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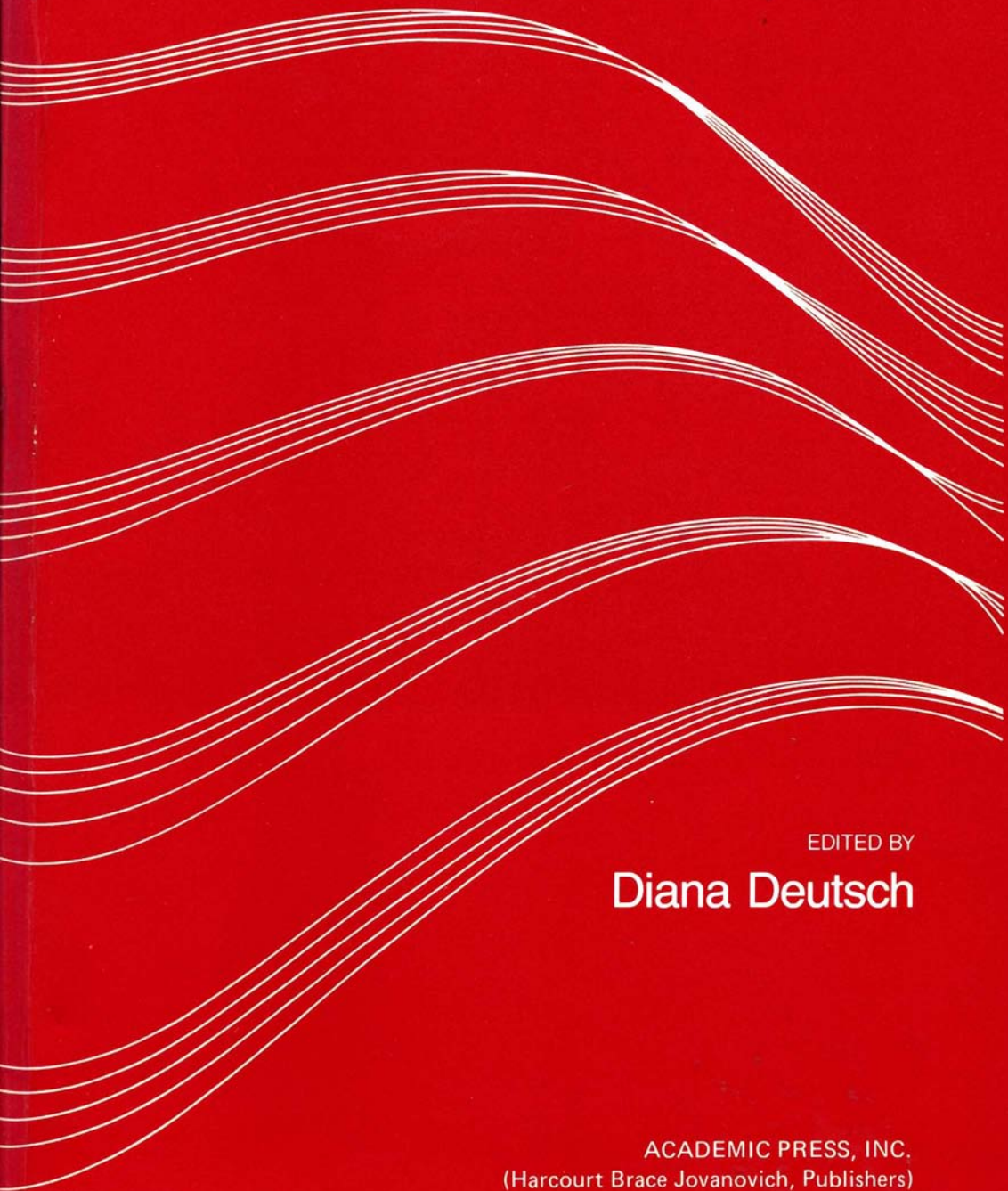

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Social Interaction and Musical Preference

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I. INTRODUCTION

Studies of aesthetic preference and of the process of appreciation have always represented a major aspect of experimental aesthetics and of the psychology of music and art (e.g., Child, 1969). Experimental work on, and theorizing about, preference for both authentic pieces of music and visual art, on one hand, and for stimulus patterns synthesized specifically for experimental purposes, on the other, have been going on at least since Fechner's (1876) *Vorschule der Ästhetik*, and have had a major boost in the 1960s and 1970s through Berlyne's "new experimental aesthetics" (Berlyne, 1971, 1974) and other influential developments (e.g., Arnheim, 1966; Farnsworth, 1969; Francès, 1958, 1968; Kreitler & Kreitler, 1972; Meyer, 1956). Numerous studies of musical preference have been carried out both early in the century (e.g., Gilliland & Moore, 1924; Moore, 1914) and more recently (e.g., Bragg & Crozier, 1974; Crozier, 1974; Heyduk, 1975; Konečni & Sargent-Pollock, 1976; Overmier, 1962, Simon & Wohlwill, 1968; Steck & Machotka, 1975; Vitz, 1966), and

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there have been several good reviews and theoretical integrations, which, though greatly varying in breadth, are all helpful for a better understanding of preference (e.g., Berlyne, 1971; Child, 1978; Madsen, 1973; Meyer, 1956; Walker, 1973).

The sheer size of the literature on music preference sometimes obscures the existence of a serious imbalance in terms of the amount of experimental and theoretical attention that has been devoted to various topics that can be reasonably regarded as falling within this area. For example, a great deal of effort seems to have been invested in discovering the exact shape of the function relating preference (in terms of ratings of pleasingness and interestingness, listening time, and various choice measures) to the complexity of authentic and synthesized musical materials (e.g., Berlyne, 1971; Steck & Machotka, 1975; Heyduk, 1975). By comparison, other issues have been almost completely ignored. For example, the vast majority of research studies and most of the theoretical attempts have treated aesthetic preference and choice as if they, and the process of appreication itself, normally occur in a social, emotional, and cognitive vacuum, as if they were independent of the contexts in which people enjoy aesthetic stimuli in daily life. In contrast, one of the main contentions of the present chapter is that a thorough understanding of aesthetic behavior cannot be achieved without examining how it changes as a function of its immediate social and nonsocial antecedents, concurrent cognitive activity, and resultant emotional states (cf. Cantor & Zillman, 1973). Before I examine these points in more detail, it seems useful to speculate about the reasons for the fact that social, emotional, and cognitive context factors have been so consistently ignored.

