups are presented in Table 5. The plot of these means are shown in Figure 9. It can be seen that a marked change in the profiles occurred. Not only is there a considerable decrease in affect for the High Novelty Preference group but also a corresponding acceleration in affective increase for the remaining group of subjects. The results of t-tests between the novelty and familiarity groups given in Table 5 shows that while the High Novelty Preference group display significantly greater preferences for stimuli at one or two exposures, there is no difference between the

TABLE 5

Means, Standard Deviations, and t-Values of Affect for Subjects with High Novelty and High Familiarity Preference

Group		Frequency					
High Novelty Preference	M	5.36	5.46	4.91	4.46	3.82	3.98
	SD	3.41	1.70	1.72	0.70	3.24	3.69
High Familiarity Preference	M	3.28	4.10	5.21	5.97	6.87	6.92
	SD	2.92	2.67	2.42	3.31	3.55	3.10
	t	3.35*	2.88*	-0.64	-3.92**	-4.91**	-3.98**

*$p < .01$
**$p < .001$

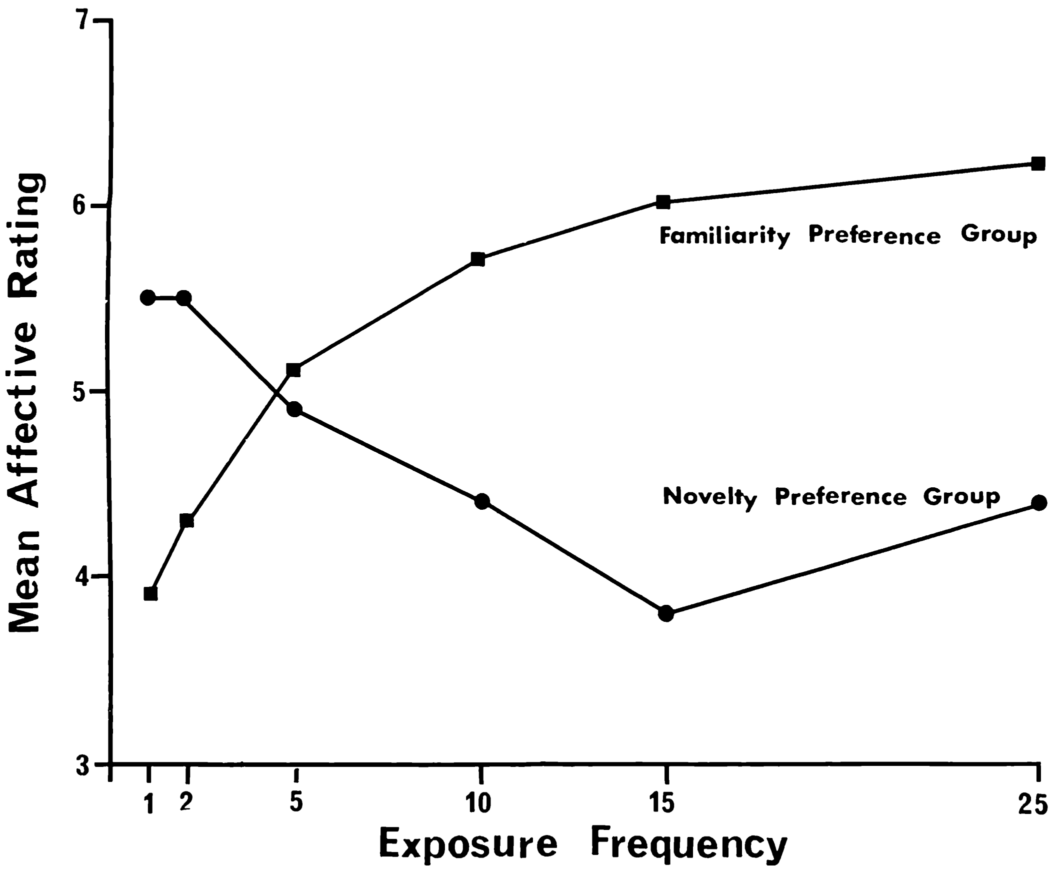


Fig. 9. Changes in affect as a function of frequency of exposure for subjects in Experiment I and III who preferred familiar random shapes as opposed to subjects who preferred novel random shapes.

two groups at the medium exposure level of 5. Further a significant difference in the opposite direction was found for frequencies of 10, 15 and 25 with the High Familiarity Preference group rating the stimuli as significantly more positive than the Novelty group. It appears, therefore, that while generally, frequency of exposure enhances attitudes towards stimuli, there are considerable subject differences with some subjects actually showing a decrease in affect as a function of exposure. Though at present only tentative, the conclusion which follows is that the frequency-affect relationship is bound more by individual differences in response characteristics than to the stimulus conditions associated with exposure frequency. Motivational predispositions of subjects may define the reward value of the frequency setting. For some subjects, little but frequent stimulation may enhance the value of a stimulus. At first, uncertainty with regard to unfamiliar stimuli, and beyond processing capacity, could be seen as mildly threatening. Subsequent exposure may provide an opportunity to explore and classify the stimuli resulting in a positive attitude associated with the reinforcing properties due to successful mastery of the stimuli.

On the other hand, subjects may easily classify the stimuli or find the novel stimuli pleasant themselves. Subsequent exposure reduces the novelty and could result in boredom and its associated negative affect. Certainly the distinction between novelty seekers and people who prefer the familiar is not new. It is the basis of such concepts as intolerance of ambiguity (Frenkel-Brunswik, 1949), effectance motive (White, 1959), and sensation seeking (Zuckerman, Kolin, Price & Zoob, 1964).

It is evident that there is a great need for detailed research into the effects which produce such marked subject differences. At this stage, it would be presumptuous to state with any degree of certainty why subjects under very similar conditions should respond in such a divergent manner. However, bearing in mind the fact that frequency of exposure can either increase or decrease attitudinal affect for the set of random shapes, it is the intention of the second part of this study not only to examine possible theoretical explanations behind the frequency-affect relationship but also to investigate subject differences in some detail.

In summary then, frequency of exposure shows its most pronounced effects when the stimuli are novel, are relatively neutral in initial affect, have little or no associative meaning, and are exposed for relatively short durations. Attitudinal affect is an increasing monotonic function of the log of exposure frequency, That is, relatively low exposure frequencies produce the greatest effects, successive increases add less and less. The maximum number of exposures is not critical since attitudinal judgements are made within the context of the entire presentation series and little increase in the asymtote for affect is gained by increasing the maximum exposure level. Instructional set does not affect the relationship for the present set of figures and though duration of exposure does have an effect, disproportionate affective increases occur only for durations between 2 and 10 seconds. Finally, though sex differences were not found there are very marked differences between subjects in their response to the novelty of stimuli and these in turn affect the extents to which the frequency-affect relationship is operative.

PART II

CHAPTER 8

EXPERIMENTS IV AND V.

The results presented and reviewed so far, support the hypothesis that repeated exposure is a sufficient condition for increases in affect towards stimuli. The relationship appears to directly conflict with other findings and theoretical formulations. More particularly the results contradict widespread findings in the area of exploration and curiosity.

An impressive amount of evidence, dealing with both human and animal subjects in free environments, points to the fact that a novel stimulus is more likely to evoke an orientation response than a familiar one (e.g. Berlyne 1960). If such an approach behaviour to novel stimuli is associated with attraction towards a stimulus object, the numerous research studies on exploratory behaviour (Berlyne, 1950, 1955; Berlyne & Slater, 1957; Dember & Milbrook, 1956; Montgomery, 1953; Thomson & Solomon, 1954) stand in clear contradiction of the frequency-affect relationship found in the present research. However, there is no direct evidence to support the assumption that orientation to novel stimuli can be associated with positive affect. On the contrary, it is more likely that orientation to a novel stimulus in preference to a familiar one is likely to evoke greater uncertainty and response conflict and produce negative affect. Curiosity and orientation to a novel stimulus may be regarded as the organisms attempt to master the unfamiliar and arousal producing stimulus. Novelty, which is commonly associated with the unknown, is likely to produce negative affect while at the same time there is a stronger pull for the organism towards the stimulus for exploration and thus a greater orientation to the stimulus.

Typically in the research on exploration behaviour, workers provide their subjects with the choice of exposure of a familiar or novel stimulus. Preferences are equated with the stimulus chosen to be re-exposed with the general finding that subjects tend to choose the novel rather than the familiar stimulus. Thus novel stimuli are "preferred" only in the sense that they are more frequently chosen to be re-exposed. Harrison (1968) obtained an inverse relationship between exploration and preference for nonsense words, Chinese characters, and men's faces. However, Maddi (1968) suggests the possibility that Harrison's findings are not reliable since he used different samples to assess exploration intensity and preference level and the resulting correlation may be due to individual differences. There is no guarantee that subjects who have high exploratory behaviour, devalue novel-stimuli, nor that subjects valuing novel stimuli fail to explore them. In fact, Maddi and Andrews (1966) found that subjects describing themselves as preferring novel stimuli were those who showed the strongest orientation towards novelty. Again, however, one can question the use of the term "prefer". The choice of a novel stimulus over a familiar one does not necessarily mean a greater positive evaluation of the stimulus. Berlyne (1960) states that novel stimuli may produce conflicting response tendencies which in mild form may be pleasant. Subjects may prefer novel stimuli (in the sense that they are more often chosen) as a result of such "pleasant tension" or moderate arousal but the stimuli that produce such tension may still be devalued. Greater liking for familiar stimuli may not, therefore, conflict with the idea that subjects are basically oriented to novel stimuli, but as yet the question remains unresolved.

At this point it is necessary to examine the frequency-affect relationship at a theoretical level and to ask for a more precise formulation of psychological processes that mediate exposure effects. Basically the increase in affect over exposure has been explained in terms of four quite different theoretical postulates. Firstly, it has been argued (Suefeld, Epstein, Buchanan & London, 1971) that the exposure effect is merely an experimental bias. These researchers induced both a positive and negative instructional set showing that the negative set actually produced a decline in preference over frequency of exposure whereas the normal increase in preference over exposure was obtained for the positive set condition. However, Experiment I in the present experimental series showed clearly that for the random polygons of low initial meaning, there was no significant difference in the results for a positive and negative set condition, that is, under both instructional sets, preference increased as a function of exposure frequency. In addition, it will be remembered that in Experiment I, a naive experimenter was used to test the effect of the experimenter on subjects' performance and again the frequency-affect relationship was obtained. It would appear unlikely, therefore, that increases in affect are the result of either experimental or instructional bias operating in the present series of experiments.

A second interpretation has been offered by Burgess and Sales (1971) who see the exposure effect as a result of a response set due to attitudes of the subject towards science, the laboratory, experimentation, etc. Therefore, rather than being affectively neutral the laboratory provides a highly positive or negative context for the "mere exposure of stimuli". Thus Burgess and Sales argue that exposure will involve a great deal of positive and negative reinforcement. As found in classical conditioning trials, the exposure of a stimulus within the affectively meaningful context of the laboratory provides the subject with a clear expectation relating frequency of exposure to resultant affect. Thus exposure increases assume the affect which is aroused by the "context". Stimuli shown in positive contexts, then, would produce more positive evaluations with increased exposure. Furthermore, a mirror image should be obtained for frequency of exposure and evaluations due to negative contexts. This is exactly the results obtained by Burgess and Sales in two experiments. In the first experiment it was found that for subjects who viewed the experimental context as relatively attractive there was a stronger relationship between exposure frequency and attraction for nonsense words. In the second experiment intentionally created positive contexts (via paired associate learning) was shown to provide a positive relationship between frequency and affect while negative contexts produced a negative relationship.

