Liking words as a function of the experienced frequency of their occurrence

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A hypothetical inverted-U curve is postulated linking liking of stimuli to familiarity with them. An experiment using a special procedure was carried out in which the relationship was investigated for words, ranging from very unfamiliar to very familiar, between favourability and familiarity. The results conformed to the theoretical curve. This indicated that the positive correlation between the variables reported by several researchers (e.g. Zajonc) and the negative correlation found by others (e.g. Cantor) should be regarded as complementary rather than contradictory.

Aesthetic judgements have long been thought to depend, among other things, on stimulus intensity. This relationship is depicted by the well-known Wundt curve. The curve, as given by Wundt and also as presented later by Berlyne (1971), is set out in Fig. 1. The hedonic value of a stimulus is regarded by Berlyne as a function, rising to a peak and then falling, of the person's arousal; and arousal is considered to be directly related to the novelty of the stimulus.

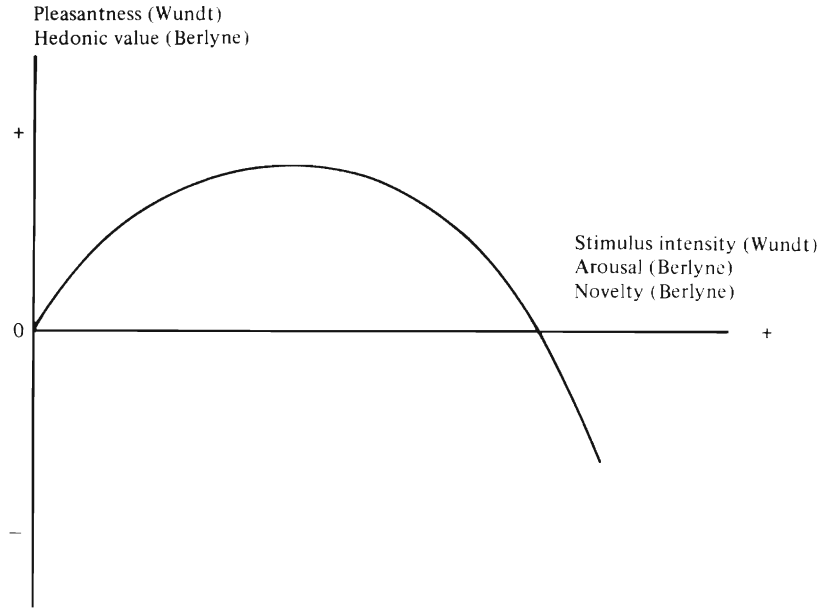

Figure 1. The Wundt/Berlyne curve.

Novelty in Fig. 1 starts at nought, and this presents a conceptual problem. Zero novelty implies that the person is totally familiar with the stimulus. However, the view may be taken that such complete familiarity is never, strictly speaking, achieved. Familiarity may be thought of as increasing *ad infinitum* with continued exposure to the stimulus. Complete unfamiliarity, on the other hand, clearly occurs when exposure to the stimulus is nil, i.e. when the stimulus is entirely strange to the person.

The difficulty of conceiving of novelty as starting at zero in the Berlyne curve which relates hedonic value to novelty has prompted us to propose a function presented in Fig. 2. In this curve the axis of abscissae is the reverse of that in Fig. 1, that is high novelty (low

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familiarity) is now on the left and low novelty (high familiarity) is on the right-hand side of the figure. A consequence of this reversal is that at zero familiarity hedonic value (labelled favourability by Zajonc, 1968) is negative. This makes intuitive sense in that a strange stimulus may well be initially disliked by a person, rather than merely regarded as of neutral favourability. It should further be noted that familiarity is directly related to time. Thus, the curve in Fig. 2 assumes the form of a time function, linking in an inverted-U fashion favourability (or liking the stimulus) to the duration of the person's exposure to the stimulus.