One possible reason is that psycho-aestheticians have underestimated or failed to grasp the significance of the extent to which music appreciation has been radically altered by the technological and social changes in the twentieth century. Consider first the conditions prevailing in the eighteenth and nineteenth centuries, when non-folk music was performed almost exclusively in the salons of the wealthy and later in the concert halls and opera houses accessible only to the privileged few. Enjoyment of music was a special occasion, something carefully planned in advance, each performance a unique, fleeting event. Contrast that with our times. There is wide availability of relatively low-cost, high-quality equipment for the recording and reproduction of music. There are excellent recordings of an astonishing range of musical pieces. In most large cities of the Western world, there are numerous radio stations specializing in every conceivable type of music and making it available on a 24-hour basis. Consider the amount of time in an average day that so many people spend listening to music—in their homes, offices, and automobiles (even while walking or roller skating!).

As a function of all of these factors taken collectively, a veritable revolution in music appreciation has occurred. Music of all types has become a major part of the lifestyle of a very large number of people.[1] Gone are the days when only the elite could hear high-quality music, while the rest had to await weddings and harvest

[1]Although perhaps not quite to the same extent, the advent of television has analogously revolutionized the appreciation of theatrical performances, opera, and ballet, and vastly increased the number of viewers.

festivities to hear any music at all (unless they produced it themselves or were content with bird songs). This situation has been replaced by the penetration of music into every corner of people's lives, literally and metaphorically. Entire generations of youngsters have been brought up on rock-'n'-roll. Social mini-movements and subcultures revolve around music and its association to other mood-optimizers, such as drugs and alcohol.[2] The most frequent, prototypical situations in which people listen to music have shifted from specialized locations, such as opera houses and concert halls, into the informal settings like the home and the automobile.

Perhaps related to this notable disregard for the technological and social changes affecting music appreciation are the prevailing elitist views of what constitutes "serious" music and, especially, which types of music are worthy of serious attention by psycho-aestheticians. Commonly ignored in both the experimental and theoretical work in the psychology of music are even the best examples of the jazz, rock-'n'-roll, and rhythm-and-blues idioms. The typically given reasons why these forms of music are not worthy of study are quite feeble when one considers the imprecision and arbitrariness of the existing formal definitions of what constitutes "serious music," the extent of the disagreement in value judgments among the critics, aestheticians and aesthetes themselves, and the extent to which all definitions and evaluations are culture- and period-bound. Above all, the exclusion of, say, rock-'n'-roll from the pool of music worthy of scientific attention blatantly ignores the obvious fact that it brings a great deal of pleasure to an immense number of people. These people's aesthetic preference and choice are presumably at least as important as those of the minority preferring "serious" music—if one is interested in developing a general theory of music appreciation. Moreover, major aspects of the aesthetic experience (in terms of both the factors affecting choice behavior and the hedonic effects of the music) may well be more similar for the appreciators of Palestrina, Stravinsky, and Led Zeppelin, respectively, than is generally believed.[3]

What seems needed is a broader perspective on music appreciation, one that transcends the narrow, elitist, and arbitrary definitions of what constitutes good and serious music and also takes into account the reality of music appreciation in our time. From this perspective, one of the most important by-products of the dramatic changes in the dominant modes and locations of music appreciation is the fact that music is nowadays so frequently enjoyed in a great variety of *social* contexts. More-or-less

[2]The following quotation from a film review by Carol Olten (the *San Diego Union*, 23 Oct. 1980) illustrates this point well, if casually:

> It is doubtful if anyone will truly define how or why rock 'n' roll or the entire area of pop music began to change the fabric of our lives. A groupie—probably a third-generation groupie—in *One-Trick Pony* . . . comes close to some explanation. "Rock 'n' roll kept me sane when I was a child. We were always moving around the country changing houses, changing schools. But on the road I could always turn on the radio and there would be the same rock 'n' roll song playing. It kept me sane, I tell you, sane." Softly, she begins to hum the first few lines of "Me and Bobby McGhee": "From the Kentucky coal mines to the California sun . . ."

[3]Introspections by a subject in an informal study ($N = 1$, myself, and an appreciator, incredibly, of both Bach and the Rolling Stones) have "confirmed" this.

active listening to music has become fully imbedded in the stream of daily life of ordinary men and women. People listen to music while working, talking, eating, engaging in sexual intercourse. That this fact has been ignored by psychoaestheticians, and that they have continued to think of preference as a process largely unrelated to social situations, is quite remarkable. What music does to people at different times, why they choose to listen to it so much, why they choose a particular type of music while engaged in a particular activity—all of these are important and unanswered questions. They cannot be answered by "speculative aesthetics" (Berlyne, 1971), by philosophical treatments of the "social function" of music and art, or by the hitherto popular types of studies of aesthetic preference. One needs to analyze preference with at least some reference to the typical situations in which music is appreciated, in social contexts, in the presence of friends, lovers, and family members, in the stream of daily life.

Whereas an average person probably rarely goes to a concert of any kind and probably never attends an operatic performance, ordinary days are filled with countless aesthetic micro-episodes—numerous conscious decisions to listen to some type of music by turning on the radio, putting on a record, and so on, and then proceeding to listen. One of the main contentions of this chapter is that the nature of these aesthetic choices, which music people decide to listen to, and for how long are to a very high extent affected by the social context in which the listening occurs. The social activity the listeners are engaged in, whom they are with, and what emotions and moods they are experiencing as a function of the social stimulation emanating from others in their environment are very likely to affect the type of music that is chosen. Furthermore, effects on choice among musical pieces (including computer-generated "melodies" synthesized for research purposes) differing on various stimulus dimensions (e.g., complexity, novelty, surprisingness) can also be reasonably expected to be a function of the nature, difficulty, information-processing requirements, and arousingness of tasks and activities in which a person is concurrently engaged. In short, what I am suggesting is that musical preference and choice may be highly affected by the social, emotional, and cognitive factors leading to, and in, the listening situation.

This point logically leads to another issue largely ignored in the psychology of music. Despite a considerable amount of interesting theoretical work on the relationship between music appreciation and emotion (e.g., Langer, 1942; Meyer, 1956, 1957), there have been few experimental investigations of the very real possibility that not only the listeners' emotional states but also their social behavior and their treatment of others in numerous everyday social micro-episodes may be perceptibly and differentially affected by music. That both subtle and major changes in social behavior may occur as a function of listening to music is another contention of the present chapter.