The findings of Perlman and Oskamp (1970) corroborate those of Burgess and Sales (1971). They presented their subjects with photographs of black and white stimulus persons with varying exposure frequencies for different pictures. Subjects were presented with photographs either of positive social settings (e.g. a Negro sitting at a desk writing, dressed in a suit, white shirt, and tie), neutral settings (e.g. a Negro in collar and tie with no background), or negative settings (e.g. a Negro in work clothes scrubbing the floor). After exposure, subjects were required to rate the photographs on twelve trait adjectives. Analysis of the change in trait ratings showed significant effects for photographs, frequency of exposure, and a social content by exposure interaction, the latter being by far the greatest effect. Positive settings significantly enhanced evaluation while negative settings decreased evaluations over exposure. Overall, however, increasing exposure enhanced attitudes since the effects for positive stimuli was marked, weak for neutral stimuli, and slightly the reverse for negative stimuli. From these results Perlman and Oskamp see the effects as due to associative learning processes where the value of the social context plays a significant part in the extent to which frequency enhances affect. Again in reference to the analysis carried out in the present experimental series outlined in Chapter 7 it was found that in Experiments I and III two groups of subjects could be delineated. While one group showed a high preference for familiarity with a marked increase in positive affect over exposure the other showed a high preference for novelty where increases in exposure were associated with increases in negative affect. Here also, the interpretation of the experiment as source of a positive or negative affect can be applied. However, at the completion of the experiments in the present series, subjects were asked for their feeling towards the experiment and towards the stimuli. Although some subjects mentioned boredom and uncertainty, there was no clear evidence that their attitudes towards the experiment influenced the results. In fact, many subjects not only expressed attitudes of tedium and frustration but also denied the fact that frequency had had any affect on their preferences for stimuli, yet it was clear from the results that attitudinal enhancement was a function of frequency of exposure. Further, research by Harrison (1968) and Harrison and Zajonc (1970) suggests that when subjects are free to associate with stimuli exposed at different frequencies, they very seldom mention such things as "science", "psychology", or "experimenter" yet the learning model postulates these kinds of responses as dominant. Also the results of Experiment II showed that there are differences in the rate of affective increase over frequency even for stimuli of very low associative meaning. Stimuli with little or no initial meaning produced greater preferences over exposure frequency than stimuli with higher probabilities of associative meaning. However, the latter set of stimuli still produced increased affect. If the affective value of the experimental situation were prepotent it would be very unlikely for such small differences in meaning of the stimuli to produce the exposure effect. At present, therefore, the learning interpretation of Burgess and Sales (1971) seems rather hard pressed to account for the accumulated evidence of correlational, response latency, and conflict data generated by the exposure hypothesis.

A third interpretation for the frequency-affect relationship has received much more empirical support and has already been alluded to with regards to Experiment II. Harrison (1968), utilizing Berlyne's (1960) theory of novelty, has argued that a novel stimulus presents a problem to the subject. The subject does not know whether to approach or avoid the object and knows nothing certain about the attributes of the object. The strange stimulus, however, may be similar to other stimuli encountered in the past or if not the first attempts to master the stimulus will be to liken it to something known and thus the responses elicited by the novel stimulus may be many and varied. Such variation in potential response or response competition would be accompanied by a state of tension and negative affect. With repetition of the stimulus, however, some responses become more dominant while others become attenuated, hence response competition is reduced and with it, negative affect. Reduction of the negative affect is viewed as an increase in positive affect.

At present the Response Competition Hypothesis is supported by evidence that as response competition decreases, positive attitudinal affect increases. (Harrison, 1968; Harrison & Zajonc, 1970; Matlin, 1970; and Harrison, Tutone & McFadgen, 1971). Further curiosity as measured by approach-behaviour, has been found to be inversely related to liking as assessed by semantic rating scales, (Harrison, 1968;

and Harrison & Hines 1970). Studies have successfully manipulated response competition to assess its effect on the preference function. For example, Matlin (1970) predicted that response competition is increased as the number or strength of responses to a stimulus increased and that attitudinal ratings would subsequently be lowered. In one experiment Matlin asked his subjects to learn one, two, three or six responses to an initially novel stimulus. As predicted, she found that stimuli associated with fewer response alternatives received more favourable ratings. In a second experiment she presented nonsense-words and required her subjects to pronounce them aloud in either the same way or in different ways over successive presentations. Matlin found an inverse relationship between the number of responses to the stimuli and the favourability of stimulus ratings. In both experiments subjects were forced to make overt responses. Harrison, Tutone and McFadgen (1971) present evidence to support Matlin's (1970) results when their subjects are required to take a relatively passive role which minimised task difficulty.

The results of Experiment II suggests that the lower the association value of the shape, the more marked the increase in affect over frequency of exposure. This supports the response competition interpretation in that stimuli with low meaning are more likely to have fewer conflicting responses associated with them and therefore there is less chance of interference over the exposure sequence due to meaning response conflict. Further, stimuli producing frequent but still unsystematic associations (as in the case of the high meaning stimuli used in Experiment II) interfere with the exposure effect since subjects have to overcome the competing tendencies before a dominant response prevails.

It appears, therefore, that the "response competition" interpretation holds up well in explaining changes in affect with increasing exposure frequency. However, it cannot alone account for the differences in response to novelty found in subjects in Experiments I and III. Such differences point to a more basic motivational difference on the part of subjects and to say that conflicting response tendencies are produced by novel stimuli and diminish by increased exposure, is not sufficient to explain the fact that some subjects preferred novel stimuli generally, while others showed greatest liking for more familiar stimuli. Consequently it is necessary to examine the relationship between activation through stimulus exposure and the motivational basis of stimulus preference particularly with regard to the arousal produced by novel stimuli.

To Berlyne (1960), arousal rather than drive is the major motivational construct. Arousal is the level of activity in the organism, an internal condition that puts a premium on some overt responses over others and whose termination or reduction is rewarding. Conflict is the primary mechanism with novelty, complexity, and incongruity or surprisingness being the major stimulus factors which increase conflict. Reduction in conflict which follows from decreases in novelty, complexity, or incongruity is said to be reinforcing.

Berlyne (1960) postulates that stimulus preference through a reduction in novelty (increase in frequency of exposure) is an inverted U shape function rather than a monotonically increasing function as suggested by the exposure hypothesis. The point of maximum positive affect on the preference curve would be obtained at the number of exposures necessary to reduce cognitive conflict, subsequently liking would fall off. Complete reduction in conflict or response competition may leave the organism under-stimulated and bored, while over-stimulation confuses and disorients the subject and is likely to lead to marked avoidance responses. Further, Berlyne (1970) sees two primary motivational and antagonistic factors operating within the exposure context. Changes in affect are dependent on the interaction between these opposing factors. Tedium, he asserts, is preponderent when simple stimuli are encountered repeatedly and positive habituation predominates during repetition of complex stimuli. According to this view, therefore, positive affect can be increased in either of two ways. Firstly, conditions which increase arousal markedly are aversive so that stimulus conditions which reduce such arousal are rewarding and will have attributed to them the positive affect associated with that reward. Secondly, stimulus conditions which produce a moderate increase in arousal are rewarding and increase positive affect towards such stimuli.

To summarize the interaction between the factors of tedium and positive habituation Berlyne (1970) refers to the Wundt curve of the relationship between hedonic value and arousal potential presented in Figure 10. Along the abcissa in this figure increasing arousal potential of the stimulus situation is plotted and would include the stimulus properties of novelty, complexity and incongruity, as being those which increase arousal potential. From this curve affect (hedonic value) tends to reach a maximum under conditions of moderate arousal potential, that is, under stimulation conditions producing medium arousal increments. As arousal potential is further increased affect takes on decreasing positive values moving finally to increasing negative affect. A new stimulus results in a high degree of arousal potential but as the stimulus becomes more familiar it loses its potential, that is, there is a movement from right to left along the horizontal axis in Figure 10. A stimulus that is extremely novel but low in complexity will have medium arousal potential, somewhere in region 2 in the figure. Increases in familiarity through repeated exposure would decrease arousal potential and be accompanied by a fall in affect. Continued exposure to a simple stimulus (of low information content), however, would induce the factor of tedium and thus the ratings of simple stimuli at a high frequency of exposure would result in negative affect, that is, arousal potential would shift from

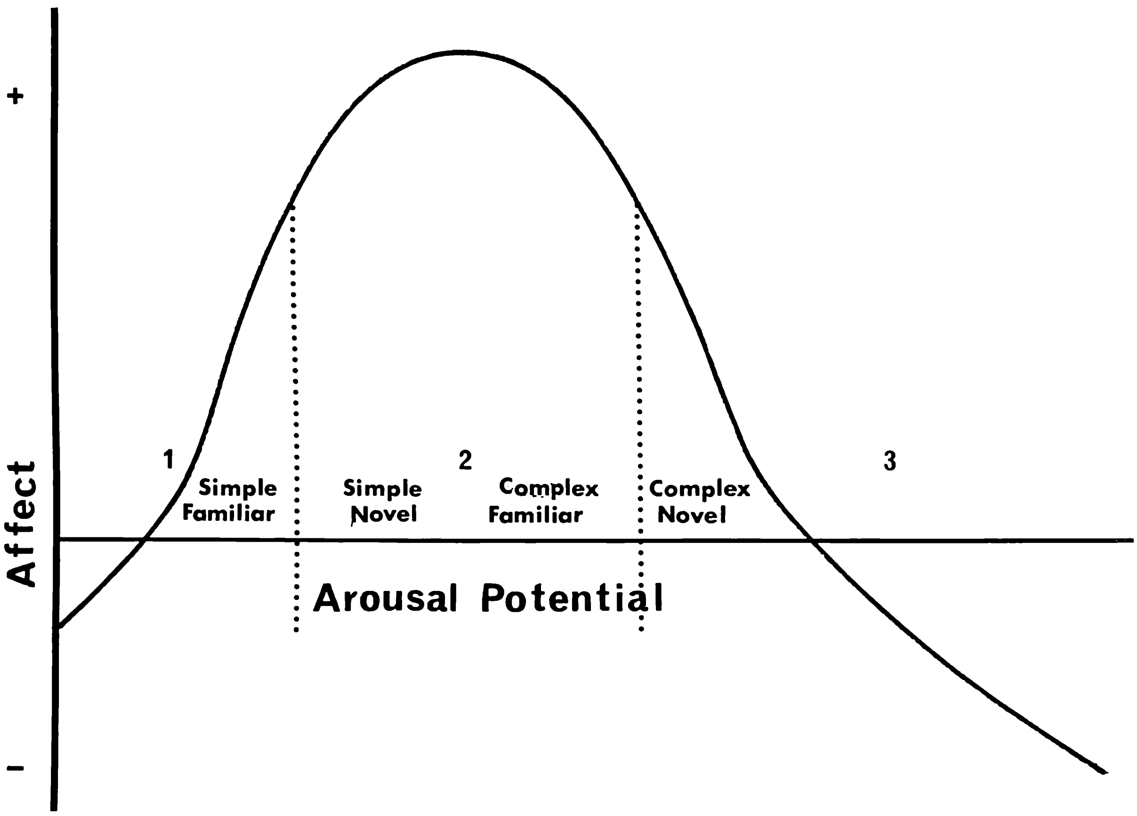


Fig. 10. Affect as a function of arousal potential (complexity and/or familiarity) as predicted by Berlyne (1970).

region 2 to region 1 in the figure. For complex stimuli Berlyne (1970) posits that positive habituation predominates. A novel complex stimulus at first generates uncertainty and conflict. Subsequent exposure to the stimulus, however, provides the organism with an opportunity to process the additional information with time for the elements of the stimulus to be recognised, discriminated, and classified which in turn resolves the uncertainty and conflict associated with the stimulus. Successful mastery of such stimuli would be highly reinforcing. A complex novel stimulus has high arousal potential and thus corresponds to stimulus conditions given by region 3 in Figure 10. Loss of novelty through frequent exposure would produce a shift in arousal potential to region 2 accompanied by an increase in positive affect.

Berlyne (1970) conducted two experiments in which he exposed his subjects to sequences of coloured shapes to investigate the effects of rating "pleasingness" and "interestingness" as variables which had previously been shown to be related to novelty and complexity experience (Berlyne, Ogilvie & Parham, 1963; Day, 1968). Increases in ratings for both variables were obtained with increases in novelty which is in direct contrast to the frequency-affect relationship. In two further experiments Berlyne found increases in positive affect over exposure for complex stimuli but a decline in positive affect with ratings of neutral or negative for simple stimuli. Extending these findings to a fifth experiment further increases in negative affect were obtained for simple stimuli whereas for complex stimuli positive affect increased to a peak and levelled.

The two factor theory of Berlyne (1970) appears to hold well The arousal potential model can account for the results obtained by Perlman and Oskamp (1970) in which a decrease in positive affect towards neutral and negative values occurred when subjects were exposed to stimulus persons in a negative social context. For example, the photograph used by these researchers of a Negro cleaning the floor in working clothes is likely to produce high arousal potential since a complex system of attitudes dealing with prej¨dice and stereotypes would be associated with the stimulus. It is likely also that such a system of attitudes will not be resolved within the experimental context, thus the arousal potential of such stimuli would be outside the acceptable range for immediate mastery and the stimulus rather than the social setting it represents is likely to be devalued.

The major limitation of the experimental evidence presented by Berlyne (1970) for the inverted U shape function of affect for stimulus complexity is that he provided his subjects with only two levels of complexity. Also his results may be due to stimulus contrast since both the simple and complex stimulus sets varied greatly and were therefore likely to produce quite different ratings. It is not possible to show the shape of the complexity-affect function clearly with only four points being represented, simple novel and familiar, and complex novel and familiar. It was felt necessary, therefore, to test Berlyne's curvilinear prediction in greater detail, by providing a greater range of stimuli varying along the complexity dimension. Sets of random shapes taken from each of the ten levels of shape complexity generated for the present research (Chapter 3) would provide a more adequate range of stimuli.

