

## **Anger and Expression of Aggression: Effects on Aesthetic Preference<sup>1</sup>**

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Preference for melodic sequences of different complexity was found to vary as a function of whether or not the subjects aggressed, prior to the aesthetic-preference test, against a person who had angered them. One-third of the subjects were individually annoyed by a "confederate" of the experimenter, and then gave "electric shocks" to this person (Annoy-Shock). Subjects in the Annoy-Wait group were also angered, but had no opportunity to "hurt" the annoyer. The controls were neither annoyed nor did they perform aggressive responses (No Annoy-Wait). All subjects then chose on each of 50 trials between listening to a more complex (9.17 bits/tone), or a less complex (4.00 bits/tone), 10-second computer-generated melodic sequence. As predicted, the Annoy-Shock and the No Annoy-Wait subjects chose the more complex sequences significantly more often than the Annoy-Wait subjects did. The results demonstrated that aggression-related aspects of a dyadic social interaction are relevant for predictions of aesthetic preference.

While examining some unexplored consequences of human aggressive behavior and aversive emotional states, such as anger and frustration, the experiment reported here demonstrates that the specification of the often elusive motivational variables governing aesthetic behavior may be improved by considering the social antecedents of such behavior. In particular, factors arising in an aversive social interaction were found to influence the aesthetic preference of participants in such an interaction.

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Despite the continuing debate over the validity of the catharsis hypothesis (e.g., Bandura, 1973; Feshbach, 1970), it seems clear that a decrease in the amount of aggressive responding of angered individuals does occur following some forms of "expression of aggression." When a person's anger is experimentally induced, the amount of his subsequent aggression against the annoying agent may be reduced, in comparison to the appropriate controls, by giving him the opportunity to "hurt" the annoyer (Doob & Wood, 1972; Konečni, 1975; Konečni & Doob, 1972). Needless to say, there are numerous specifiable conditions under which the decrease in aggressive activity does not occur; conversely, the amount of angered subjects' subsequent aggression may be reduced by nonaggressive activities (e.g., Ebbesen, Duncan, & Konečni, 1975; Konečni, 1975).

The annoyance/frustration manipulation developed in these earlier studies involves a trained "confederate" of the experimenter (posing as a subject), who insults the true subject in a standardized manner, and prevents the latter from completing an intellectual task. It seems justifiable to regard the manipulation as an arousal-raising device (Berlyne, 1971). In fact, it has been found that cardiovascular indices of arousal rose sharply when subjects were exposed to a similar manipulation; however, a decrease in the level of the annoyed subjects' arousal, in comparison to controls, followed their administration of "electric shocks" to the annoyer (Gambaro & Rabin, 1969; Hokanson, Burgess, & Cohen, 1963; Hokanson & Shetler, 1961). These results complement the findings of studies using aggression as the dependent variable.

It has been proposed by Berlyne (1960, 1967) that the fluctuation of arousal in the perceiver is determined by a number of stimulus properties, among which are the "collative" ones (complexity, variety). The model is ultimately based on the relationship between stimulus properties affecting the level of arousal and the "hedonic value" associated with different levels. It asserts that an excessively high level of arousal is aversive. Since complexity and other collative variables appear to play a major role in aesthetic phenomena, this motivational framework has been extended to account for aesthetic appreciation in general (Berlyne, 1971).

One of the important implications of the model is that highly aroused subjects should shun stimuli which ordinarily raise the level of arousal. As a consequence of the additional impact of such stimuli, the already high level of arousal would presumably reach the aversive range. Complexity (or uncertainty, in information-theory terms) is one of the collative variables which has been shown to affect arousal: Its level tends to be raised by complex stimuli, in comparison to the effect of simpler ones (Berlyne, Craw, Salapatek, & Lewis, 1963; Bryson & Driver, 1969). In accord with

these propositions, various arousal-raising procedures (loud noise, expectation of shocks, methamphetamine) have indeed been found to lead human and infrahuman subjects to *decrease* self-exposure to *complex* auditory and visual patterns (Berlyne, Koenig, & Hirota, 1966; Berlyne & Lewis, 1963; Day, 1967; Konečni & Sargent-Pollock, 1975).