The two basic propositions made so far are complementary and can be related to each other within the same theoretical framework as components of a prototypical "aesthetic episode." The model assumes that music, and aesthetic stimuli in general—specialized and highly valued as they are—are simply another aspect of a person's acoustic (or visual) environment and that they are chosen largely for the

purpose of mood- and emotion-optimization. The model regards a person as being engaged in a constant exchange with the social and nonsocial environment, of which the acoustic stimuli are a part. The social behavior of others—and I am referring to the ordinary, everyday behavioral sequences unambiguously interpreted as indicating social support, love, antagonism, and so on—is assumed to have a profound effect on a person's emotional states, which, in turn, affect aesthetic choices, including the choice of music, that a person will make in a given situation.[4] The degree of enjoyment of the chosen piece presumably varies as a function of the concurrent social and nonsocial micro-environmental conditions (which also may affect the probability of that particular piece being chosen in the future).[5] Listening to music is further assumed to produce changes in the listener's emotional state and thereby affect his or her behavior toward others in the situation. Since social behavior is by definition interactive, it is safe to assume that the behavior directed toward the listener by others will also change, leading to a further modification in the listener's emotional state, and possibly to different subsequent musical choices. The model thus contains a feedback-loop feature representing the ongoing nature of a person's interaction with the social and musical environment—a series of aesthetic episodes mediated by changes in emotional state and mood.

I do not mean to imply that the factors discussed above are likely to override completely the basic individual differences in the preference for different types of music produced by, say, early exposure (see footnote 4). However, these factors can perhaps account for a respectable amount of variance in the choice behavior within the broad preference domains (e.g., classical versus rock-'n'-roll) and also increase the understanding of the reasons for the occasional choice switches across these domains.

Also the aesthetic episodes and musical choices I have been discussing clearly may well be far removed on several dimensions from the profound effects of hearing for the first time a great piece of music, be it Mozart's *Don Giovanni* or the Who's *Tommy*. But how often do such experiences occur, and how many people have them? Music clearly plays an important role in human life, but one is not likely to understand this role and develop a reasonably general theory of music preference, choice, and enjoyment by consistently ignoring the music-related behaviors of the vast majority of listeners. Indeed, a good argument can be made that further progress in the psychology of music hinges on the success of investigations of *mundane* types of aesthetic appreciation and choice, those preceded and accompanied by routine social behaviors and common emotional states.

[4]I am not denying the importance of other factors that may affect aesthetic choice, including availability and the appropriateness of listening to a particular piece of music in a given situation and, of course, a person's basic liking ("musical taste") for different types of music that is presumably affected by a host of factors in the person's upbringing, exposure, cultural conditions, musical education, peer pressure, and so on.

[5]This type of context effect in which aspects of the social environment are assumed to affect the basic liking (preference for a piece of music has been discussed by others—e.g., Child, 1978) and is, of course, a part of the folklore surrounding music preference. Child's example was of a not particularly musically inclined couple who attended a concert while falling in love and found the music divine.

My collaborators and I have so far carried out a number of experiments relevant to the various stages of aesthetic episodes. We have used different experimental paradigms, induced a variety of emotional states in our subjects, and explored the subjects' preferences and choice behavior for pieces of music ranging from computer-generated melodies to authentic musical pieces from the eighteenth, nineteenth, and 20th century, as well as contemporary rock-'n'-roll. These experiments and the analogous studies using visual aesthetic stimuli (e.g., Konečni & Sargent-Pollock, 1977; Sargent-Pollock & Konečni, 1977) should be regarded as only the first tentative steps toward the elucidation of the various components of aesthetic episodes. For one thing, although they examined the relationship between music-related behaviors and some of the social, emotional, and cognitive factors discussed above, they have so far all been laboratory experiments. Putting some of the ideas presented so far to the test, however, should facilitate subsequent field investigations, both those paralleling the laboratory studies and others designed to collect normative data. Such field investigations could perhaps be profitably organized around the basic question of how people's everyday aesthetic choices are influenced by the setting (house, automobile), emotional state (elation, anxiety, depression), information load (conversation, manual work, reading, eating), physical state (fatigue, illness), the type of other people present (family members, other intimates, co-workers), even by atmospheric conditions.

The remainder of this chapter will consist of a brief review of some of our experiments. With a few exceptions, these studies have been previously published; so the main purpose here is to convey the flavor of the research and present some of the conclusions.

II. EFFECTS OF SOCIAL STIMULATION ON AESTHETIC CHOICE

In one study (Konečni, Crozier, & Doob, 1976; also see Konečni, 1979, Section II,A), the subjects were, in the first part of the experiment, repeatedly insulted in the course of working on a task by an accomplice of the experimenter, posing as a subject. Pilot work had shown that this procedure significantly increases various psychophysiological indices of arousal and that, moreover, subjects invariably report themselves as experiencing considerable anger. In the second part of the experiment, seemingly quite unrelated to the first, the subjects, now alone in the room, chose on each of many trials to listen to 10 sec of one of two types of melodies. Both types of melodies were computer-generated; they differed considerably from each other in both objective complexity (or "uncertainty," measured in information-theory terms) and subjective complexity (measured by verbal ratings in pilot studies). The two particular complexity levels were chosen because the normally aroused subjects, experiencing no pronounced emotion, chose to listen to them about equally in pilot studies. Indeed, in the experiment proper, a control group of subjects who had not been insulted by the accomplice showed roughly equal preference for the two types of melodies over trials.

In sharp contrast, subjects who had been insulted chose the simpler of the two types of melodies about 70% of the time, shunning the more complex type. In the third experimental condition, insulted subjects were given an opportunity to retaliate behaviorally against the accomplice prior to the choice measure. In line with predictions from prior research (e.g., Hokanson & Shetler, 1961; Konečni, 1975a), which had shown that retaliation by angry people may reduce arousal level, these subjects' choice behavior was very similar to that of the noninsulted controls.