On the basis of the model given in Figure 10 it was predicted that as stimulus, complexity (arousal potential) increased, affect would also increase to a level of medium complexity [in this case for 10 point shapes, since it is this level which is within the averaging processing capacity of subjects (Munsinger & Kessen, 1966)]. As the complexity of the stimulus is increased beyond 10 points, affect would decrease since arousal potential would be beyond the point of successful mastery within the experimental context. Thus Hypothesis IVa was that affect would be an inverted U function of stimulus complexity. Hypothesis IVb predicted that the point of inflexion of the curve would be at the medium complexity level, that is, in the region of 10 points for the present set of random shapes.

If now stimulus complexity was to be ignored and the average rating of stimuli over the entire complexity range were taken, the frequency-affect relationship thus far obtained would look quite different. Simple stimuli presented only once would produce positive affect (area 2, Figure 10) due to the medium arousal potential of novel stimuli of low informative value, while complex stimuli presented only once would produce neutral to negative affect since their arousal potential would be high (part 3, Figure 10). When combined, the effects would compete to produce neutral affect ratings. Similarly the effects of simple stimuli exposed frequently (part 1, Figure 10) and complex stimuli exposed frequently (part 2, Figure 10) would combine to produce neutral affective ratings from the resultant antagonistic influences of tedium and positive-habituation respectively. It was expected, that with a large range of stimuli varying in stimulus complexity in the experimental series, frequency of exposure should show no effect on affect. Hypothesis IVc, therefore, predicted that frequency of exposure has no effect on the evaluation of stimuli when the stimuli vary in complexity.

Again, from the arousal potential curve, a significant interaction would be predicted between frequency of exposure and stimulus complexity with regard to affect. While repetition of simple stimuli would produce negative affect through tedium, negative affect would also be evoked by complex novel stimuli. Simple novel and complex familiar stimuli, on the other hand, provide a moderate amount of arousal potential and would result in high positive affect. Thus while novelty in the case of simple stimuli may provide conditions for stimulation which are reinforcing, novelty for complex stimuli produces negative affect since such stimuli are outside the subject's processing capacity and although familiarity through repeated exposure or exploration is reinforcing for complex stimuli, it produces boredom for simple stimuli. Accordingly it was predicted that the interaction between stimulus complexity and frequency of exposure would be significant (Hypothesis IVd). This would be shown by differences in the affective changes over exposure frequency at different levels of complexity. For simple stimuli a decrease in affect over exposure would occur while for complex stimuli affect would increase over exposure.

METHOD

Subjects

Thirty subjects were selected at random from the pool of 186 first year psychology students in the 1972 intake. There were 17 males and 13 females in the sample which ranged in age from 18 to 22 years with a mean age of 20.3 years. All but one subject had University Entrance qualification and 27 were in their first year of university.

Design

The experiment took the form of a 10 x 5 factorial design with repeated measures on both factors (Winer, 1962, pp. 289-290) there being 30 subjects per cell. The first factor was stimulus complexity with each subject being exposed to polygons with 3,4,5,6,8,10,13,15,20, and 30 independent points. The second factor consisted of five levels of frequency of exposure, i.e. 1,2,5,10, and 15 stimulus exposures. Thus each subject was shown five shapes at each of ten complexity levels, one stimulus at each of the exposure frequencies. The dependent variables were evaluative ratings on a 9 point graphic rating scale following stimulus presentation and a Reaction Scale Score which measured the degree subjects were aroused by the presentation series (Byrne & Clore, 1967).

Stimuli

Ten random shapes of each of the ten complexity levels (defined by the number of independent turns of the polygon) of 3,4,5,6,8,10, 13,15,20, and 30 point shapes were taken from the standardized set generated for the present research (Chapter 3). As there were 26 stimuli in the ten point sample ten were chosen at random to provide representative comparison set for the other nine complexity levels.

Procedure

The subjects were taken in groups of three and were seated in the experimental booths. The experimenter read out the same instructions as those used in Experiment I.

The stimuli were presented to the subject for 1 second with a mean inter-stimulus interval of 9.57 seconds. Five of each of the ten complexity level shapes were selected at random for each group of three subjects with one stimulus being exposed at each of the five frequency levels. There were, therefore, a total of 330 stimulus exposures. Allocation of stimuli to exposure trials was random so that each three subjects were presented with different stimuli in different trial positions but representing all complexity and frequency levels.

The total presentation series was constructed as one series and then divided into two series lasting approximately 30 minutes with a three minute rest between the two series. Three minutes after the total presentation series the subject was given a booklet with the instructions for rating the stimuli (Appendix I), followed by fifty pages of 9 point graphic rating scales for evaluation on a like-dislike continuum.

When the subject had read the rating instructions the 50 stimuli were presented in random order for one second after each of which the subjects made their evaluative judgement. The subject was then asked to fill out the Reaction Scale.

The Reaction Scale (Appendix II) was developed by Byrne and Clore (1967) as a measure of effectance arousal (White, 1959). However, research by Heilizer and Cutter (1971) suggests that the scale can be considered to provide a general measure of arousal since these researchers found a significant relationship between the Reaction Scale scores and two anxiety measures together with the fact that higher scores were produced in an examination condition than in a gambling situation.

The Reaction Scale consists of five subjectively unpleasant reactions aroused by a stimulus situation; unreality, uneasiness, confusion, a dream-like feeling, and a desire for social comparison. The Scale is constructed as five point likert ratings, one for each of the above characteristics, with four buffer items of entertained, disgusted, anxious,and bored. The Scale was used as a check of the extent of arousal evoked by the stimulus situation.

Finally the experiment was terminated by the experimenter asking the subjects what thoughts or reactions they had had during the experiment, especially with regard to the experimental hypothesis, explaining the purpose of the experiment, asking the subjects not to communicate with other students about the experiment, and thanking them for their participation.

RESULTS

Effects of Frequency and Complexity

The basic analysis of variance for the affective ratings is presented in Table 6. The significant main effect ($p < .001$) obtained for complexity is illustrated by a plot of the mean affective ratings (disregarding frequency of exposure) given in Figure 11. It can be seen that as the number of independent turns of the shapes increases the affective rating increases until a maximum is reached for the 10 point shapes. Thereafter there is a sharpe decline with the shapes of higher complexity receiving successively lower affective ratings.

To test the hypothesis (IVa) that affect is an inverted U shape function of stimulus complexity a trend analysis was computed on the variance data. Normally an orthogonal comparison can be conducted only on independent variables with levels based on an equal interval scale. However, as Figure 11 shows the means conform more closely when the complexity values, although not equidistant with regards to the number of points, are equally spaced. Further, the analysis of ratings of subjective complexity in terms of the objective complexity measure given in Chapter 3 (Figure 5) shows that subjects responded to the complexity of the shapes as if the stimuli were equally spaced on the dimension. It was therefore decided to treat the complexity variables as an equal interval scale and compute trends from the normal orthogonal polynomial coefficients.

Table 7 gives the linear, quadratic and residual components for the variance data. For stimulus complexity the quadratic function was significant beyond the .001 level. In fact, 92% of the variance for complexity is accounted for by the quadratic trend. The shape of this function has the form

$$X = 4.718 - .0202\ (c_{ij}) - .2204\ (c_{2j})$$

(where c_{ij} and c_{2j} are the appropriate orthogonal linear and

TABLE 6

Analysis of Variance of Affective Ratings of Random Shapes for Experiment IV

Source	SS	df	MS	F
Subjects	231.6991	29	7.9896	
Complexity	1039.5393	9	115.5043	14.66*
Error	2038.8572	261	7.8117	
Frequency	49.3093	4	12.3272	5.09*
Error	280.8101	116	2.4201	
Frequency X Complexity	573.5702	36	15.9325	7.95*
Error	2092.1792	1044	2.0040	
Total	6305.9639	1499		

* $p < .001$

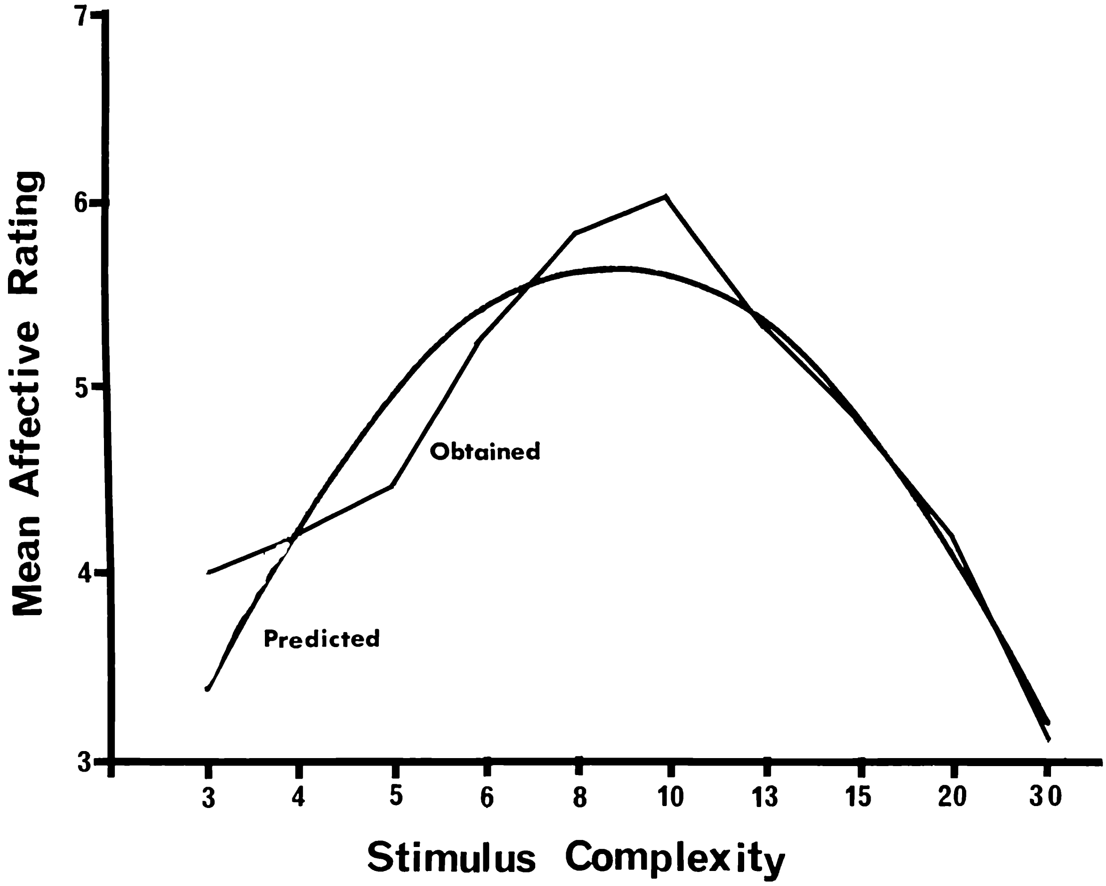


Fig. 11. Changes in affect as a function of stimulus complexity.

TABLE 7

Trend Analysis of the Effects of Complexity, Frequency, and the Interaction between Complexity and Frequency on Affective Ratings

Source	MS	F
Complexity		
Linear component	20.1616	2.58***
Quadratic component	961.8432	123.15***
Residual	8.2192	1.05
Frequency		
Linear component	25.9470	10.72**
Quadratic component	15.2402	6.30*
Residual	4.0611	1.68
Frequency X Complexity		
Linear X quadratic component	419.5398	293.51***
Residual	4.3980	2.19***

*$p < .05$
**$p < .01$
***$p < .001$

quadratic coefficients respectively) and is plotted in Figure 11. A test of goodness of fit of the equation to the observed means (Kirk, 1970, pp 124-125) showed a non-significant departure from quadratic trend (F =2.178, df = 1/261), therefore Hypothesis IVa was accepted. That is, affect was an inverted U shape function of stimulus complexity.

From the inspection of Figure 11 it is clear that the point of inflexion of both the observed means and the fitted function means are at the middle range of complexity, that is, for the 8 and 10 point shapes, therefore Hypothesis IVb was accepted.

One further point to note with regard to the prediction curve is that the fit to the data is very close for high complexity values, suggesting that affect is a function of the log value of the number of independent points in the shape. Low complexity values in the present series do not adequately reflect the log scale and therefore greater departures from the quadratic trend were obtained for low complexity values.