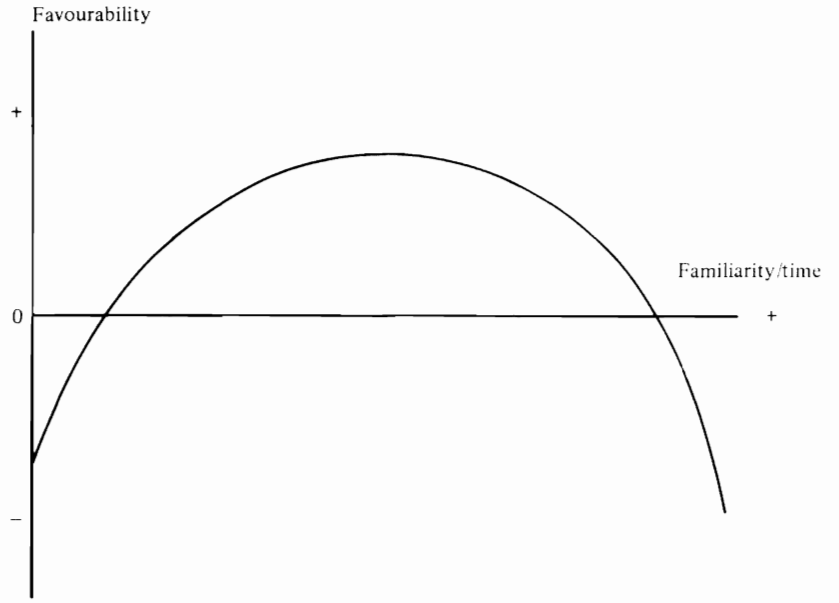

Figure 2. The hypothesized curve linking favourability to familiarity/time.

This model relationship is in keeping with everyday experience, as when liking for a new tune or poem gradually increases with time and then slowly declines. Two sets of experimental findings, however, those stemming from the work of Cantor (e.g. Cantor, 1968; Cantor & Kubose, 1969) and Zajonc (e.g. Zajonc, 1968; Zajonc & Rajecki, 1969) appear not to fit the inverted-U curve (Hutt, 1975). The Cantor-type results indicate that familiarization with stimuli reduces liking for them; the Zajonc-type results show that the more familiar the stimuli the better they are liked.

It has been said that Zajonc-type results occur in situations in which the stimuli with which the subject is familiarized are complex in relation to the subject's prior general experience (Berlyne, 1970; Faw & Pien, 1971). Such stimuli are preferred to similar but totally strange stimuli. In studies of this kind the relationship between familiarity and favourability is positive and approximately linear. When familiar stimuli are simple in character, as in the Cantor-type studies, favourability is thought to decrease with increased familiarity in a roughly linear manner (see review of 'two-factor' theories by Harrison, 1977). Thus the varying findings may be only seemingly conflicting; they could be the result of differing experimental conditions. It has been suggested that some cases fit the ascending part of the inverted-U curve in Fig. 2, some cases fit the descending part, and yet others, in which liking was found to be independent of familiarity, fit the top, approximately flat, part of the curve (e.g. Crandall *et al.*, 1973; Stang, 1974). However, a common feature of well-nigh all the previous studies is the relatively short range over which the familiarity

variable has extended. This may well have been responsible for the approximately straight-line functions found to link favourability to familiarity, either rising, or flat, or falling.

To investigate the effect on favourability of familiarity ranging widely from very low to very high, special experimental procedures have to be employed. In fact, in more recent times, some studies have attained this aim by utilizing the subjects' naturally acquired familiarity with common stimuli such as letters and words. Thus, Sluckin *et al.* (1973), using letters and letter-like shapes as stimuli and children as subjects, found that 'favourability is a function of exposure, but that additional exposure does not necessarily increase favourability and may even reduce it' (p. 563). Colman *et al.* (1975), using words and word-like syllables as stimuli and children and young adults as subjects, found 'an inverted-U function relating familiarity and liking' (p. 481).

Design and methodology

A few words need to be said about the design and methodology of the present experiment, since it differs in certain important respects from most previous research in this area. The first somewhat unusual feature is the between-subjects design, used previously by Harrison (1969) and Moreland & Zajonc (1977), rather than the much more common within-subjects design. In our experiment subjects were randomly assigned to conditions in which they were called upon to rate *either* their familiarity with *or* their liking for the chosen words. One of the advantages of this design feature is that the results are unaffected by any hypotheses or expectations on the part of the subjects concerning the relationship between familiarity and liking, since none of the subjects knows that these are the two variables under investigation. A potential source of artifact in the results, which is present in all within-subjects designs, is excluded.