The pattern of results that was obtained had been predicted on the basis of a great deal of prior research relating arousal, anger, aggression, and collative variables, such as complexity. From the perspective of the present chapter, however, the findings are important insofar as they show that a socially induced change in a listener's emotional state may strongly affect that person's aesthetic choice (i.e., choice between musical stimuli varying in complexity—the first stage of the proposed prototypical aesthetic episode. Moreover, to the extent that the insulted subjects' preference for the simpler type of melody was reduced, brought down to "normal," by retaliation (presumably because this behavior had decreased the level of arousal and the degree of anger), the finding in that condition is also relevant for the feedback-loop aspect of the proposed model regarding the relationship between overt behavior and internal states. A person's socially induced emotional state affects his or her social behavior toward other people; in addition, the execution of actions directed at social targets affects the actors emotional state, which, in turn, regulates subsequent behavior, and so on.

Aesthetic factors fit in this feedback loop in two related ways. First, to the extent that choice between musical stimuli varying on certain dimensions (such as complexity) is affected by fluctuations in emotion and arousal, it follows that the performance or nonperformance of behaviors (such as aggression) that are seemingly totally unrelated to musical preference would turn out to be very relevant (because such behaviors seem to affect emotions and arousal). Second, insofar as listening to musical stimuli varying in complexity may itself differentially affect arousal and emotional state, it follows that music would play an important part in the behavior/internal state/behavior causal sequence.

Some of these hypotheses were further investigated in another experiment involving simple and complex computer-generated melodies, anger, and retaliatory aggression (Konečni, 1979, Section II,B). After being either insulted by an accomplice of the experimenter or neutrally treated by this person, the subjects participated in another task involving the same accomplice in the course of which, on each of many trials, they had the choice of either punishing or rewarding the accomplice by pressing the appropriate button. Unlike the situation in the experiment described earlier, the *aesthetic* consequences *for the subjects* were inextricably linked, on each trial, on their punishment versus reward choice. In the study as a whole, across all seven experimental conditions, there were three possible aesthetic consequences for the subjects: a simple melody, a complex melody, and silence. Different permutations of these three consequences were operative in different experimental conditions. For example, in one of the conditions, whenever a subject pressed the punishment button (supposedly physically hurting the accomplice), he or she heard—for as long as the button was

pressed—an example of the simple melody, whereas whenever the subject pressed the reward button, he or she heard—for as long as the button was pressed—an example of the complex melody. In another condition the pairing of the aesthetic consequences with the two behaviors in question was reversed. In still another condition pressing the punishment button yielded silence; this pairing was reversed in a further condition, and so on.

In making the predictions, we found several reasonable assumptions, based on other studies in my laboratory and elsewhere, helpful. One assumption was that in comparison to the noninsulted subjects, the insulted ones would be significantly more inclined to press the punishment button. Another assumption, more relevant to one of the components of the hypothesized aesthetic episode, was that angry subjects would prefer simple to complex melodies both in absolute terms and in comparison to the noninsulted subjects and that their preference for the no-melody (silence) consequence would fall in between.

When these assumptions are put together with other ideas presented so far, quite precise predictions can be made concerning the subjects' aesthetic-choice behavior (i.e., punishment versus reward behavior, since the aesthetic consequences for oneself and behavioral consequences for the social target, the accomplice, where inextricably linked in this experiment). The clearest preference for simple melodies (i.e., the least preference for complex melodies) should be displayed by the insulted subjects for whom listening to simple melodies is linked with the punishment of the accomplice, whereas listening to complex melodies is linked with the reward of the accomplice. At the other extreme should be the insulted subject for whom exposure to simple melodies is linked with the reward of the accomplice, and listening to complex melodies with the punishment of the accomplice. In the former condition, the two motivations (to listen to simple melodies and to punish when angry—an internal and an external consequence of the same behavior) were experimentally made maximally congruent whereas in the latter condition they were maximally divorced. The exact pattern of data for the experiment as a whole would, of course, depend on the relative strengths of the two motives (i.e., their relative strengths as manipulated in this particular experiment) and on the degree of preference for the "silence" consequence, relative to the other two consequences, for the insulted and neutrally treated subjects, respectively.

On the whole the findings closely followed the predictions and thus gave a considerable amount of support to the underlying assumptions that had been based on the previous studies and, more importantly, on the feedback aspect of the aesthetic-episode formulation. The choice between melodies differing in complexity does indeed seem to be affected both by the socially induced emotional states and by the feedback effects on such states from overt actions directed at social targets.

Another way of looking at the results would lead one to stress, perhaps with some surprise, the extent to which the performance of a socially (and presumably biologically) very important behavior—retaliatory aggression—can be modulated by the seemingly subtle differences in the musical consequences for the listener (i.e., aggressor). For example, whereas the insulted subjects who heard a simple melody whenever they

punished the accomplice (and a complex melody whenever they rewarded that person) chose the punishment button on 26.6 of the 50 trials on the average, the mean for the equally insulted subjects who heard a complex melody whenever they pressed the punishment button (and a simple melody whenever they rewarded the accomplice) was only 18.8—and this was a statistically highly significant difference. The difference between these two groups in terms of the mean duration of punishments to the accomplice was no less than about 3.8:1.

III. EFFECTS OF INFORMATION LOAD AND AROUSING NONSOCIAL STIMULATION ON AESTHETIC CHOICE

Just as the social aspects of music appreciation have been largely neglected in the psychology of music so far, so has the "cognitive context" in which choice and listening occur. Yet, it would seem clear that in many situations involving listening to music, not all of a listener's attention or processing capacity (Broadbent, 1958; Moray, 1969; Treisman, 1964) is devoted solely to the appreciation of the chosen piece of music. As often as not the person may be concurrently engaged in other intellectual activities or motor tasks. In addition to being intrinsically interesting, the issue of how various intellectual and motor activities affect aesthetic choice seems worthy of investigation for another important reason.