The significant main effect of frequency (Table 6) is shown by a plot of the affective rating means in Figure 12 as a decreasing monotonic function of exposure frequency. Thus over the range of ten levels of stimulus complexity affective ratings decrease significantly as a function of frequency of exposure. The major trend component (Table 7) accounting for over 52% of the variance for frequency was linear. The equation of the fit of the means to the linear component has the form

$$X = 4.718 - .093\ (c_{ij})$$

(Where c_{ij} is the appropriate orthogonal linear coefficient). A test of goodness of the fit of the equation to the observed means (Kirk, 1970, pp. 124-125) yielded a non-significant departure from linear trend (F = 3.023, df = 1/116), therefore it was concluded that affect decreased

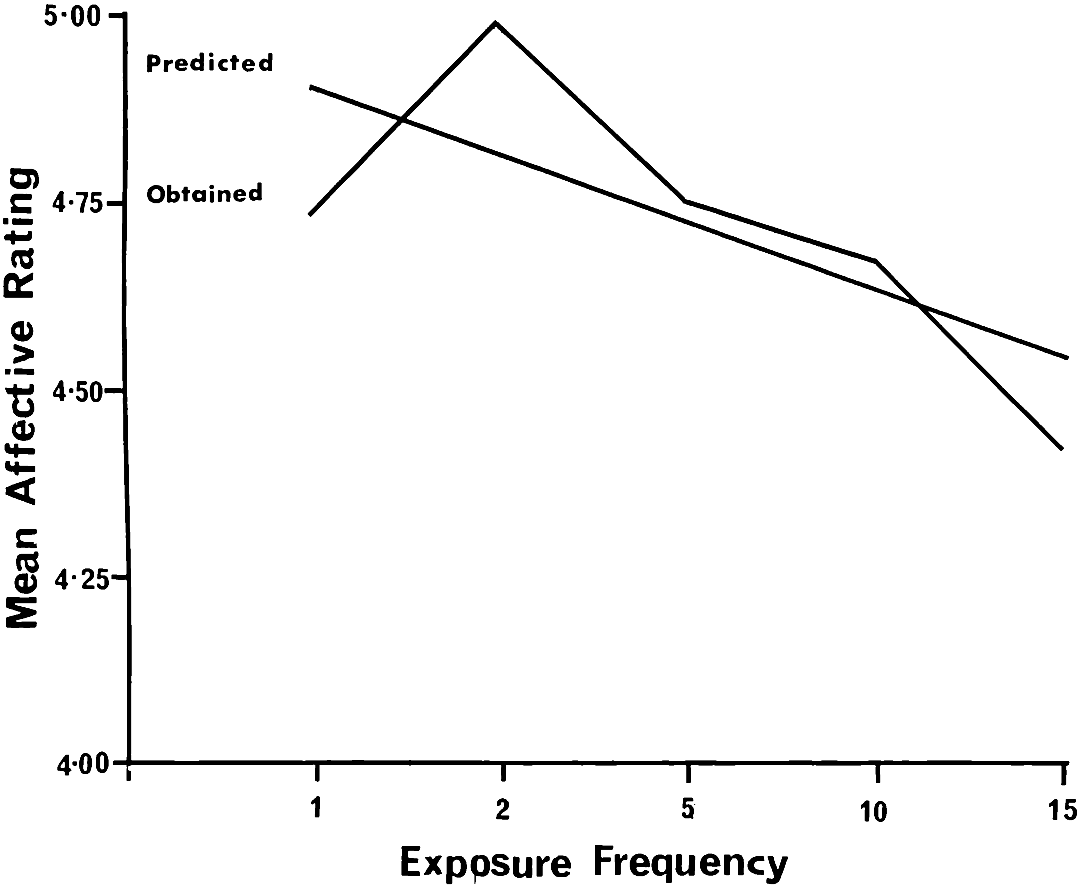


Fig. 12. Changes in affect as a function of frequency of exposure for Experiment IV.

as a monotonic function of frequency of exposure for a set of stimuli ranging in complexity (that is, Hypothesis IVc was rejected).

The interaction between complexity and frequency was found to be significant at the .001 level ($F = 7.9503$, $df = 36/1044$; see Table 6), therefore Hypothesis IVd was accepted. The major trend component (Table 7) accounting for over 73% of the variance was a linear x quadratic component reflecting the major main effect components of a linear trend for frequency and a quadratic trend for complexity.

A test of difference in trends for the simple effects of complexity at different levels of frequency yielded a sum of squares for differences in quadratic trend of 284.38 which was significant at the .001 level ($F = 35.477$ $df = 4/1044$). Therefore the variation due to differences in quadratic trend in simple effects of complexity explains nearly 50% of the total variation of the interaction between complexity and frequency. A similar analysis of the simple effects of frequency at different levels of complexity yielded an F for differences in linear trend of 27.138 which was significant at the .001 level ($df = 9/1044$) and which explained over 85% of the total variation of the interaction between complexity and frequency.

It appears, therefore, that the shape of the frequency function remains linear but moves from a negative to a positive slope as the middle range of complexity is reached then back to a negative slope as complexity level increases.

The trends are best illustrated by examination of the plot of the mean affective ratings for all levels of frequency and complexity shown in Figure 13. It can be seen that generally for the low complexity stimuli in Figure 13 (A) (3,4,5, and 6 point shapes)

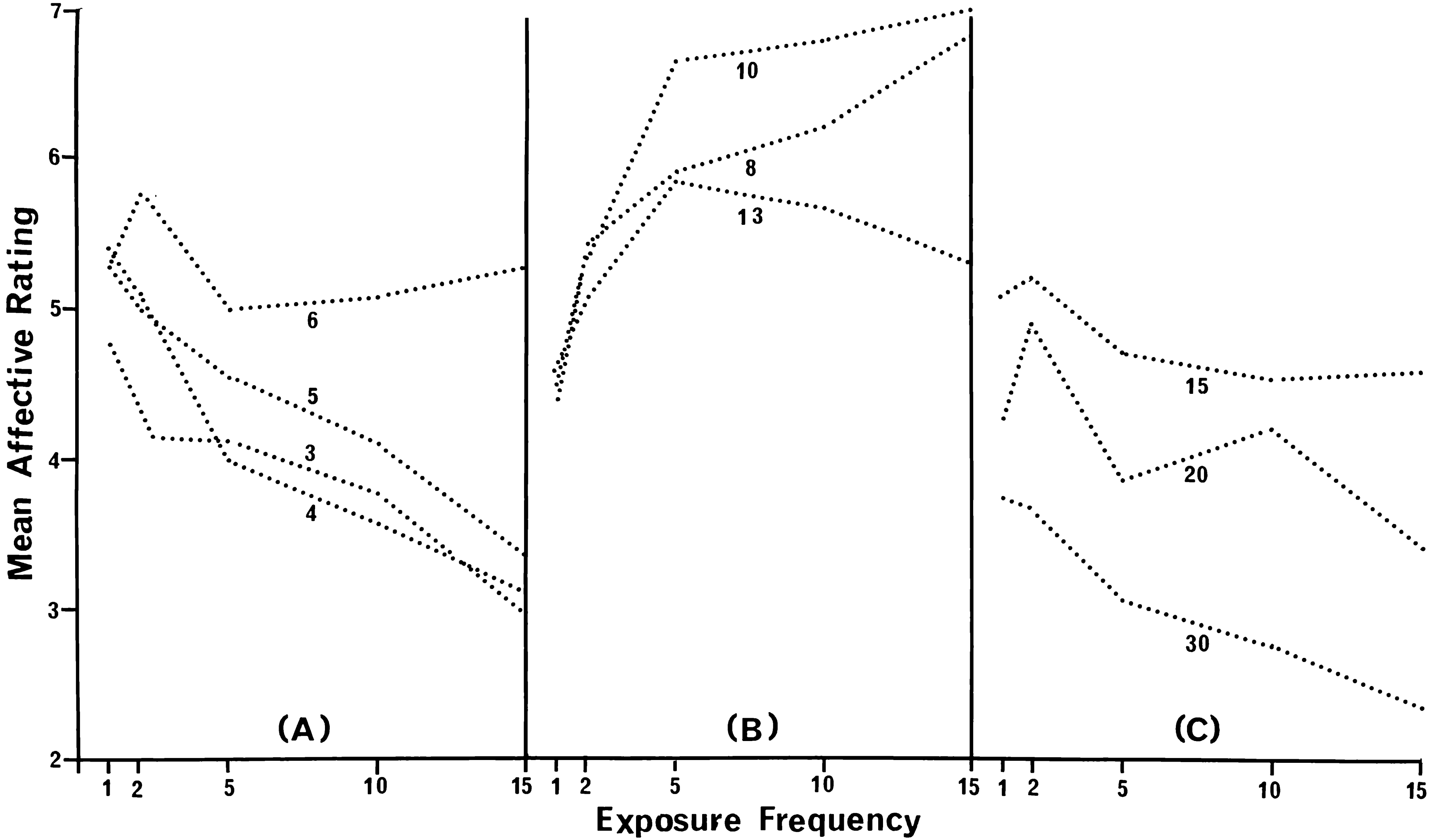


Fig. 13. Changes in affect for random shapes at ten complexity levels, as a function of frequency of exposure.

affect decreases as a function of frequency of exposure. For the 6 point shape there is some initial decrease and then a change towards attitudinal enhancement. At the medium complexity level in Figure 13 (B) (8,10, and 13 point shapes) there is a marked increase in affect over frequency of exposure with maximum affective increase for 10 point shapes. Again the affective ratings decrease as a function of frequency of exposure for the more complex shapes in Figure 13 (C) (15,20 and 30 points). It is interesting to note that both levels where the affect function changes, towards increase in affect over frequency at 6 and away from increase affect over exposure at 15, the shapes are almost identical showing a fluctuation in affective response.

The differences between the mean affective ratings for all complexity levels at 1 and 15 exposures were tested to examine the changes that occurred. Newman-Keuls (Winer, 1962, pp 80-85) method was used and the differences are shown in Table 8. Examination of the differences for an exposure frequency of 1 (above diagonal in Table 8) indicates that only the means for the 30 point shapes in comparison with the 4,5,6, and 15 point shapes are significantly different ($p < .01$). Generally, all the differences at 1 exposure for the 30 point shapes are large and negative suggesting that these shapes are seen as significantly more negative initially than shapes of lower complexity. Further, the lack of significant differences for 1 exposure suggest initial preferences are not markedly affected by stimulus complexity. It can be seen from Figure 13, however, that there is tendency for simpler shapes to be preferred initially.

The differences between means for 15 exposures shown below the diagonal in Table 8 presents an entirely different pattern. Generally, the 6,8,10,13, and 15 point shape means are significantly higher than the low complexity (3,4, and 5) and high complexity (20 and 30) shapes.

TABLE 8

Differences in Mean Affective Rating for Ten Levels of Stimulus Complexity Exposed Once and Fifteen Times

Exposure Frequency of 15: Stimulus Complexity	Exposure Frequency of 1: Stimulus Complexity 3	4	5	6	8	10	13	15	20	30
3		19	16	17	-8	-11	-5	10	-15	-31
4	4		-3	-4	-27	-30	-24	-9	-34	-50*
5	12	8		1	-24	-27	-21	-6	-31	-47*
6	70*	66*	58*		-25	-28	-22	-7	-32	-48*
8	117*	113*	105*	47*		-3	3	18	-7	-23
10	122*	118*	110*	52*	5		6	21	-4	-20
13	71*	67*	59*	1	-46*	-51*		15	-10	-36
15	48*	44*	36*	-22	-69*	-74*	-23		-25	-41*
20	13	9	1	-57*	-109*	-109*	-58*	-35		-16
30	-19	-23	-31	-89*	-136*	-141*	-90*	-67*	-32*	

*$p < .01$, of r/1044; where r is number of steps between means.

Note: To read the direction of the differences for values above diagonal read down the column. Thus for complexity level 10 in comparison with 6 the value -28 means that total sum for 10 is 28 less than that for level 6. To obtain the direction for the 10/20 comparison look down the column for 20 which gives the value -4 which means 20 is four points below its comparison 10.

A similar procedure applies to the below diagonal matrix except that the values are obtained from reading the rows.

This again reflects the inverted V shape function of the results but highlights the finding that differences in affect over complexity is a significant function of frequency of exposure.

Individual Differences in Affective Ratings

To examine the differences between subjects in affective ratings due to frequency of exposure each subject's stimulus preferences across all levels of stimulus complexity were compared. For each subject, complexity point at which the maximum increase in affect over exposure frequency occurred was obtained by selecting the complexity level where the difference between the ratings for the first two exposure frequencies, (i.e. 1 and 2) and the last two (i.e. 10 and 15) gave the largest positive difference. Therefore, if the sum of a subject's ratings for the 6 points shapes at the exposure frequencies of 1 and 2 was 11 and at exposure frequencies of 10 and 15 was 18, the difference would be an increase of 7 points. If this was the largest increase in comparison with the other complexity levels then the subject received a score of 6. This score, therefore, represented the complexity level at which the maximum increase in affect over exposure occurred for that subject.