Another feature of the design sets it apart from most previous work in this area, namely the use of subjective measures of both familiarity and liking. Harrison (1969) has used ratings of familiarity with persons (public figures) but not with ordinary words. Most previous studies have used subjective measures of liking but have manipulated the familiarity of the stimuli by varying the number of exposures the subjects have to them. In the present experiment, the number of previous exposures varies from zero to literally millions but is not known in specific cases. The subjects were requested simply to rate familiarity in an analogous fashion to their ratings of liking. Moreland & Zajonc (1977) have reported an association between liking on the one hand and both subjective and objective familiarity on the other. The reasons for our use of a subjective measure of familiarity are (*a*) the comparatively large variance in familiarity which this enabled us to investigate; (*b*) the fact that objective indices of the familiarity of words (e.g. word counts) are not only inevitably obsolescent and culturally biased but also give at best a rough approximation to the familiarity of the subjects in a specific experiment with the words chosen; (*c*) that such objective measures are based in any event on averages, whereas the subjective procedure enabled us to measure directly the familiarity of each subject with each word separately; and (*d*) that subjective measures have been found to be better predictors of favourability than any objective ones (Harrison, 1977).

The final and possibly most significant design feature is the use of naturally occurring stimuli of varying degrees of familiarity rather than stimuli whose familiarity has been artificially manipulated in the course of the experiment. Thus, following Sluckin *et al.* (1973) and Colman *et al.* (1975), stimuli are chosen with which the subjects are more or less familiar; in the present case they are words. In most previous work in this area, the stimuli are initially novel and an attempt is made to manipulate their familiarity by repeated exposure. The methodology used in the present experiment, however, allows a much wider

range of the familiarity continuum, from complete unfamiliarity in the case of obscure words to extremely high levels in the case of common words, to be investigated.

Method

Subjects and procedure

The subjects were 33 young adults (18 females and 15 males) whose ages ranged from 19 to 43, with a mean of 23·3 years. Seventeen subjects were randomly assigned to the Familiarity condition and 16 to the Favourability condition.

The quasi-random method of selecting the stimulus words was as follows. From every 10th page of the *Pocket Oxford Dictionary* (rev. ed.) a one-syllable word was selected at random. If the word turned out to denote an object or idea of an obviously emotive kind, which occurred very rarely, it was rejected and another one-syllable word was selected. Further, words such as 'and', 'of', etc., which have no clear meaning when considered on their own were also rejected. In several cases no suitable word was found on the designated page; in these cases words were then considered in exactly the same way from the following page. This procedure resulted in the selection of 98 of the 100 words used in the experiment (there are 980 pages in the dictionary). The final two were selected by choosing two more pages at random from the dictionary and then following the procedure described above. The final list contained 100 words ranging from 'add' through 'manse' to 'zone'. Some of the words selected were extremely common (e.g. 'chair', 'meet', 'two') and some extremely rare (e.g. 'crore', 'nard' and 'surd').

Each word was typed in lower case on a separate 5×3 in index card. The 100 cards were stacked in a deck and well shuffled before being presented to each subject. In addition to the shuffled deck of cards, each subject was presented with five additional cards. In the Familiarity condition, these cards contained the following phrases: 'Very uncommon words in my experience', 'Quite uncommon words in my experience', 'Words which are neither common nor uncommon in my experience', 'Quite common words in my experience' and 'Very common words in my experience'. The five additional cards used in the Favourability condition contained the following phrases: 'Words I dislike', 'Words I rather dislike', 'Words I neither like nor dislike', 'Words I rather like' and 'Words I like'. Subjects were tested separately and in each case were simply given these materials and requested to sort the words into five piles as indicated (in addition, they were asked to try to put roughly equal numbers of cards in each pile if possible). After the subject had completed the sorting, the results were transferred to a standardized scoring sheet, and the cards were shuffled for the next subject.

Results

Mean familiarity and favourability ratings were computed for each of the 100 words, and plotted in scattergram form (Fig. 3). Each point can be regarded as fairly robust, since the mean ratings are derived from samples of 17 and 16 subjects respectively.

Visual inspection of the scattergram provides some support for the inverted-U relationship. The hypothesized curve rises predictably for words of low familiarity, and appears to flatten out at values within the range of approximately 1·5–3·0. The high familiarity words show a greater degree of clustering, and there is a tendency for favourability ratings to drop at the top of the familiarity scale. This hypothesized relationship was tested in three ways.