The reason is that there is a possibility that the effect of the socially induced emotional states on aesthetic choice (observed in the experiments discussed so far) is mediated by fluctuations in arousal level. If so, a further question arises. How do gross changes in the arousal system affect the subtle operations presumably involved in aesthetic choice? The missing link may be found through an extension of the views that high levels of arousal impair cue selection and lead to a "narrowing" of attention (e.g., Broadbent, 1971; Easterbrook, 1959). After all, in the experiments described so far as well as in real-life choice situations involving different pieces of music, people do not simply choose one piece over another but actually then proceed to listen to the chosen piece for a time. It is reasonable to assume that listening to a piece of music requires cognitive work; it requires that the components of which the piece of music consists be analyzed and processed, and that their meaning be extracted (e.g., Berlyne, 1971; Günzenhauser, 1962; Moles, 1958; Morris, 1957; Perkins and Leondar, 1977). In the experiments discussed earlier, subjects were well aware before each choice of the information-processing demands of the two types of melodies. In other words, they had a fairly good idea of how much their processing capacity would be taxed in the 10 sec following a particular choice. Similarly, in daily life, when people choose between various pieces of music or between radio stations, they are aware from prior experience of the general characteristics of the piece of music about to be listened to, including its complexity and information-processing requirements. Therefore, it could be hypothesized that the experimental subjects experiencing anger

shun complex melodies because these melodies' information content exceeds the subjects' currently available processing capacity (which had been reduced by the elevation of arousal characteristic of anger and other pronounced emotional states).

It therefore seemed of interest to us to examine within the same experiment the effects on aesthetic choice of both high arousal per se (induced by an information-free loud tone) and of cognitive tasks carried out simultaneously with the listening to the chosen melody on each trial where the tasks varied in (a) the processing effort demanded and (b) arousingness (Konečni & Sargent-Pollock, 1976).

Prior to each block of choice trials (the previously described simple and complex melodies were the choice alternatives), some subjects were exposed to bursts of a very loud squarewave tone, which considerably raised their arousal level (measured by the common psychophysiological indices), especially in the first half of the choice trials, whereas other subjects heard bursts of the same tone at a much lower loudness level.

The second experimental variable was the type of task on which the subjects worked while listening to the chosen melody on each trial. During each block of choice trials (between two exposures to the tone), one group of subjects worked continuously on the "digit-symbol" task (which requires the continuous processing of information with little fluctuation in processing difficulty over time), pausing only to press one of the two choice buttons every 10 sec and thus hear either a simple or a complex melody on that trial. Because the digit-symbol task involves not only the processing of information but also rapid writing—which by itself may raise arousal level—a number of additional conditions were included. In one of these ("contour-tracing"), subjects were asked to trace, as fast as possible, the contours of the symbols that had already been written in on the worksheets given to them. Thus, these subjects engaged in at least as much rapid writing as the digit-symbol group but were required to process far less information. In another condition, subjects were asked to watch slides of paintings closely during the choice trials and to memorize as many details as possible for a supposed subsequent test. The active storage of information involved in this task presumably required a great deal of processing effort but contained few elements of "conceptual conflict" (Berlyne, 1960), which the digit-symbol task—a series of mini-problems—may contain and which may itself raise arousal level (Blatt, 1961). In a further condition, subjects saw the same slides but without the memorization instructions, meaning that they would probably process less information during the choice trials. In the final control condition, subjects did not work on any task while choosing and listening to the melodies.

The results of the experiment were quite clear. The subjects' choice behavior was strongly affected by the task in which they were engaged while choosing and processing the melodies. Being required to work on the digit-symbol and slides-memorization tasks, both of which involved a considerable amount of information processing (and thus presumably decreased the subjects' processing capacity), sharply reduced the choice of complex melodies. The contrast of these two conditions with the remaining three accounted for virtually all of the variance due to the type of task. More processing capacity was presumably allocated to these congitively more demanding tasks (cf. Kahneman, 1973); since complex stimuli are more difficult to process than simple

stimuli and given that the option existed, subjects chose to listen to the less demanding additional stimulation, simple melodies.

If we turn to the arousal aspects of the results, several observations are worthy of mention. First of all, being exposed to a loud tone prior to a block of choice trials significantly increased the level of arousal and decreased the percentage of choices of complex melodies in comparison to the control condition. However, the arousal aspects of the cognitive tasks themselves were quite irrelevant. Even though the slides-memorization subjects were physiologically far less aroused than were the rapidly writing digit-symbol subjects, they chose as few complex melodies. Furthermore, the digit-symbol subjects were no more aroused physiologically than were the contour-tracing ones, but they chose significantly fewer complex melodies. These and other aspects of the findings clearly showed that the processing-capacity factors, unmediated by the arousal-level fluctuations, had a direct and powerful effect on the choice between melodies. This finding does not prove that the effect on choice of high arousal (due to a loud tone or anger) is itself mediated by a decrease in processing capacity, but it does make such an explanation tenable.

Experiments discussed so far show that the socially induced emotional states, nonsocially-induced high arousal (due to a loud tone), and processing requirements of the concurrently performed cognitive tasks, all affect choice between melodies differing in complexity. In addition, they suggest a plausible mediational chain, one which runs from the actions of other people directed at the listener, via the listener's interpretation of these actions, his or her labelling of the emotional state, and arousal fluctuations, to the change in processing capacity and its effect on choice behavior.[6]

IV. EFFECTS OF LISTENING TO MELODIES DIFFERING IN COMPLEXITY ON EMOTIONAL STATES AND SOCIAL BEHAVIOR

In the introductory section I suggested that any treatment of aesthetic appreciation that aspires to some degree of completeness must deal not only with the antecedents of

[6]Perhaps we are now a step closer to understanding why a person enraged by someone, thinking hard about the details of the encounter and simultaneously maneuvering his automobile through noisy, rush-hour traffic, seems likely to tune his car radio away from his favorite classical station playing, say, Stravinsky's *Rite of Spring* (though it seems already a relatively tame, traditional piece) and tune in, volume reduced, to the local "mellow" station or switch off the radio altogether.

It is also of considerable interest to explore the effects on musical preference of variables that fall, on the social–nonsocial dimension, somewhere between impersonal bursts of an aversive squarewave tone and verbal insults from a stranger in a face-to-face situation. In an experiment designed by Sigrid Flath-Becker and presently being carried out by her in my laboratory, subjects are differentially aroused by being repeatedly and sternly told by the experimenter to be faster while working on demanding cognitive tasks and subsequently informed that they did either very poorly or very well in different experimental conditions. (There are several additional control conditions.) Flath-Becker is investigating the effect of such manipulations on subjects' preference for different rhythmic structures (regular, ostinato, syncopated, complex) in piano (Bach, Debussy, Bartok, Schönberg, respectively), orchestral (Bach, Ravel, Bartok, Schönberg), and percussion (Baker, Fink, Fink, Cage) compositions.

preference and choice but also with the consequences of the choice and exposure to aesthetic materials. Yet, this issue has been almost completely ignored in the psychology of art [with the honorable exception of a vintage study by Gilliland and Moore (1924)]. The prevalent, if unstated, attitude has been that the domain of interest does not extend beyond the period of exposure (unless one takes seriously the metaphysical speculations on the enrichment of the soul and spirit and the taming of savage beasts by music). However, to the extent that music may affect moods and emotions (a point that everyone readily agrees with) and given the social context in which music is so often appreciated, it would be very surprising if people's exposure to aesthetic stimuli, including music, would not have quite considerable effects on their social behavior. Paradoxically, this would also suggest that perhaps some of the most important effects of music (in terms of the sheer frequency of their occurrence in the life of average people) may be quite transient in that they are primarily mediated by emotional changes that ordinarily dissipate quite quickly.