Table 9 gives the complexity values obtained, the number of subjects showing the maximum increase in affect at that level and their mean affect scores for that level for each of the five frequency levels. It can be seen that generally the mean affective ratings are higher after initial exposure than was obtained when subject differences were ignored (see Figure 13). Generally, there is a large increase in affect from 5 to the 10 exposure frequency level being of the order of 2 scale points. It appears, therefore, that though the middle complexity level produced the greatest increase in affect over frequency the increases are more generally dependent on differences in complexity level between subjects.

TABLE 9

Distribution of Subjects and Mean Affective Ratings According to the Level of Complexity at which Increases in Affect Over Exposure Frequency was Optimal

Complexity Level	Number of Subjects	1	2	5	10	15	Total
6	1	4.0	5.0	6.0	7.0	8.0	6.0
8	7	4.57	4.43	5.83	8.29	8.68	6.36
10	12	4.5	5.58	6.83	8.25	8.33	6.70
13	8	5.25	5.88	7.0	8.0	8.63	6.95
20	2	5.0	5.0	6.5	8.5	8.0	6.6
Total	30	4.86	5.38	6.38	8.21	8.40	

That is, subjects seem to have a preferred information level where the largest affective increases occur as a result of exposure frequency.

From the results given in Table 9, the subjects can be divided into three samples. A low complexity group showing frequency-affect relationship at a maximum for complexity levels of 6 and 8; a middle complexity group with a maximum at 10, which is within the average processing capacity of subjects; and a high complexity with a maximum affective increase for 13 and 20 point shapes. The changes in mean affective ratings for these groups are shown in Figure 14. It is clear that while the inverted U shape function of affect for complexity remains for all groups the difference lies in the complexity level at which the ratings are highest. Thus for the low complexity group not only do they show maximum affective increase over exposure frequency at the 6 and 8 point complexity levels but also generally at all frequency levels the ratings for 6 to 8 point shapes are higher than for shapes of higher or lower complexity. The same is true for the middle and high complexity groups with each showing greatest preference for shape belonging to the level at which the affective enhancement over frequency of exposure was at a maximum.

Reaction Scale Scores

The mean reaction score of the 30 subjects in the present study was 8.83. In comparison with the mean obtained by Byrne & Clore (1967) of 9.6 for an arousal producing film depicting in colour a detailed and "gruesome" cataract operation, there was no significant difference ($t = 1.26$, $df = 68$), therefore, it was concluded that subjects generally found the stimulus situation quite arousing.

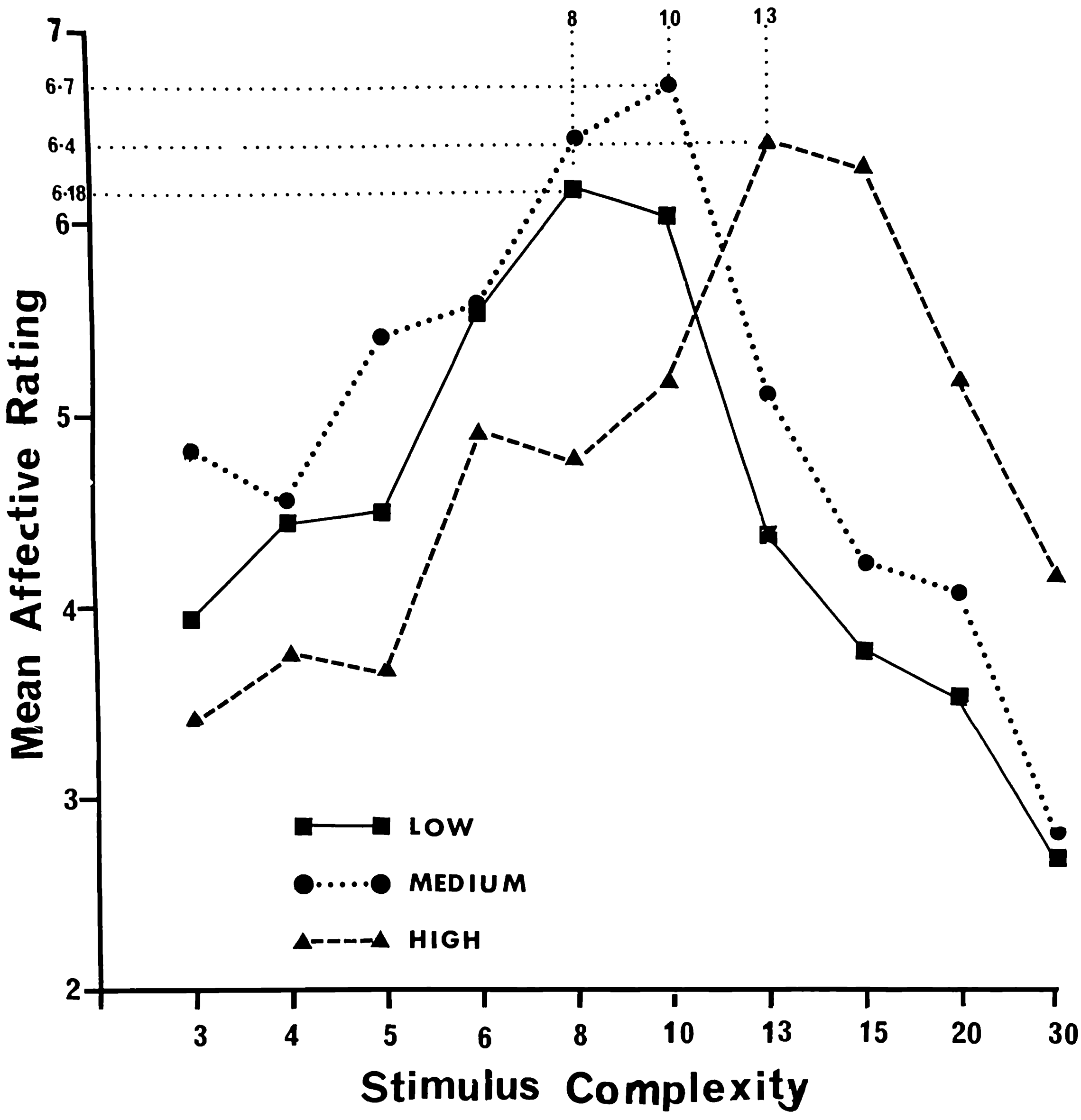


Fig. 14. Changes in affect as a function of stimulus complexity for three groups of subjects who showed maximum increase in affect over exposure frequency at different complexity levels.

A more detailed examination of the reaction scores was made to ascertain if there were any differences between the three groups of subjects showing differential complexity preference levels (see Figure 14). It was predicted that subjects who showed greater positive affective ratings for the middle complexity level would be moderately aroused through the success and subsequent rewards built up through successful classification while at the same time, confused by the uncertainty of shapes of high complexity. Subjects who preferred low complexity shapes, on the other hand, would face a greater amount of uncertainty since a greater proportion of stimuli would fall beyond the range of successful mastery and thus for those subjects a greater degree of arousal associated with the negative affect was likely to be present. Subjects preferring a high level of complexity, however, would find the greatest proportion of stimuli to be well within their processing capacity and therefore tedium would operate to produce low to mild arousal for the series.

An examination of the mean reaction scores for the three groups given in Table 10 shows that the mean arousal scores increase as a function of preferred level of complexity. The means for the low complexity group were significantly different from the medium ($t = 3.1$, $df = 20$, $p < .01$) and high ($t = 4.4$, $df = 16$, $p < .001$) complexity groups while although in the predicted direction the medium group mean was not significantly different ($t = 2.21$, $df = 18$) from the high group, for the one-tailed test. The results make tenable the conclusion that differences in arousal occurred as a result of the differences in preferred complexity level of the subject. It is noteworthy that the trend is quite marked even with such small sample sizes.

TABLE 10

Means and Standard Deviations of Arousal Scores for the Three Complexity Preference Groups

	Low	Medium	High
Mean	6.9	9.08	10.88
SD	1.81	1.40	2.00

EXPERIMENT V

The results of Experiment IV showed that preferences were an inverted U shape function for random shapes varying in complexity. Shapes of an intermediate amount of complexity were most preferred, and those at either extreme of the complexity dimension were least preferred. This result would support the general line of theorizing made by many researchers (Leuba, 1955; Dember & Earle, 1957; Fiske & Maddi, 1961) postulating the concept of optimal level of stimulation or activation that an organism seeks out. Organisms are said to possess a preferred level of stimulation and great deviations from this optimal level in either the direction of insufficient stimulation or stimulus overload, are found to be disconcerting.

Before discussing the implications of Experiment IV it is necessary to examine further the relationship between stimulus complexity and affect since it is possible that the U shaped function is an experimental artifact. Examination of the three groups showing different levels of preferred complexity suggests that stimulus complexity can be equated with degree of information and that subjects differ in the complexity level at which maximum affective increase occurs over exposure frequency. Further such increases may be indicative of an optimum arousal level which subjects bring into the experimental situation. However, since the middle complexity range for stimuli was 8 to 10 points and since it was at this point that the complexity affect function reached asymptote, it could be argued that the U shape function is a result of the subject's adaptation level through experience and learning over the entire complexity range of the experimental series. Helson (1954) and McClelland, Atkinson, Clark & Lowell (1953) postulate that for any given stimulus dimension an organism will develop an adaptation level through experience and learning.

The adaptation level acts as a reference point from which any discrepancy in either direction produces an affective reaction the positive or negative reaction of which is determined by the degree of discrepancy.

In the present series of experiments subjects are presented with stimuli which are both novel and which contain little intrinsic meaning. The effects found could therefore be due merely to the adaptation of subjects to the complexity value of the stimulus, taking their reference point at the middle of the range. Therefore, rather than a preferred level of stimulation the subject brings into the experimental situation, ratings could be the result of stimulus adaptation, subject differences being differences in the selection of the anchor points in the stimulus series.

To test whether the results of Experiment IV were due to general subject propensity or the specific stimulus series, two groups of subjects were exposed to either the lower or upper halves of the complexity range. If adaptation to the complexity range is operative then both groups would show an inverted U shape function of complexity and affect since the middle complexity range for either group would produce maximum affect. If, on the other hand, subjects bring into the experimental session a preferred level of stimulation then there would be no difference from the results obtained in Experiment IV, that is preference would be for the medium-complexity stimuli for the entire complexity range. Thus subjects receiving the low complexity range would show maximum preference for the high values in their series while subjects receiving a high complexity range would show maximum preference for low complexity values in their series.

METHOD

Subjects

Twenty subjects were selected at random from the pool of 186 first year psychology students in the 1972 intake with the restriction that no subject had previously participated in Experiment IV. There were 8 males and 12 females in the sample which ranged in age from 18 to 26 year with a mean age of 20.7 years. All had University Entrance and were in their first year of study.

Design

The experiment took the form of a 2 x 4 x 5 factorial design with repeated measures on the second two factors (Winer, 1962, pp. 319-337), there being 10 subjects per cell. The first factor represented two groups of subjects. One group was presented random shapes at the low end of the complexity range, that is, shapes of 4,6,8 and 10 points while the other group was presented random shapes at the high end of the complexity range, that is, shapes of 10,13,15 and 20 points. The second factor was stimulus complexity represented by four complexity values for each group. The third factor consisted of five levels of frequency of exposure, that is, 1,2,5,10 and 15 stimulus exposures. Thus two groups of subjects were shown five shapes at each of four complexity values but differing in the average complexity of the stimuli shown. Again the dependent variable was a 9 point evaluative rating of each shape presented.

Procedure

The procedure was identical to that used in Experiment IV except that since a subject saw shapes at only four complexity levels there was only one presentation series of 132 exposures. Also the Reaction Score was not obtained.

RESULTS

Table 11 presents the results of the analysis of variance of affective ratings. Exposure frequency was the only significant main effect. The inter-action between complexity group and stimulus complexity was also significant and is illustrated by a plot of the mean affective ratings for the two groups over stimulus complexity in Figure 15. The interaction is clearly shown since for the low complexity group an increase in affect was obtained for increasing complexity while for the high complexity group a decrease in affect was obtained for increasing complexity.

Since the main object of this experiment was to test the shape function of affective ratings over stimulus complexity for the two complexity groups a trend analysis was computed for each of the lines given in Figure 15. A significant linear component only was obtained for both groups. For the group which were exposed to random shapes of 4,6,8 and 10 point the linear component yielded an F of 4.04 (df = 1/54) while the linear component for the group exposed to random shapes of 10,13,15 and 20 points yielded an F of 6.32 (df = 1/54) both being significant at the .05 level. Given these results and the fact that there was no significant quadratic trend for either group it can be concluded that the changes in affective ratings over complexity are a function of specific stimulus characteristic, that is, complexity defined by the number of points, and not the changes due to range of stimuli in the experimental series per se. If affective changes were a function of adaptation to the stimulus range then an inverted U shape function would have been obtained for both complexity groups.