(*a*) Product–moment correlations were computed between familiarity and favourability ratings over all 100 words ($r = 0{\cdot}25$, $0{\cdot}05 > P > 0{\cdot}01$); for the 41 words with familiarity ratings less than 2·5 ($r = 0{\cdot}47$, $0{\cdot}01 > P > 0{\cdot}001$), and for the 59 words with ratings greater than 2·5 ($r = -0{\cdot}27$, $0{\cdot}05 > P > 0{\cdot}01$). The first result is predictable: the overall shape of the scattergram would lead us to expect a moderately significant positive correlation. The increased value of r for our 41 words of low familiarity provides support for the initially rising portion of the inverted-U curve, and the significant negative relationship for the words of higher subjective familiarity confirms that there is a fall in the curve within this range. Three regression lines have been drawn in Fig. 3 to illustrate these relationships.

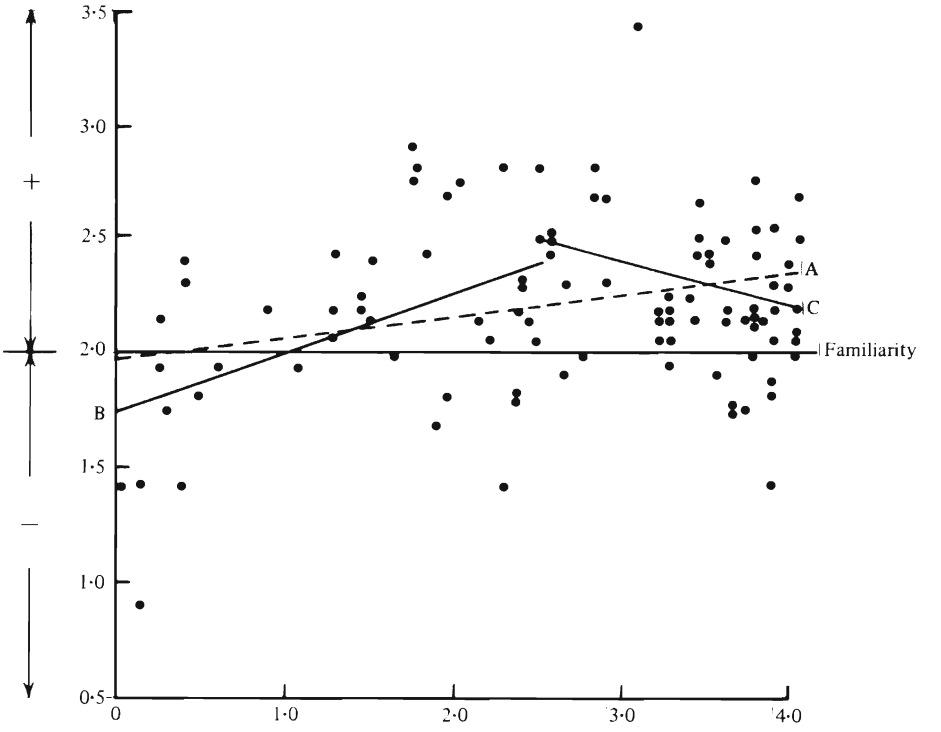

Figure 3. Scattergram of mean familiarity and favourability ratings for 100 words, with regression lines (A) for the whole sample, (B) for those words with familiarity < 2·5 and (C) for those words with familiarity > 2·5.

(*b*) The analysis of variance technique for testing for linearity of regression of one variable on another (McNemar, 1962) was applied to the data, coded into familiarity step-intervals of 0·5. Using the variance estimates computed in Table 1, we find that the correlation ratio is highly significant (eta = 0·49; $F = 4{\cdot}16$, d.f. = 7, 92, $P < 0{\cdot}001$), and that the departure of the array means from linearity is also statistically significant ($F = 3{\cdot}64$, d.f. = 6, 92, $0{\cdot}01 > P > 0{\cdot}001$). This means that we can confidently assert that the relationship between familiarity and favourability departs significantly from linearity.