Unfortunately, it is extremely difficult to study the ways in which the quality of people's interactions with their intimates is affected by the type of music they listen to in their homes and automobiles, at work, or on a picnic. Perhaps this will be possible in the future. So far, however, I have been forced to remain in the laboratory, but the inclusion of many of the features of the experiments to be described in this section has been inspired by the broader picture of music appreciation in social contexts.

Does listening to melodies varying in complexity differentially affect the amount of subsequent aggressive behavior? If so, does the effect of the melodies combine with that of anger? Also, does the loudness level at which the melodies are presented play a part in determining the amount of aggression that ensures? These were among the questions dealt with in an experiment by Konečni (1975b; also see Konečni, 1979, Section III,A).

In the first part of the experiment, some of the subjects were treated in an insulting, rude way by the accomplice of the experimenter whereas others were treated neutrally. All subjects then had an opportunity to administer supposedly painful "electric shocks" to the accomplice on each of many trials. With the exception of a control group that heard no melodies at any point in the experiment, the subjects listened to a 10-sec computer-generated melody on each trial while making the decision whether or not to shock the accomplice. Some subjects listened to a simple melody played at a comfortable listening level on each of the trials whereas others also heard simple melodies on all trials except that they were played at a very high listening level. Still other groups of subjects heard a complex melody on each trail, either at a comfortable or very high listening level, depending on the experimental condition. This experimental design allowed a detailed comparison of the effects on aggressive behavior of three quite different experimental treatments each of which, however, independently produced differences in arousal level. Pilot work had shown that listening to complex melodies in comparison to simple ones may raise the level of arousal; however, listening to these complex melodies is not, by any criterion, aversive for the normally aroused subjects. On the other hand, listening to melodies at a very high listening level (close to 100 dB-A) in comparison to listening to these melodies at a comfortable

listening level is both arousing and aversive. Finally, prior work had shown that being rudely insulted by an accomplice in a face-to-face situation is arousing, aversive, and leads subjects unequivocally to label themselves angry.

On the basis of such information, rather precise predictions could be made. It was hypothesized that the melodies themselves—whether complex or simple and whether heard at a high or low listening level—would have little, if any, effect on aggressive behavior. The subjects would be differentially aroused and find the experimental situation differentially aversive, but this would presumably not be quite enough to produce differences in a highly important, high-consequence social behavior, such as aggression. In contrast, it was predicted that the aggressive behavior of subjects who had been made angry by the accomplice's insults would be further augmented by the melodies they were forced to listen to while making the choice of whether or not to punish the accomplice on each trial. The more arousing and/or aversive the melodies, the greater the increment over the baseline established by anger alone. The highest amount of aggression was thus expected to occur in the condition in which angry subjects listened to complex melodies at the high listening level on each trial.

The pattern of results that was obtained largely corroborated these predictions with some interesting exceptions. Subjects who had not been insulted generally displayed a low level of aggressive behavior that varied little as a function of the type of melody and loudness level. The one exception to this was the noninsulted subjects who had been repeatedly exposed to complex melodies at the high listening level: these subjects' aggressive behavior was only somewhat less pronounced, and statistically not different, from the amount of aggression displayed by the insulted controls who had heard no melodies whatsoever. It would thus seem that there is at least some tendency for the arousing complex melodies when they are played at a very high listening level to incline the subjects toward aggression. One could well imagine a situation in which people aroused by loud complex music would tend to overreact to relatively slight additional provocations that would ordinarily be brushed aside.

The pattern of results for the insulted subjects was quite different. As predicted, angry people who had been exposed to loud complex melodies displayed the greatest amount of aggression in the experiment, significantly more than the angry subjects who had heard no melodies. The insulted subjects who had heard complex melodies at a low listening level and those who had heard simple melodies at a high listening level displayed an intermediate amount of aggression. The one result that did not fit well in this general pattern but was not altogether unanticipated [on the basis of a study using visual aesthetic stimuli by Konečni and Sargent-Pollock (1977)] was the amount of aggression displayed by the insulted subjects who had repeatedly heard simple melodies at a low listening level. These people's aggressive behavior was significantly lower than that of the insulted subjects who had heard no melodies at all; it was, in fact, lower (though not significantly so) even than the aggressive behavior of some noninsulted subjects (those who had heard complex melodies at a high listening level). It thus seems that simple, soft melodies may have been actively soothing—perhaps by virtue of reducing the level of arousal and the degree of anger faster than was the case in the condition involving insulted subjects who had heard no melodies.

The experiment was thus a tentative demonstration that the exposure to melodies varying in complexity could have a differential effect on an important (anti)social behavior—both directly, insofar as it may combine with the effects of anger, and indirectly, in that it may raise arousal level and create a disposition to aggress. It was also shown that the loudness at which the melodies are heard is important, but it remains to be seen whether loudness would have a similar effect with authentic musical pieces and nonmusical acoustic patterns.

The apparently soothing effect of simple melodies presented at a comfortable listening level was tested by a different procedure in another experiment (Konečni, 1979, Section III,B). In the key condition of this complex experiment, subjects were rudely treated by the experimenter as soon as they walked into the laboratory, blamed for "being late" in a hostile and arrogant manner, and told that being late for important appointments implied irreponsibility and immaturity.[7] Next, subjects listened to simple melodies for three minutes continuously. The hypothesized effect of listening to simple melodies at this point was that the melodies would accelerate the decrease in the subjects' anger over and above the rate of recovery that would have been produced by homeostatic processes acting alone. Following the listening period, subjects rested for 15 minutes, after which they were insulted again by a different person, an accomplice of the experimenter using a different angering procedure.