The triple interaction given in Table 11 was also significant. This is illustrated in Figure 16 by a plot of the mean affective ratings for each group over exposure frequency at each complexity

TABLE 11

Analysis of Variance of Affective Ratings of Random Shapes for Experiment V

Source	SS	df	MS	F
Between subjects	142.96	19		
Complexity Group (G)	4.01	1	4.01	1
Error g	138.05	18	7.6667	
Within subjects	906.7	308		
Stimulus Complexity (C)	5.16	3	1.72	1
G X C	67.07	3	22.3567	3.57*
Error c	338.27	54	6.2643	
Frequency (F)	20.66	4	5.165	2.72*
G X F	.29	4	.072	
Error f	136.75	72	1.8993	
C X F	6.24	12	.52	1
G X C X F	38.33	12	3.1942	2.35**
Error c x f	293.93	216	1.3608	
Total	1048.76	399		

*p < .05
**p < .001

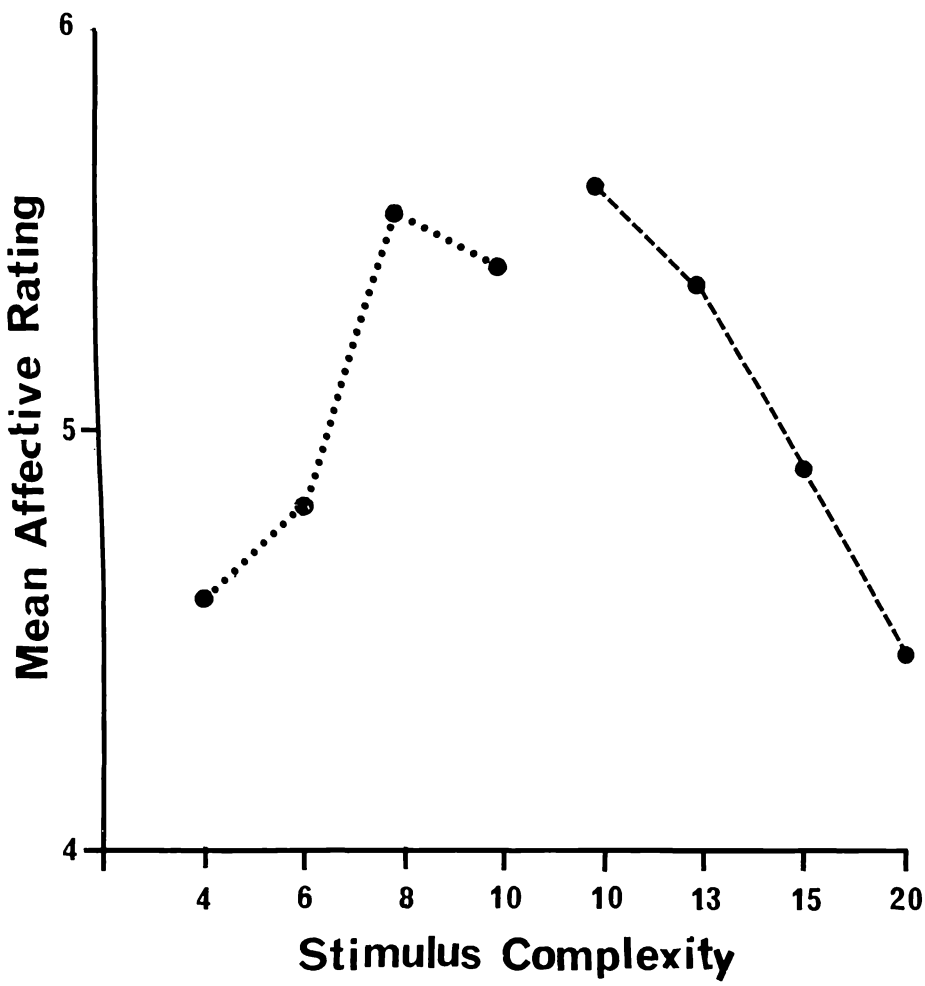


Fig. 15. Changes in affect as a function of stimulus complexity for two groups of subjects exposed to different amounts of complexity

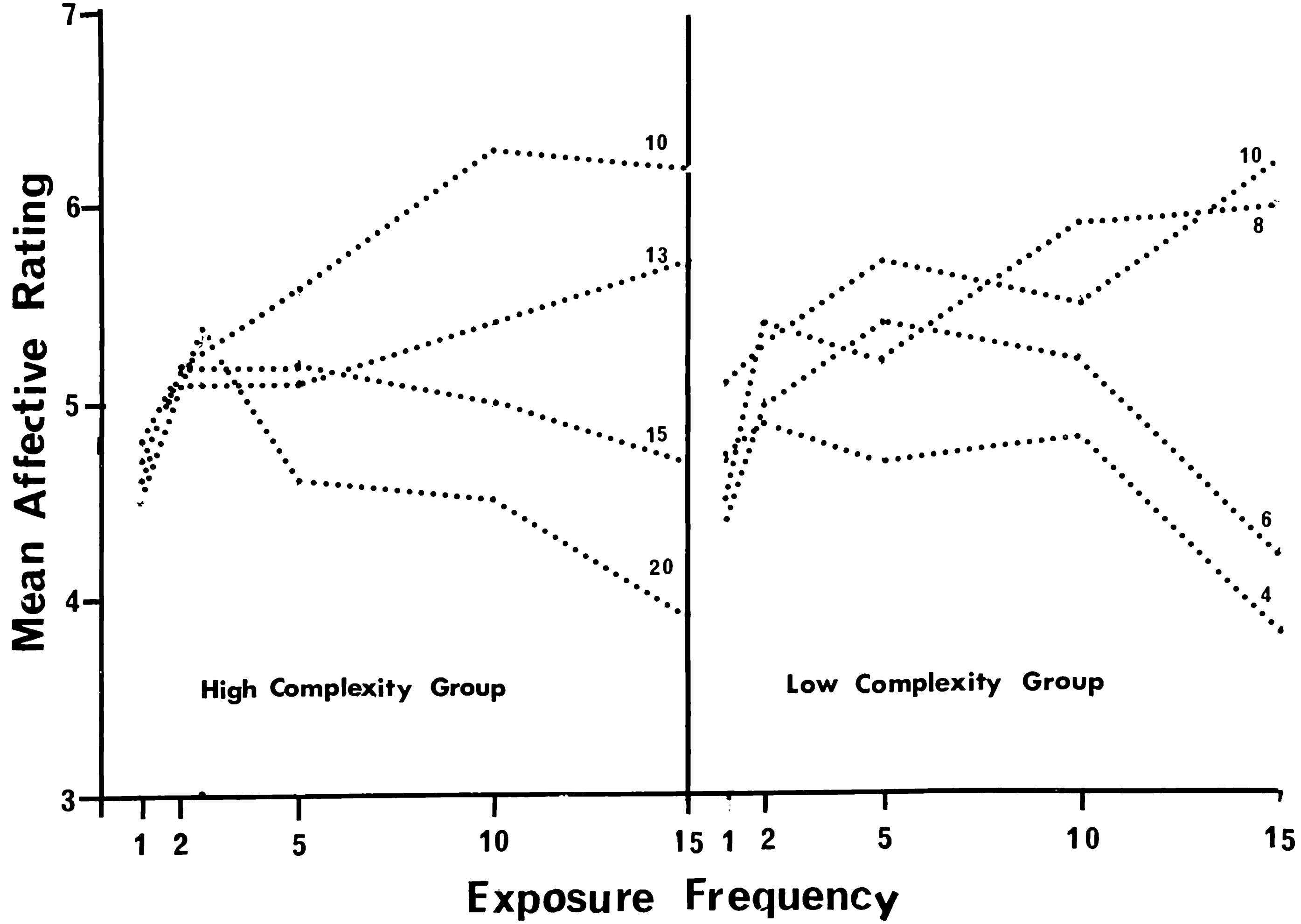


Fig. 16. Changes in affect at four complexity levels as a function of frequency of exposure for two groups exposed to different amounts of complexity.

level. It can be seen that for the high complexity group increase in affect over exposure is at its maximum for the 10 point shapes and is less marked for 13 point shapes. 15 and 20 point shapes show a decline in affect over frequency. For the low complexity group increase in affect over frequency occurs for 10 and 8 point shapes while decreases occur for the 4 and 6 point shapes. Thus while the patterns are similar for the two groups maximum increase in affect occurs for the low complexity shapes in the case of the high complexity group and for the high complexity shapes in the case of the low complexity group.

It is interesting to note the similarity between the results given in Figure 16 and those in Figure 13. The shapes of the change functions are remarkably similar except that the values shown in Figure 16 are not as extreme as those in Figure 13. Also the evidence for affective contrast is more prominant in the present experiment since the two levels of complexity showing an increase in affect over frequency for both groups are clearly differentiated from the other two showing a decrease in affect over frequency (Figure 16). Further, a comparison of the Figures 13 and 16 for the 6 and 13 point shapes indicates a shift in the function probably as a result of stimulus contrast.

It can be concluded that the inverted U shape function of affect for stimulus complexity, obtained in Experiment IV (Figure 11) is unlikely to be due to stimulus adaptation per se and the subject differences in preferred information level suggests that the changes in affect over frequency of exposure is indicative of some optimal level of arousal which the subject brings with him into the experimental setting.

DISCUSSION

Although the results obtained in Experiment IV support the prediction that frequency of exposure and stimulus complexity interact to produce differences in evaluation of stimuli they do not fully substantiate Berlyne's (1970) model. While the relationship of arousal potential to affect holds for novel and familiar stimuli of low complexity, that is a decrease in affect over exposure, complex stimuli do not conform to the predicted pattern (Figure 10). Complex novel stimuli generally showed more negative affective ratings, rather than simple novel stimuli as predicted. However, complex familiar stimuli (15 exposures) were the least preferred stimuli while from Bertyne's model these stimuli would be predicted to produce relatively high positive affect or at least more positive affect than in the case of complex novel stimuli. Perhaps within the experimental context a great many more exposures are required before such stimuli produce increases in positive affect. The results suggest that the complex stimuli did not become familiar following frequent exposure which would support the contention that such stimuli were generally outside the processing capacity of subjects. Subjects normally may be able to process such stimuli but since a large number of stimuli were presented subjects opted for stimulus complexity levels of lower arousal potential to achieve successful mastery.

As the results of Experiment V preclude the interpretation of subjects merely adapting to the stimulus series some other process must have been operative. It might be that since attitude enhancement through successful mastery occurred around the moderate complexity levels, subjects were blocking in some way, the excessive stimulation produced by high complexity shapes. That is, subjects may have been able to deal more effectively with the moderate complexity level shapes, by trying to ignore shapes of higher complexity. At the same time negative affect would be associated with the high complexity shapes because they interfered with the classification of other less complex stimuli. It would follow that it would be the medium complexity shapes which were the highest level of complexity actually being processed by subjects. The results would then be completely in line with Berlyne's (1970) model. That is, it is the medium complexity level which shows increased affect for increasing exposure.

Whilst the arousal potential model of affective changes appears to hold there is some doubt about the adequacy of using the factors of tedium and positive habituation alone to account for subject preferences. Both factors focus on stimulus conditions, and yet as evidenced by subject differences, some prior set here referred to as the subject's optimal level of arousal must be imputed to explain the characteristic differences in affective change. An additional factor appears to be some inhibitary mechanism, a subject utilizes to cut off stimulation beyond his characteristic or optimal processing level. Thus, while tedium operates under low arousal potential conditions and positive habituation operates under medium arousal potential conditions or conditions which are just outside the normal processing level, inhibition or blocking of stimulation occurs at excessive arousal conditions and produces negative affect.

At this point, however, it is beyond the scope of the research to conjecture any further on the inhibitary mechanism except to say that future research should be designed to examine both the extent of stimulation blocking and the point in the affective arousal curve at which blocking or stimulation occurs particularly as it relates to the differences in subjects optimal levels of arousal.

CHAPTER 9

GENERAL DISCUSSION AND CONCLUSIONS

As the main experiment in this study Experiment IV has shown that human subjects often tend to prefer familiar stimuli in their environment but this is dependent upon the level of information as determined by the complexity of environmental stimulation. The results have basically two implications for research on affective responses to repeated exposure of stimuli.

First, the results support the optimal level of arousal hypothesis which is central to current theorizing on novelty. Second, the results demonstrate consistent individual differences suggesting that novelty orientation may be conceived of as a cognitive style and indicating that the behavioural effects of novelty orientation are relatively unexplored in social psychology.

Support for the optimal level of arousal hypotheses

Preference for stimuli was an inverted U shaped function of stimulus complexity. This finding is in accordance with the evidence of a number of studies (Munsinger & Kessen, 1964; Munsinger & Kessen, 1966; Dorfman & McKenna, 1966; Thomas 1966; Vitz, 1966; Terwilliger, 1963; Wohlwil, 1968). Not only is the expressed preference generally curvilinear but also the point at which the preference function is maximal is to a large extent dependent on the processing capacity of the individual. What is particularly important with regard to the results of Experiment IV is the fact that responses to familiarity, through repetition, produce marked subject differences in the preference functions. That is, not only is there a preferred level of stimulus complexity but also it is at this level that repetition, or reduction in novelty, produces greatest changes towards positive affect. Thus stimulus complexity and novelty operate in some combined way on affective arousal.