Table 1. Analysis of variance table for regression of favourability on familiarity scores

Source	Sum of squares	d.f.	Variance estimate	*F*
Linear regression	4·11	1	4·11	
Deviation of means from line	12·21	6	2·04	3·64**
Between-array means	16·33	7	2·33	4·16***
Within arrays	51·11	92	0·56	
Residual from line	63·33	98	0·65	
Total	67·44	99		

** $0{\cdot}01 > P > 0{\cdot}001$; *** $P < 0{\cdot}001$.

(*c*) To gain further information about the nature of this departure from linearity, a curvilinear regression analysis was performed on the data (Kerlinger & Pedhazur, 1973). This analysis enables us to test the significance of increments in the proportion of the total variance successively accounted for by linear, quadratic, cubic, quartic and higher power relationships. Since the hypothesized inverted-U function would lead us to expect a significant quadratic component, the analysis was performed using the second-degree polynomial equation

$$\text{FAV} = a + b\,(\text{FAM}) + c\,(\text{FAM})^2.$$

The significance of the incremental variance accounted for by the quadratic component was tested by computing

$$F(k_1 - k_2,\ n - k_1 - 1) = \frac{(R^2_{\text{FAV.FAM, FAM}^2} - R^2_{\text{FAV.FAM}})/(k_1 - k_2)}{(1 - R^2_{\text{FAV.FAM, FAM}^2})/(n - k_1 - 1)},$$

where n = number of words, k_1 and k_2 = degrees of freedom for $R^2_{\text{FAV.FAM, FAM}^2}$ and $R^2_{\text{FAV.FAM}}$ respectively. With $R^2_{\text{FAV.FAM, FAM}^2} = 0{\cdot}22$ and $R^2_{\text{FAV.FAM}} = 0{\cdot}06$, we find that $F = 19{\cdot}22$, d.f. = 1, 97, $P < 0{\cdot}001$: the quadratic component of the relationship between familiarity and favourability is highly significant, which suggests support for the inverted-U. The proportion of the total variance unexplained by the linear and quadratic components = $1 - 0{\cdot}22 = 0{\cdot}78$: we must now use this as the error term in testing the significance of the linear component alone. We find that

$$F(k_2,\ n - k_1 - 1) = \frac{R^2_{\text{FAV.FAM}}/k_2}{(1 - R^2_{\text{FAV.FAM, FAM}^2})/(n - k_1 - 1)} = 7{\cdot}43 \quad (0{\cdot}01 > P > 0{\cdot}001).$$

The significance of the linear relationship between the two variables is confirmed, and is slightly lower than that of the quadratic component.

Discussion

When the stimulus words were roughly split into two groups, the relatively unfamiliar and the relatively familiar, liking was found to be positively related to familiarity in the former case (as in Zajonc-type studies) and negatively related to familiarity in the latter case (as in Cantor-type studies). The function that properly fitted the familiarity–favourability relationship over the full range of the familiarity variable was found to be curvilinear, first rising and then falling. Thus the result contained both the Zajonc-type *and* the Cantor-type effects, showing them to be complementary rather than contradictory. We undoubtedly achieved this by using a very wide spread of the independent variable; and this was made possible by the particular experimental procedure adopted.

The complex dependence of liking for the words used in this experiment on their rated familiarity is striking. In particular, several of the very unfamiliar words were quite strongly disliked, and many of the words of intermediate familiarity were strongly liked. The possibility cannot be ruled out, of course, that correlations between degree of familiarity and other variables, e.g. association value and meaningfulness, may mediate the relationship we found (Cofer, 1972), and therefore our results could be partly artifactual. Our experimental procedure and method of word selection were such as to render the probability of this confounding bias relatively low.

It is not being suggested, of course, that familiarity is the sole factor which determines liking for stimuli. What has been shown in this as in previous studies, however, is that familiarity is one important factor. It appears, furthermore, that when a sufficiently wide range of the novelty/familiarity continuum is sampled, the characteristic function relating familiarity and liking is of the inverted-U type. Theoretical considerations suggest that the

parameters of this function may depend upon such factors as the subjective complexity, discriminability and orderliness of the stimulus objects. A plausible hypothesis may be that an inverted-U-shaped curve obtains in all cases, but that simple, highly discriminable and ordered stimulus patterns attain peak attractiveness at low levels of familiarity, while complex poorly discriminable and unpredictable patterns produce curves whose peaks occur at relatively high levels.

More detailed research is, therefore, needed to test conjectures of this kind. It is not impossible that work along these lines could help to account for the apparently haphazard way in which fashions wax and wane within a given culture like our own, rather slowly in some cases (e.g. classical music), somewhat more quickly in others (e.g. women's clothes) and very rapidly in still others (e.g. pop music).

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