In the final part of the experiment, the dependent measures were collected. These were the number and duration of simple-melody choices to which the subjects decided to listen, and the number and duration of punishing blasts of noise supposedly delivered to the accomplice in the context of a task. Subjects were told that every time a light of a particular color came on, they could press a button, which would expose them to a simple melody, and that the melody would go on for as long as the button was pressed. They were also told that when a light of a different color came on, they could press another button for as long as they wished, which would deliver a blast of noise to the accomplice (a plausible pretext was devised and presented to subjects).

There were several sets of control conditions that can be characterized by the following: (a) no listening to melodies following the first anger induction; (b) no initial anger induction; and (c) no second induction of anger. (There were additional conditions that are of little interest from the perspective of the present chapter.)

The major experimental hypothesis was that the subjects whose recovery from a high degree of anger was accelerated in the first part of the experiment by listening to the soothing melodies—presumably a relatively favorable state of affairs in that people can be reasonably expected to prefer a fast rate of diminution of a pronounced negative emotional state—would be particularly prone to listen to simple melodies following the second anger induction. In comparison to various control groups, the simple melodies had, for these subjects, proved their usefulness in alleviating a negative emotional state. In contrast, the same melodies had accomplished no such outcome for

[7]The reader may assume that at the end of all experimental sessions involving the insult procedure, subjects are thoroughly debriefed about the purpose of the experiment, the nature of the procedures, and reassured about their performance.

subjects who had listened to them in the first part of the experiment without being angry. Similarly, subjects who had been made angry in the first part of the experiment, but not given the opportunity to listen to the simple melodies at that time, could not have been as sure, following the second anger induction, of the melodies' positive impact on anger. Finally, subjects who were not angered the second time, just before the collection of the dependent measure, presumably did not experience at that time a negative emotional state that needed to be diminished.

The actual results confirmed these hypotheses, in terms of both the frequency and duration of listening to simple melodies and the frequency and duration of blasts of noise to the accomplice (the choice of melodies and the decision to deliver a blast of noise to the accomplice were independent, nonredundant measures). This experimental outcome and the data from an analogous experiment involving the emotion of fear (Konečni, 1979, Section III,C) suggest that listening to simple melodies, paired with negative emotional states, can have a powerful effect on the subjects' behavior at the time of the second anger induction. Subjects who had experienced that simple melodies can successfully decrease their anger (faster than simply the passage of time) resorted to listening to such melodies a great deal when angered again. These subjects were less prone to engage in aggression at that time.

In summary, the experiments presented in this section, taken together, seem to suggest—even if with regard to a very restricted range of musical materials and social behaviors—that listening to melodies varying on certain fundamental stimulus dimensions may differentially affect subsequent behavior of the listeners toward other people and that they may learn to seek actively the melodies with certain properties to alleviate negative emotional states. This question, the use of musical materials for the purpose of mood optimization, is further pursued in the next section.

V. LISTENERS' SEQUENCING AND "CHUNKING" OF MUSICAL MATERIALS AND THE USE OF MUSIC FOR MOOD OPTIMIZATION

Given a range of musical materials to which they are asked to listen, how do people plan their "musical environment"—that is, how do they program their exposure to the materials in terms of the listening sequence and the duration of the individual "chunks"? If there is some truth to the idea that music is consciously used for the purpose of mood optimization or an emotional boost, would this extend to the active use of certain pieces of music (characterized by a given level of pleasingness, soothingness, and so on) in order to offset the effects of an aversive event (e.g., exposure to a very loud tone)? In other words, what type of music do people choose to listen to immediately after exposure to aversive auditory stimulation? These and related questions were systematically investigated in a series of previously unpublished experiments conducted in my laboratory (Allen, Hammerbeck, & Konečni, 1978; Allen, Breckler, & Konečni, 1980), in which an entirely different aesthetic-choice research paradigm was used.

In the main experiment subjects were first acquainted with the range of musical materials by hearing for 30 sec an example of each of the following: (1) eighteenth century "serious" music; (2) twentieth century "serious" music; (3) "mellow" rock'-n'-roll; (4) "hard" rock'-n'-roll; (5) computer-generated simple melodies (similar to those in the experiments previously described); (6) computer-generated complex melodies; and (7) intermittent bursts of a highly aversive 350-Hz squarewave tone at 95 dB-A. The musical selections that the subjects heard had undergone a considerable amount of pretesting. From a much larger pool of musical pieces, three pieces were chosen to represent each of the four types of music, such that within each type the pieces were homogenous with regard to the ratings (by pilot subjects) of arousingness, soothingness, pleasingness, interestingness, and complexity. In addition, the eighteenth century selections (by Bach, Haydn, and Vivaldi) were rated as highly similar to the "mellow" rock selections (by Genesis, Mott the Hoople, and Linda Ronstadt) on the arousingness, soothingness, and complexity scales. Also, these two types of music had been rated as far less arousing and complex and more soothing than the twentieth century "serious" pieces (by Bartok, Prokofiev, and Skriabin) and the "hard" rock selections (by Montrose, Outlaws, Scorpions) while the latter two types had been rated as equal to each other on these three dimensions. However, on the dimensions of pleasingness and interestingness, the four types of music (or, rather, the particular selections that were decided upon on the basis of pretesting) had been rated as fairly comparable to each other, although there was a certain preference, on the pleasingness scale, for "mellow" rock, followed by the eighteenth century "serious" music—a very stable finding that held across a wide variety of selections and could not be eliminated, at least for the population studied (UCSD students).

In the pretest, subjects also rated the computer-generated melodies and the loud squarewave tone. The simple and complex melodies were rated both significantly less pleasing and less interesting than any of the authentic musical pieces but significantly more pleasing and interesting (by about 4 points on a 10-point scale) than the squarewave tone. The mean ratings of the aversive squarewave tone on both the arousingness and soothingness scales were at the very extremes of the scales, at the expected scale ends.

In the main experiment, after they heard a 30-sec example of each of the seven types of auditory stimuli, subjects were seated in front of a console on which seven keys were arranged in a circle and told that they would have to listen to two minutes of each of the seven types of stimuli. Every 15 sec subjects were to choose one of the seven (and keep track of the choices on a tally-sheet provided) until all seven types had been heard for two minutes. The order in which subjects were to hear the different types of stimuli was completely up to them. At one extreme, subjects could choose the same type eight times in a row, thus exhausting that type, and then move on to the next type, and so on. At the other extreme, subjects could switch from type to type every 15 sec in a more-or-less random fashion.