Most current theories of arousal explain the occurence of opposing responses to familiarity and complexity by utilizing the concept of an optimum point. At the same time they predict that the organism will approach a stimulus when the amount of familiarity or complexity is not too discrepant from the optimal level, but will retreat when the amount is too high. However, writers differ both in their conception of the major stimulus factors involved in affective arousal and in the underlying mechanisms inferred.

Hebb and Thompson (1954) and Leuba (1955) independently and within the same year proposed that organisms have an optimal level of arousal and stimulation. The basic postulate of Dember and Earl (1957) is that the critical determinant of exploration is the discrepancy between a stimulus and the subject's expectation. While discrepancy over time is normally referred to as novelty and discrepancy over space is normally called complexity, these writers use the term complexity for both. They suggest that all organisms and all stimulus situations can be assigned a complexity level. Further, while subjects have an "ideal" complexity level they will pay attention to stimuli slightly above their ideal stimuli but that stimuli too discrepant from the ideal produce negative affect.

The most elaborate theory of affective arousal is that offered by Berlyne (1960, 1963, 1966, 1970), already outlined. Berlyne suggests that novelty and complexity are just two of a group of stimulus properties which are associated with arousal potential. Arousal is generated by response conflict rather than discrepancy from expectation. Since decreases in arousal are rewarding, the organisms act so as to lower the arousal either by withdrawing or by approaching and exploring the stimulus. Though Berlyne's theoretical explanation is quite unique and complex the predicted behavioural outcome remains that an organism will approach mild amounts of novelty or complexity and avoid large amounts.

Fiske and Maddi (1961) see organisms approaching mildly novel stimuli which raise their arousal to some optimum point, and avoiding those highly novel stimuli which raise arousal beyond an acceptable point.

White (1959) draws heavily on the concept and research dealing with the optimum level of arousal in defining his "effectance motive". However, in contrast to Berlyne, White sees maintenance rather than decline in arousal as the major direction of orientation to novelty and complexity. The organism orients itself to conditions under which it can be most effective, thus boredom as well as confusion is avoided.

Hunt (1963, 1965a, 1965b) while agreeing with the discrepancy model presented by Dember and Earle (1951) feels that it does not account for the intensity of the persistent attachment shown by young animals and humans for familiar persons and places, and the concomitant despair when these are missing. Utilizing a concept of "intrinsic motivation", Hunt goes on to suggest that familiarity generates attachment and thus the avoidance of large amounts of complexity is motivated not only by an aversion to it but also by a seeking for the missing and characteristically preferred amount of familiarity.

It is clear that the results of Experiment IV are in line with the theory of an optimal level of stimulation. Generally, subjects preferred stimuli of moderate complexity. Additional support, however, comes from the fact that familiarity exerted a significant effect of its own on changes in stimulus preferences. Such changes are congruent with Hunt's hypothesis that familiarity has a "pull" of its own and that the organism while seeking out variation in stimulation poetry preferences, and Lane (1968) with computer generated histoforms. Therefore, while most individuals do seem to prefer a moderate degree of complexity generally the amount will be highly variable across any group of subjects and any complexity range.

While in Experiment IV subjects preferred stimuli around the medium complexity range, individuals differed particularly with regard to the complexity point which produced maximum affective enhancement. This suggests that repetition is probably a more sensitive measure of individual differences in optimal level of arousal than stimulus complexity. Also, experimentally, repetition is more easily accomplished than variation in stimulus complexity, particularly since many more levels of stimulus complexity would have to be used than in the present study to produce reliable individual differences.

The potency of exposure frequency as a measure of individual differences in optimum levels of arousal receives further support from the analysis of two types of preference functions given in Chapter 7. Here subjects were clearly differentiated into those who preferred novel and those who preferred familiar stimuli. It appears, therefore, that affective arousal though dependent to some extent on the complexity level preferred by subjects is also to a large degree determined by the extent to which familiarity of itself, is reinforcing to the individual.

Novelty vs Familiarity as a Cognitive Style

Novelty behaviour research has been concerned almost entirely with the organisms responses to increasing novelty by assuming that behavioural effects increase as the novelty of stimulation is increased. Familiarity is viewed as a progressive absence of novelty. The organism's preference for familiar stimuli is interpreted as avoidance of the novel, thus familiarity becomes merely zero novelty.

The results of Experiment IV, however, suggest that familiarity through repeated encounters with stimuli exerts "a pull of its own" (Zajonc, 1968). As stated by Hunt (1965b):

> "recognitive familiarity is in itself a source of emotional attachment, and this attachment is attested further by the fact that separation grief always concerns familiar objects and persons and by the fact that such grief is but transient in infants too young to have established object permanence". (pp 91.)

Hunt further proposed that the development of the perceptual ability to recognise familiar stimuli generates an emotional attachment to familiar stimuli. This preference towards familiar stimulation is <u>intrinsic</u> to the perceptual system and occurs ontogenetically earlier than attraction toward novel stimuli.

Though it is difficult to experimentally separate the avoidance of novelty from the attraction towards the familiar it is clearly seen in the behaviour of young children. Nothing is more boring to adults than the repeated presentation of commercials on Television yet the writer has observed his two year old son consistently drop an absorbing activity and go over to listen and watch the familiar sounds and sights of the ads. Further, when the commercials are over he will go immediately back to his previous activity as if he had never left it. This observation is supported by a great deal of research including that conducted by Hunt and his collaborators and is said to be typical of two year olds who often show consistent preferences for redundant and frequently exposed stimuli. This issue is further complicated by the fact that children of this age can also become bored by excessive repetition and are attracted to the new and unfamiliar. It seems likely, therefore, that children develop a motivation towards both the familiar and the novel, the combination of which determines whether stimulation is approached or avoided in a given situation.

It is clear that both factors were operative in the present study. Though subjects differed with regard to the preferred complexity level all subjects showed significant increases in positive affect for stimuli of increasing familiarity at some complexity level of the stimulus sequence. It can be concluded, therefore, that the point at which repetition produces greatest positive affect not only may be linked with the degree of arousal induced by the stimulus situation for a given subject but also the early developmental history of repeated versus variable stimulation. Certainly the work with human babies would suggest that approach to novelty is to a large extent dependent upon the variety of stimulation in the early years.

Hunt (1965b), with considerable research backing, outlines three developmental stages in orientation towards stimuli in human infants. The new born infant first responds to arousal changes in the ongoing input to its sense mechanisms. Regular change sequences are particularly potent. For example, the writer observed in his daughter of two days old that she was clearly attentive to the light changes created by a curtain waving in the breeze. The second stage occurs when repetition of input leads to recognition. Through familiarity stimuli of themselves become attractive and provide the infant with impetus to retain or regain the perceptual encounter with the familiar. Thirdly, there is the emergence of orientation towards novel stimuli in an otherwise familiar environment. It can be seen in young children as the imitation of new actions, gestures, and the exploration of new objects.

The adequacy of the progression through each of the three stages of stimulation will determine, to a large extent, the child's orientation towards stimulation in later life. Insufficient stimulation at the first stage would have a profound effect on the general level of optimum arousal. Early deprivation of stimulation from even basic visual, auditory and tactile input has a profound effect on the child's ability to receive high level input later. That is, the basal (optimum) level would be low in children of impoverished environments. Whereas enriched environments, where young infants are exposed to progressively greater amounts of variable stimulation would act to heighten the level of optimal stimulation. In the second stage excessive repetition without variation in stimulation would create a high motivation to experience the familiar, possibly due to the excessive degree of repetition required to maintain the basal level of stimulation before stimulus satiation occurs. The child would become "fixated" at the developmental level where attachment to familiar events is predominant. For example, a child in an authoritarian family, where discipline is strict and parental demands though consistent are rigid, is not rewarded for novelty search unless it is within the bounds of acceptable behaviour. The child is likely to be rewarded for action toward objects in their environment which are prescribed and well defined as appropriate by his parents. Novelty search as well as novel responses would become less dominant in such children. Excessive reward for stereotyped responses would establish a strong attachment to extremely high amounts of familiarity together with a low tolerance for stimuli of high complexity.

The emergence of interest in the novel, seen in the child's imitative behaviour is fundamental for psychological growth. Here too, behavioural abnormality could occur through inadequate progression through the first two stages. Consider the psychopathic delinquent who shows an obsessional preoccupation for stimulation and novelty. If a child is deprived of normal amounts of stimulation at the first stage and is exposed to an environment where there are no consistent demands or relatively few repetitive inputs then the child may have to seek excessive amounts of novelty for the maintenance of pleasant affect since the environment would provide both low amounts of sensory input and also little consistent experience for the formation of attachments through familiarity. Skyrapek (1969) found that the psychopathic delinquent lacks tolerance for repetitiveness even for short periods and is highly motivated to seek increased intensity and variability of stimulation after sensory deprivation. The psychopath in an everyday environment tends to react as if in a state of stimulus deprivation seeking excessive amounts of novelty and complexity.

Though a great deal of research is needed to substantiate this developmental theory, affective arousal as a product of familiarity and novelty search is likely to be a particularly important determinant of social and psychological adjustment.

Although it is beyond the scope of the present study to discuss the physiological bases of optimal levels of stimulation and the need for novelty versus familiarity it is possible that individual differences in levels of early stimulation may produce differences in reactivity of the central and autonomic nervous systems. Berlyne (1960) places heavy emphasis on the reticular arousal system as playing a major role in the degree to which stimulus input is assimilated. It is quite possible that the degree to which the central nervous system and the autonomic nervous system are integrated is to a large extent dependent upon the type and extent of early sensory experience. Reisen (1961) provides evidence which points to the fact that complete or severe sensory deprivation in early life can lead to impairment in the development of fairly complex sensory and motor integrative functions. It would appear that organisms require certain types of experience in order that their capacities can develop normally.

Studies of sensory deprivation clearly support the major role familiarity plays in affective arousal. Sensory deprivation is arousal inducing and leads generally to significant improvement in performance on familiar, structured and simple tasks where responses which are well rehearsed are the correct responses. Suedfeld (1969) and Landon and Suedfeld (1972) in reviewing all the studies concerned with sensory deprivation on tasks varying in complexity provide strong support for this view. In addition studies by Quay (1965) and Skyrapek (1969) suggest that the long term effects of early stimulus deprivation are extremely potent indicators of preference for novel versus familiar environmental stimulation.

Apart from sensory deprivation early social deprivation has long term effects on familiarity-novelty preference. Sax and Stollak (1972) found when investigating the parent-child relationship and curiosity behaviour of five year old boys that curiosity about stimuli was not only most highly correlated with their mothers' novelty-curiosity but also mothers of highly curious and prosocial boys displayed more positive feelings to their children than mothers of boys low in curiosity. These results indicate that the type of parental model and predominant direction of social reinforcements are crucial in determining whether a child will approach a novel object and prefer it. Further, studies of social deprivation particularly with regard to grief from separation of one or more significant others at an early age have found that regression to some behaviour which is both repetitive and to which the child is emotionally attracted is almost automatic. In other words the child substitutes a familiar and affectively positive stimulus for that which is absent.

In a study by Maw and Maggon (1971) ten year old children were classified as high or low in curiosity by both peers and teachers. Less curious children were clearly distinguished as low in social responsibility, less intelligent and creative, and more intolerant of ambiguity than highly curious children. The difference in intolerance of ambiguity is particularly important since a child low in curiosity would feel less at ease in new situations and would be less able to tolerate dissonance. Repeated exposure would provide opportunities for the reduction of uncertainty, and therefore, a child low in curiosity would show greater preference for the familiar.

In a comparison between culturally deprived pre-school children enrolled in a Headstart programme and non-deprived pre-school children Hicks and Dockstader (1968) found that the culturally deprived children showed a significant preference for simple and familiar stimuli and tended to avoid acute levels of activation.

Given the developmental importance of familiarity and novelty seeking then, and the generality of the early stimulation history for subsequent orientations towards both the intensity and frequency of stimulation it is here proposed that familiarity versus novelty preference be conceived as of a fruitful area of research on cognitive styles. Although we have been concerned with affective responses in the form of preference towards different amounts of repetition the term "cognitive" is not a misnomer since an organism is more likely to utilize cognitive modes which have produced positive feelings and his most efficient "learning set" for classifying experience will be preferred particularly when there is a high degree of environmental uncertainty. The writer has chosen to discuss cognitive styles nott only because the results of the present study indicated a predominance of individual differences in orientation towards repetitive stimuli, but also because of the consistency with which the different orientations emerge, indicating that not only is the orientation towards novel versus familiar stimulation fundamental to an individual's ability to cope effectively with a complex and changing world, but also because stimulation preferences seem to be relatively situationally non-specific.