Hypotheses of considerable interest can be formulated by simultaneously considering the two sets of findings which have been outlined, even though these findings stem from two quite different lines of research (the aggression and collative motivation literatures). Provided that the reward value of complex stimulus patterns is decreased when the level of arousal is high, and if anger represents a state of aversively high arousal which can be brought down by angered people's hurting of the annoyer, one would expect such anger- and aggression-related activities to influence aesthetic choice behavior, where melodic sequences of different complexity are the choice alternatives. In comparison to nonangered subjects who are presumably characterized by an intermediate ("normal") level of arousal prior to choice, the highly aroused, angered subjects should choose the more complex patterns relatively less often. Conversely, angered subjects who had an opportunity to administer "shocks" to the annoyer should display choice behavior similar to that of nonangered controls.

## METHOD

### *Subjects and Design*

The subjects were 36 male and female experimentally naïve University of Toronto introductory psychology students and high school students (17–18 years of age) solicited by newspaper advertisements; the latter were paid \$2 for participating in the 1-hour experiment. A total of 44 subjects was actually run in the study, but 8 were eliminated for various reasons: Three saw through the annoyance manipulation, 3 misunderstood the instructions for the final part of the experiment and yielded no data, 1 had a speech disorder, and for 1, data were not collected due to equipment failure.

There were three experimental conditions, with 12 subjects randomly assigned to each condition. Subjects in the Annoy–Shock condition were first annoyed by the confederate and then allowed to express aggression toward this person. The Annoy–Wait subjects did not have an opportunity to express aggression after being angered. Finally, the No Annoy–Wait subjects were neither annoyed nor did they give shocks to anyone.

### *Procedure*

The confederate (a female third-year student) arrived at the laboratory at about the same time as the subject, and the two were brought together to the experimental rooms. The procedural details, the setting, and the instructions given for the first part of the experiment were identical to those reported by Konečni and Doob (1972, pp. 382–383). The experiment was said to deal with problem-solving, and the two participants were given identical lists of different anagrams on which they were to work independently for 7 minutes. About 3 minutes after the experimenter's departure, the annoyance manipulation began if the subject had been thus assigned. The experimenter was "blind" as to whether or not the confederate annoyed the subject; the confederate was unaware of the condition in which the subject would be next. The confederate finished the anagrams quickly and began to insult the subject, mainly about his or her poor performance. Since these rude comments continued until the experimenter's return, most Annoy subjects failed to solve any of the anagrams. If the subject had been assigned to the No Annoy condition, the confederate worked quietly, without disturbing the subject in any way. These subjects usually solved 3–4 anagrams.

After the anagram task, some of the Annoy subjects were allowed to "hurt" the confederate (the Shock condition), whereas others were assigned, like all of the No Annoy subjects, to the no-aggression (Wait) condition. In the latter case, the confederate was sent off to participate in another (fictitious) experiment, and the subject was left alone in the room for 7 minutes. In the Shock condition, the confederate was "randomly" appointed the "learner," and the subject the "teacher." The former was to "learn" a list of word–number associates, after which the subject would read the word in each pair, whereas the confederate would try to recall the associated number. Ostensibly in order for the effect of punishment on recall to be studied, the subject was to deliver a "relatively painful, but safe" electric shock to the confederate for each incorrect response (no shocks were actually delivered). Following an explanation of the operation of the shock-button to the subject, and "assurances" to the confederate that no hazard was involved, the latter was escorted to an adjoining cubicle to learn the list. After a 4-minute learning period, the subject heard the experimenter attach palm electrodes to the confederate and the testing session began (with the experimenter absent). The two participants were in auditory, but not visual, contact. During the 3-minute session, the confederate made 14 standard errors, and each subject pressed the shock-button 14 times. This manipulation was identical to that used by Konečni and Doob (1972).