Subjects heard the stimuli over headphones with musical selections and computer-generated melodies at 73 dB-A and the squarewave tone at 95 dB-A. The tracks with each of the four types of music were prepared in such a way that four minutes of each

of three selections within a type were recorded in a random succession for a total of 36 minutes per track.

There were also a number of variations of this basic experimental condition. In one of these, subjects were asked to write a hypothetical program of 15-sec choices without actually listening to any of the stimuli after making the choices. In addition, there were experimental conditions involving only six (no squarewave tone), five (no simple or complex computer-generated melodies), and four (no squarewave tone or simple and complex melodies) types of stimuli. The basic seven-types condition and these additional three with fewer types of stimuli can be thought of as a 2×2 design with the squarewave tone (present or absent) and simple and complex melodies (present or absent) as the two factors.

The results were interesting and will be briefly summarized here. In the five-types and seven-types conditions, both of which involved the aversive squarewave tone, there was a very strong tendency for subjects to choose the loud squarewave tone very early in the session. The aversive tone was heard in relatively short "runs" (in terms of sequential 15-sec choices), interspersed with runs of both simple and complex computer-generated melodies (when these, as well as the tone, were available in the seven-types condition). These chunks of exposure to various stimuli of relatively low pleasingness early in the session were followed by longer runs of the type of music that the subject liked *second* best, which for the majority of subjects in the experiment proper, as in the pretest, was the soothing, nonarousing eighteeth century "serious" music. (Since the ratings on the five dimensions described above were available from subjects in the main experiment, it was possible to do the various analyses on the basis of each subject's individual order of preference for the various types of music, as opposed to the group means from the pretest.)

Thus, in what seems to have been a disconfirmation of what one would reasonably predict from most versions of the general learning theory, subjects chose to get the aversive stimulation over with early in the session, rather than delay the aversive experience as long as possible. They "chose to suffer" in small "doses" and apparently made the whole experience more palatable by listening immediately afterward to the type of music that pleased them considerably (though not their most favorite type). These results gave further support to the notion that people actively seek different types of music at different times in order to optimize their mood or, as in the present case, to offset the impact of aversive stimulation.

In the condition with six available types of auditory stimulation (no aversive squarewave tone), an analogous pattern of results was obtained. Subjects tended first to listen to a great deal of both types of computer-generated melodies (thus, again getting the exposure to the least liked stimulation over with early in the session), which was interspersed with chunks of the second best-liked music. However, for this type of choice behavior and listening strategy to occur, a certain threshold of aversiveness apparently has to be exceeded; namely, in the four-types condition, in which the squarewave tone and both type of computer-generated melodies were absent, subjects tended to begin the session by a considerable amount of listening to the second best-liked music, rather than by listening to the less pleasing types. (In the

pretest the least liked type of authentic music, the twentieth century "serious" pieces, still received a relatively high mean rating of 6.2 on a 10-point pleasingness scale in comparison to 3.4 for complex computer-generated melodies and 7.1 for the most pleasing music, "mellow" rock.)

In all the conditions, whether there were four, five, six, or seven types of stimulation available, the majority of the subjects reserved the end of the session for long runs of listening to the most pleasing music, which was—both in the pretest and in the experiment proper—"mellow" rock. With the proverbial liver and spinach eaten—in small bites—subjects helped themselves to mouthfuls of chocolate mousse at the end. (An irresistible, though imprecise, analogy in that the spinach/mousse sequence is influenced by factors other than preference.) This particular mood-optimization strategy was convenient for us as experimenters concerned with the subjects' welfare: it insured that subjects left the experiment happy.

The middle part of the session tended to be filled with listening to the two least preferred types of music, "hard" rock and twentieth century "serious" pieces. Even these types of music, however, were listend to in longer runs than were the squarewave tone and computer-generated melodies.

Perhaps the most parsimonious explanation of the subjects' overall listening strategy links mood-optimizing to subjects' efforts to keep arousal level within a certain range and avoid getting overaroused, while experiencing a controlled variety of arousal fluctuations through a sequence composed of: arousing squarewave tone; soothing eighteenth century "serious" music; arousing "hard" rock and twentieth century "serious" pieces; and, finally, soothing "mellow" rock—an alternating arousing/soothing sequence vaguely reminiscent of the order of fast and slow movements in certain musical compositions (cf. Berlyne, 1971, for a discussion of arousal-related musical "devices" used by composers).

It is somewhat surprising that subjects almost never chose to listen to a full two minutes of the same type of music, even in the 4-types condition. Since the selections within each type were all recorded in four-minute segments, there would have been a good chance for a subject to hear a pleasant piece of music uninterrupted by either other types of stimuli or to change from one to another selection within a type. It is possible that the nature of the experimental procedure favored relatively frequent alternations between types. Also, the fact that a choice had to be made every 15 sec, even if of the same type of music repeatedly, may have disturbed the subjects' perception of continuity of a piece. Interestingly enough, if the latter reason is important, the subjects were apparently unable to predict that this is how they would feel; namely, in the previously mentioned experimental variation in which subjects prepared a hypothetical listening program without actually listening to any auditory stimulation, there were far longer runs of the music of the same type.

The experiments described in this section seem to provide additional information about the use of music for the purpose of mood optimization. Moreover, the major finding has now been replicated with visual nonartistic stimuli. In the course of the experimental session, subjects had to view five different sets of slides that vastly differed in rated pleasingness. Although the subjects had to view all slides within all

sets for a fixed length of time, the order in which they viewed the slides was completely up to them. Subjects generally viewed the least pleasing slides (those belonging to the set of gory slides of accident victims) early in the session, interspersed with the second most-liked slides, those from the set of humorous cartoons. As was the case in the experiment involving musical stimuli, these subjects—who were male—left the most pleasing slides, of *Playboy* nudes, for the end. Again, it seemed to us that subjects left the laboratory quite content.

In summary, it seems that both the idea that music is used for the purpose of mood optimization and a theoretical framework with feedback features based on the concept of an aesthetic episode could be of heuristic value. The experimental steps taken so far have been tentative and relatively narrow in scope, but they can perhaps help develop a psychology of music that recognizes the role of social, emotional, and cognitive factors in music appreciation as well as the conditions under which music of all kinds is enjoyed in daily life.

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