There have been a number of attempts to measure the tendency to seek novelty but most have been relatively unsuccessful in establishing a single instrument which accounts for the major sources of behaviour variance in novelty seeking. Acker and McReynold (1967), for example, in order to establish the need for novelty as a unitary dimension, examined six instruments which were designed to measure cognitive innovation, change seeking, stimulus seeking, sensation seeking, change, and originality. Though there was some overlap in the intercorrelations of these measures it was not sufficient to conclude that the tests were measuring essentially the same dimension. A lack of intercorrelation between novelty seeking instruments was also found in a study by Farley (1971). These results are rather disappointing considering the unanimity with which the need for novelty and stimulation has been put forward as a primary determinant of an individual's approach to stimulus contexts.

The results of the present study suggest that much of the previous failure to establish the generality of measures results from viewing approach to stimulation merely in terms of novelty seeking. Though it is safe to conclude that all organisms will at some time approach novel stimuli, to assume that stimulus seeking can be measured merely on a continuum of zero to high novelty seeking is to ignore the important adaptive function played by stimulation already encountered and to which the organism has already established strong attachments. Further, since most of the instruments have been standardized on university student samples where it would be expected that novelty search would be high, both through the search for identity and the high curiosity behaviour concomitant with high intelligence, it is not surprising that a large degree of discriminative power is lost.

It can be concluded that measures of orientation towards stimulation must include some account of orientation towards the familiar to adequately account for individual differences in general orientation towards stimulation.

More encouraging, however, are the results of the development of a scale of novelty seeking by Pearson (1970) in which she divides novelty experience into four forms on the basis of the source of stimulation and the type of subjective experience.

She describes the "external sensation" seeker as a person who likes active, physical participation in "thrilling activities" such as speed on a motor cycle. The "internal sensation" seeker on the other hand prefers experience like that of unusual dreams, and internally generated feelings. The "external cognitive" novelty seeker enjoys discovering facts, how things work, and how to accomplish new things, while the "internal cognitive" novelty seeker prefers mind games and unusual cognitive processes which deal more with explanatory principles and cognitive schemes. In comparing the scale constructed to measure the four theoretically different forms of novelty seeking Pearson (1970) not only found the instrument more homogenous than four previously published measures of novelty seeking, but also clearly differentiating the four forms of novelty orientation. In a later study Pearson (1971) found substantial conceptual support for the four types and the validity of the scale. Demographic variables, social desirability, other novelty scales, self-descriptive traits, patterns of ego-control, internal versus external control, interpersonal attraction, and H.E. Murray's needs were successfully differentiated on the basis of predictions from the four novelty experience modes. It can be concluded that, though not a unitary dimension orientation towards stimulation can be reliably measured in self report form and does have considerable power in predicting individual differences over a wide range of variables and behaviours.

The generality and pervasiveness of different orientations and preferences towards the familiar and the novel can be seen in examining the conceptual bases of many other cognitive styles.

Probably one of the most important cognitive styles which relies heavily on the conception of the tendency for subjects to orient to different levels of familiarity is that of repression-sensitization proposed by Byrne (1961). His scale of repression-sensitization, as he points out, measures the characteristic manner in which a person responds to stimuli which are threatening and attempts to reduce arousal. Repressors would deny or repress stimulation while sensitizers would intellectualize the contents or take some obsessional interest in it. Certainly subjects preferring simple or familiar stimuli in the present study were subjected to excessive input by the presentation of a large number of stimuli well outside their preferred complexity level. It is possible that these subjects were repressors. Sensitizers, however, may not necessarily prefer extreme amounts of novelty since intellectualizing requires at least a moderate degree of exposure. Preference for extraordinary amounts of novelty and stimulation may be related to obsessional behaviour which is also characteristic of sensitizers. Thus novelty orientation could well distinguish two types of sensitizer.

Cognitive complexity as a cognitive style (Bieri, 1855) refers to the relative degree of differentiation of a person's construct system. A cognitively complex person has available more numerous and more integrated personal constructs of his environment. A continual preference for the familiar would not only restrict stimulation but also information about the environment. It would therefore be the cognitively simple person who tends to prefer the familiar. Further, Suedfelt and Struefert (1961) found novelty information search increased as a function of increased cognitive complexity. It should be pointed out, however, that cognitively complex subjects should not be taken as necessarily preferring complex or novel stimuli. It is possible that a cognitively complex person would prefer moderately complex stimuli which are still within his processing capacity, rather than a complex one merely because it presents more information or is completely new.

Although very little work has been carried out on the desire for certainty, particularly as a cognitive style, it appears to be central to the present concern. The well-known concept of intolerance of ambiguity (Frenkel-Brunswik, 1949, 1951), the tendency to make extreme judgements on test items (Berg, 1953, Runquist, 1950) and desire for certainty, itself measured by probability estimates of the occurence of phenomenon plus the degree of confidence placed in this estimate (Brim & Hoff, 1956), point to consistent individual differences in the desire to reduce stimulation through preference for the uncomplicated and efforts to understand the environment by the reduction to a simple structure. Taking the differences found in the present study in preferences for familiar and novel stimuli together with the fact that different degrees of complexity further differentiated between subjects, it can be argued that subjects who prefer low degrees of stimulation would have a greater desire for certainty and would be more intolerant of ambiguity, since in having a lower optimum level of arousal they would be forced to reduce information to cope with their environment. It is not difficult to see preference for the familiar as a cognitive mode of those who have a strong desire to reduce uncertainty.

Again, the novelty-familiarity distinction can be seen as central to the concept of internal-external control of reinforcement. Derived from social learning theory, Rotter (1966) developed the concept of internal-external control of reinforcement to distinguish the individual who believes that reinforcements are contingent upon his own behaviour (internal) from an individual who believes that reinforcements are under the control of powerful others, luck, fate, chance, etc., and not under his own personal control. Joe (1971) in a review of the research on this cognitive style concludes that internals show a greater tendency to seek novelty as a means of personal control. Further, it is not difficult to conceive the types of novelty seeking behaviour described by Pearson (1970) as discriminating clearly between internals and externals with internals searching for experience which is self generative and externals seeking experience which is comparative and is externally substantiated. For the externals, then, familiarity through repetition of experience reinforces the occurence of environmental certainties and would be preferred. Therefore, though there may be novelty seeking differences between internals and externals, preference for repetition is likely to be a major determinant of the two reinforcement orientations.

Restricted mainly to the area of interpersonal authority Rokeach's (1954) concept of dogmatism, though not specifically referring to familiarity, does suggest the possibility that rigid adherence to a simplistic view of authority leads to an avoidance of new and uncertain social situations. Certainly, the concept of rigidity (Leach, 1967) which is closely related to "dogmatism" relies heavily on the notion that rigid subjects possess a strong motive to reduce stimulation and would generally "prefer" to operate at lower levels of arousal, being oriented more to familiar than novel stimulus situations.

Harvey, Hunt, and Schroder (1961) place heavy reliance on the need for novelty as opposed to familiarity as well as the hypothesis of optimal level of arousal in their definition of "concrete" and "abstract" thinkers. With a simpler cognitive structure, Harvey (1967) sees concrete thinkers as showing greater intolerance of ambiguity and greater stereotyping in solving complex and changing problems. He further states that concrete thinkers tend to make judgements of novel situations rapidly and to polarize their evaluations which together suggest that, in all experiments in the present series, subjects who preferred simple-familiar stimuli were more concrete thinkers than subjects who preferred complex-novel stimuli. In fact Harvey (1967) contrasts the abstract with the concrete thinker by saying:

> "The individual who has become accustomed to high levels of stimulus diversity and who presumably has evolved a highly differentiated and integrated conceptual system as a consequence, should seek more stimulation, greater diversity, more challenging situations and greater risk than individuals exposed repeatedly to stimuli of restricted ranges and diversity." (pp.258).

Studies of field dependence-independence do not rely on any conception of novelty or stimulation seeking but in his discussion of indicators of the different styles Witkin (1965) defines the field dependent person's major defense as repression. Thus as with the distinction between repressors and sensitizors made earlier, it would be predicted that field dependent persons would prefer low to moderate degrees of novelty or show greater positive affect for familiar stimuli generally.

It appears that the tendency to prefer new or redundant stimulus events is a fundamental behavioural determinant of most of the well researched cognitive styles. Further, ease of manipulation in the laboratory together with successful attempts to measure individual differences by self report (Pearson, 1971) suggests that the distinction provides an extremely fruitful area of research in social psychology and personality studies.

We appear to have come a long way from the results of the experiments conducted in the present study. This has been necessitated by the generality of the phenomenon of optimal levels of stimulation and the differences in subject orientations towards novel and familiar stimulus events. The foregoing discussion, however, points to two important areas in which further research on the effects of repetition on affect should be conducted and would be particularly productive.

An attempt should be made to examine the social factors which determine consistent preferences for familiar stimuli, in early development. Long term research with more adequate measures of affective preference in the young would be required. It may not be sufficient, for example to assume that the amount of time spent viewing an object is concomitant with stimulus preference since even young children will view strange objects even though they may be unpleasant. Such variables as looking time, response latency, and response decrement may, however, be linked to affective preference which suggest the importance of research examining more closely, the relationship between such measures and accompanying motivational states.

Major determinants in the early years which optimize the general level of orientation to stimulation and the preference for novel and familiar events, are likely to be variety of stimulation, reinforcement for new behaviours generally, and opportunity for regular exposure of any stimulus event. Given the likely significance of repetition in early experience, however, much more research should be conducted to examine both its significance in the first two years and its relationship to orientation behaviour in the later years.

More immediately possible and desirable with regard to future research would be to compare the differences in preference for different amounts of repetition, obtained by the experimental method used in the present study, with a variety of other cognitive styles including Pearson's (1970) measure of novelty seeking. If preferences for familiar versus novel stimulation were to differentiate individuals, on the basis of the predictions outlined previously, developmental research could then be conducted using the relatively simple experimental procedure of repetition.

It is apparent that orientation towards repetitive and redundant stimulation may be an extremely pervasive and consistent indicator of an individual's general level of cognitive organization. The fact that idiosyncratic but stable levels of preferred stimulation occurs at the point at which the individual is most effective and shows highest preference for repetitive stimulation, supports this view.

APPENDIX I

Instructions

We are interested in the impressions that each of the patterns previously presented brings to mind.

For this purpose you are asked to judge each of a number of patterns against a scale of liking (dislike).

Suppose you feel a pattern is very pleasing (unpleasant) you would check as follows:

___:___:___:___:___:___:___:___:_√_
 1   2   3   4   5   6   7   8   9

On the other hand if you felt indifferent to the pattern you would check as follows:

___:___:___:___:_√_:___:___:___:___
 1   2   3   4   5   6   7   8   9

If you felt you disliked the pattern slightly, you would check as follows:

___:___:_√_:___:___:___:___:___:___
 1   2   3   4   5   6   7   8   9

Work rapidly. There are no right or wrong answers. The feelings you have for the particular pattern is what we want. Don't puzzle over individual patterns or worry about feeling consistent in your judgements. Just indicate your first reaction on each scale. Often a vague impression will be all you have to go on. This is exactly what we want. Be sure to answer every item.

APPENDIX II

REACTION SCALE

HOW DID YOU FEEL WHILE WATCHING THE SHAPES?

1. Entertained (check one)
---Not at all entertained
---Slightly entertained
---Moderately entertained
---Entertained
---Quite entertained

2. Disgusted (check one)
---Not at all disgusted
---Slightly disgusted
---Moderately disgusted
---Disgusted
---Extremely disgusted

3. Unreality (check one)
---Strong feelings of unreality
---Feelings of unreality
---Moderate feelings of unreality
---No feelings of unreality at all

4. Anxious (check one)
---Not at all anxious
---Slightly anxious
---Moderately anxious
---Anxious
---Extremely anxious

5. Uneasy (check one)
---Not at all uneasy
---Slightly uneasy
---Moderately uneasy
---Uneasy
---Quite uneasy

6. Confused (check one)
---Not at all confused
---Slightly confused
---Moderately confused
---Confused
---Quite confused

7. Dreaming (check one)
---Very similar to feelings I have when I'm dreaming
---Similar to feelings I have when I'm dreaming
---Moderately similar to feelings I have when I'm dreaming
---Slightly similar to feelings I have when I'm dreaming
---Not at all similar to feelings I have when I'm dreaming

8. Other thoughts (check one)
---Strong desire to know what others thought
---Desire to know what others thought
---Moderate desire to know what others thought
---Slight desire to know what others thought
---No desire to know what others thought at all

9. Bored (check one)
---Extremely bored
---Bored
---Moderately bored
---Slightly bored
---Not at all bored

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