After this period, the confederate was sent away in the Shock condition also. Instructions for an allegedly "quite different experiment, involving preference judgments" were given to all subjects. Each was asked to press one of two buttons every 10 seconds and told that while he would hear a "melody" in either case, its type would differ depending on the button he or she pressed. The melody would go on for 10 seconds and could not be discontinued during that interval. It was stressed that there were no right/wrong responses. Two 10-second examples of each of two types of melodies were demonstrated to the subject, with the left-right positioning of buttons and the order of demonstration completely counterbalanced across subjects. A "trial" consisted of pressing a button and hearing in both ears (through the earphones) either a simple or a complex melody for 10 seconds. There were 50 such trials for each subject, but the number was not announced in advance. The main dependent measure was the proportion of complex melodic sequence choices made by subjects. Each subject then rated the confederate on several scales (identical to those described by Konečni and Doob, 1972), and was carefully told about the true nature of the experiment.

The melodic sequences used were chosen from a set constructed by Crozier (1974, pp. 56-58), using an algorithm taken from Vitz (1966). A PDP-8/S computer was used to generate melodic sequences varying in complexity, or "uncertainty" (Garner, 1962). This was achieved by varying the number of pitches, durations, and loudnesses from which the two sequences were constructed. A tone could be repeated before all other possible tones within a type had been chosen (sampling with replacement), with an average of two tones being presented per second. The quantification in information-theory terms consisted of taking the logarithm (base 2) of the total number of possible tones used in the construction of a given type of melodic sequence. In the construction of simple sequences, there was a total of 16 possible tone-events (different pitch-duration-loudness combinations), or a complexity/uncertainty level of 4.00 bits/tone; 576 tone-events were possible for complex sequences or 9.17 bits/tone.<sup>3</sup> As a result of the method of construction, different 10-second sequences of a given type were similar, but not identical. However, both quantitatively and subjectively, any 10-second simple sequence was far simpler, involving less uncertainty, than

<sup>3</sup>The 4 simple-melody pitches (note names and cps) were F<sub>4</sub> (349), G<sub>4</sub> (392), A<sub>4</sub> (440) and C<sub>5</sub> (523); durations (2) were 333 and 667 msec; loudness levels (2) were 75 and 80 db. Complex-melody (18) pitches were F<sub>4</sub>, G<sub>4</sub>, A<sub>4</sub>, B<sub>4</sub> (466), C<sub>5</sub>, D<sub>5</sub> (587); F<sub>3</sub> (175), A<sub>3</sub> (220), C<sub>4</sub> (262), D<sub>4</sub> (294), F<sub>2</sub> (698), G<sub>2</sub> (784); F<sub>2</sub> (87), C<sub>3</sub> (131), D<sub>3</sub> (147), A<sub>2</sub> (880), C<sub>2</sub> (1047), F<sub>1</sub> (1397); durations (8) were 40, 81, 162, 323, 485, 646, 970, and 1293 msec; loudness levels (4) were 70, 75, 80, and 85 db. Durations within a type were in prime number ratios, thus producing an underlying rhythmic pulse, or "tempus," known as "quantitative rhythm," and common in Western musical composition.

any 10-second complex sequence. Loosely speaking, while the former were reminiscent of nursery tunes, the latter resembled avant-garde music. However, earlier work had indicated that normally aroused subjects choose the two types of melodic sequences equally often, and listen to them equally long (Crozier, 1974, pp. 75, 80).

## RESULTS AND DISCUSSION

Ratings of the confederate clearly indicated that the annoyance manipulation had been successful. The Annoy-Shock and Annoy-Wait subjects, in comparison to the No Annoy-Wait ones, rated the confederate as far more aggressive and domineering, as colder and less likeable ( $F$  values ranged from 8.67 to 48.66,  $df = 2/33$ ,  $p < .01$ ). The results on all scales were remarkably similar to those previously obtained by Konečni and Doob (1972).

The main dependent measure was the percent of complex (9.17 bits/ tone) choices made by subjects in the three conditions over 5 blocks of 10 trials each. These results are presented in Table I. The major finding was a significant main effect of Conditions ( $F = 5.93$ ,  $df = 2/33$ ,  $p < .01$ ), which was due to the difference between the Annoy-Wait and the other two conditions. The planned contrast of Annoy-Shock + No Annoy-Wait versus Annoy-Wait was significant ( $F = 11.27$ ,  $df = 1/33$ ,  $p < .01$ ), and the residual contrast of Annoy-Shock versus No Annoy-Wait was not ( $F < 1.0$ ). While the Annoy-Shock and No Annoy-Wait subjects chose the less complex and the more complex melodic sequences about equally often (50.00% and 56.17%, respectively, of complex-melody choices over 50 trials), the Annoy-Wait subjects clearly preferred the simpler sequences and made only 29.33% of complex choices (see Table I). The main effects

Table I. Mean Percent of Complex Sequence Choices by Experimental Condition, over Blocks of Trials

Condition <sup>a</sup>	Complex sequence choices over blocks of 10 trials (mean %)					Complex sequence choices over 50 trials (mean %)
	1	2	3	4	5	
Annoy-shock	46.67	40.83	55.83	50.83	55.83	50.00
Annoy-wait	37.50	26.67	27.50	28.33	26.67	29.33
No annoy-wait	55.83	55.83	55.00	60.00	54.17	56.17

<sup>a</sup>12 subjects per condition.

of Blocks of Trials and the Sex of Subjects, and all interactions, were negligible. There were also no significant differences between the high school and university students, and between paid and unpaid subjects.

Thus, highly aroused, angered subjects (Annoy-Wait) shunned the more complex sequences and clearly preferred to listen to the simpler ones. However, when angered subjects had been given an opportunity to hurt the annoyer (Annoy-Shock), which presumably decreased their level of arousal, these subjects' aesthetic preference became indistinguishable from that of the nonangered, normally aroused subjects. Viewed in conjunction with other findings mentioned earlier, the present results suggest that angered subjects' hurting of the annoyer may decrease their subsequent aggression partly because the aggressive action lowers their level of arousal, thus reducing the physiological basis for their continuing to label themselves angry.

The demonstration of effects of anger and expression of aggression on aesthetic preference is important from three points of view. First, the results clearly showed that aesthetic preference may be influenced by external variables of social nature. Second, aggression research may benefit from the convergence of its findings with those in another research area, in which the dependent measure used in the present research had been developed (experimental aesthetics and exploratory choice). Third, in giving support to somewhat counterintuitive predictions not derivable from other theoretical positions, the result demonstrated the heuristic value of the arousal model of motivation (Berlyne, 1971).

However, the role of cognitive processes in this situation must not be underestimated. One way in which such processes are likely to be important has already been implied. Insulted people are not presumably just physiologically aroused, but also cognitively interpret the source of the arousal-level increase and label their state as anger (cf. Konečni, in press; Schachter, 1964).

In addition, further research must examine the necessity of postulating an information-processing link between pronounced emotional states, such as anger, and aesthetic preference. On one hand, it is possible to argue that angered people who had not hurt the annoyer preferred simple stimuli because their occurrence precluded the exposure to more arousing events, or else because simple sequences were actively soothing. Alternatively, it could be argued that at a high level of arousal the information-processing capacity of the organism is reduced (cf. Sokolov, 1958), so that simpler stimuli represented the level of environmental complexity which angered people *could* process without a cognitive overload. The latter view is congruent with that of Schroder, Driver, and Streufert (1967) who suggest that the level of information processing is an inverted U-shaped function of environmental complexity. One could deduce from their model that a

person characterized at a certain time by a given level of information processing (the result of annoyance and shock-giving, or the lack of one or both of these) would be best suited to process input of certain complexity. Thus, simple melodies may have been overwhelmingly chosen by the Annoy-Wait subjects because they could process them without much difficulty.

While these are important theoretical and research issues, the present results convincingly demonstrated that anger- and aggression-related aspects of a dyadic social interaction are relevant for predictions of aesthetic preference. On three different dimensions it is now possible to distinguish nonangered individuals and the ones who were made angry but were given an opportunity to hurt the annoyer, from those who were also angered but had no such opportunity. Compared to the latter group, people in the first two groups tend to hurt the person they interacted with less (e.g., Konečni & Doob, 1972), their level of arousal is lower (e.g., Hokanson et al., 1963), and they expose themselves relatively more often to melodic sequences of greater complexity.

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