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## INTERACTIVE EFFECTS OF MUSIC AND VISUAL ART IN DIFFERENT EMOTIONAL STATES

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### Эффекты взаимодействия музыки и визуальных искусств в различных эмоциональных состояниях

Аннотация

Многие виды искусства основаны на одновременном воздействии музыкальных и визуальных стимулов (опера, балет, кино и др.). Относительная важность этих двух источников информации различна в разных видах искусства, равно как и степень взаимозависимости музыкальных и визуальных стимулов. Настоящее исследование посвящено одной из важнейших проблем сочетания двух указанных видов информации: каково влияние степени сложности прослушиваемой музыки на восприятие живописи (которая сама может иметь различную степень сложности), — а именно на суждения реципиентов о "приятности" и "интересности" картин?

Восприятие различных видов искусства и соответствующие процессы переработки информации, очевидно, протекают отнюдь не в социальном и эмоциональном вакууме. Поэтому возникает задача выяснить, как положительные и отрицательные настроения реципиента влияют на одновременную переработку музыкальных и визуальных стимулов, в особенности когда последние отличаются по степени своей сложности. Сложность стимула способна вызывать флюктуации уровня физиологической активности, а симпатическое возбуждение есть необходимый биологический субстрат эмоций.

Исследование состояло из двух этапов. На первом этапе произведения живописи (различных эпох) классифицировались испытуемыми как обладающие низкой, средней либо высокой сложностью. Аналогичным образом музыкальные произведения были также разделены на три уровня сложности. Второй этап заключался в проведении эксперимента по совместному влиянию музыкальной и визуальной информации. После того, как в различных группах испытуемых (каждый из которых исследовался отдельно) были вызваны положительные, отрицательные или нейтральные эмоциональные состояния, — испытуемые фиксировали свои предпочтения — в терминах "приятности" и "интересности" — по отношению к картинам трех уровней сложности, при одновременном прослушивании музыки, также различавшейся по сложности.

Были выявлены статистически значимые тройственные взаимодействия изучаемых экспериментальных переменных применительно к обоим изучавшимся предпочтениям; в данной статье приведены лишь результаты, относящиеся к испытуемым, которые находились в нейтральном эмоциональном состоянии. "Приятность" картин сначала возрастала при росте их сложности, а затем падала, — причем этот результат не зависел от сложности музыкального сопровождения.

Что же касается "интересности", — то были обнаружены два основных эффекта и два способа взаимодействия, свидетельствующих о сильном влиянии сложности музыкального сопровождения на восприятие живописи. Наиболее "интересными" оказались сложные картины, воспринимаемые при одновременном прослушивании музыки средней степени сложности.

Описываемые результаты (равно как и ряд иных данных, относящихся к испытуемым в состояниях социального и позитивно-окрашенного возбуждения) существенно ограничивают применимость выдвигавшихся ранее теорий гедонистического воздействия живописи, которые обычно игнорировали влияние музыкального и эмоционального контекста. Выводы проведенного исследования подтверждают комплексную когнитивно-эмоциональную модель эстетических предпочтений.

The total "message" in many classical, modern, and so-called popular art forms (opera, film, performance art, dance, rock-music videos) is composed of the simultaneous presentation of musical (instrumental, vocal, synthesized) and visual stimuli. That the impact and overall enjoyment of these art forms, at both the local and global levels, should depend on the *interactive* effects of the two classes of aesthetic arrays, is a highly probable expectation held jointly by the creators, performers, and consumers of art (broadly defined). Researchers in psycho-aesthetics, however, for a variety of reasons (including expertise and preference), have generally tended to focus on either auditory or visual stimulus arrays and to study one in isolation of the other.

In this paper, I shall first review a few examples of relevant research from my laboratory on such interactive effects. Also, since I have long advocated (Konečni, 1979, 1982) that the effects of aesthetic messages should be studied in their social, emotional, and cognitive context, I shall allude to some of the findings pertinent to this issue.

Finally, I shall describe a current line of research that combines the two concerns. The ultimate objective of this work is to examine the third-order interaction (in statistical terms): How is the combined effect of music and visual art modulated by the social-emotional context in which the aesthetic experience occurs?

In one condition of a larger experiment, Konečni and Sargent-Pollock (1976) found that subjects who had been exposed to aversive auditory simulation subsequently shunned complex computer-generated "melodies" (more than 9 bits/tone) when simultaneously required to memorize details of Renaissance masters' paintings, but that this was not the case when the paintings were merely viewed without the memorization instructions (a significant third-order interaction).

In addition to pitch, duration, and timbre, loudness is a major

parameter characterizing a tone. The subjects' perceived failure to acquire control over their repeated exposure to an aversive 350-Hz squarewave tone (of up to 4.5 seconds in duration) at 95dB-A led them to rate Renaissance (but not 20th-century non-representational) works as significantly more pleasing than was the case in the various control conditions (again a third-order interaction — Konečni & Sargent-Pollock, 1977).

In a study by Breckler, Allen, and Konečni (1985), using a new forced-choice research paradigm that allowed subjects to choose the sequence and size of the "chunks" of the stimuli (in terms of duration), we found that people — who had a range of options (in terms of pleasingness and aversiveness) of musical and visual stimuli, respectively, at their disposal — employed an identical (and rather sophisticated) strategy to optimize mood in the auditory and visual conditions.

Other studies that examined music-related behaviors as varied as preference for rhythmic patterns (in terms of type and complexity: Flath-Becker & Konečni, 1984), preference for computer-generated melodies differing in complexity (Konečni, 1982), and the recognition and reproduction of the central phrase/accompaniment of specially composed fugues (Konečni & Gotlieb, 1987) have all found that such behaviors were strongly influenced by the social and emotional context in which they occurred, as well as by the subjects' related personality profiles (e.g., "Type A/B" syndrome).

Figure 1 summarizes the interrelationships among some of the above findings with reference to one important dependent variable, *aesthetic choice*. This heuristically useful diagram depicts various temporally ordered events that have phenomenological significance for an average art consumer (on a — literally -- hourly basis), and it contains a feedback loop. Aesthetic choice is placed squarely into the stream of daily life. The theoretical basis for the represented relationships may be traced to Konečni (1982).

In the pilot studies of the present research program (in collaboration with Mitch Karno and Amy Stewart), our subjects (university students, non-connoisseurs) rated excerpts of musical compositions on psycho-aesthetically significant dimensions (pleasingness, interestingness, complexity, abstractness, structure, and the desire to own recordings). To control variability, the music was limited to solo piano pieces by Debussy, Satie, and Scriabin, including, however, a considerable variety of pieces in each composer's opus. Other subjects rated paintings from the Renaissance (modal exemplars from the period) and the 20th Century (abstract works only) on similar dimensions.

Once the paintings from both periods had been classified as being of low, medium, or high complexity, small groups of fresh subjects rated them

on scales of pleasingness and interestingness (each slide was shown for 15 sec) while listening to the musical pieces (in 4-min segments) that had also been classified as belonging to one of three complexity levels. Does the complexity of ambient music affect the judgment and enjoyment of a quite different art form?

The judgments of *interestingness* of paintings showed a highly significant, linear, increase as a function of complexity, but this was modulated by the complexity of the concurrent musical compositions: Whereas the ratings of "simple" paintings were entirely unaffected by the complexity of the accompanying music, the interestingness ratings of both the medium and highly complex paintings exhibited a U-shaped function (interaction  $p < .02$ ). The most interesting paintings of all to subjects were the highly complex ones viewed in the presence of the most complex music ( $M = 141$  on a 200mm scale).

In the case of *pleasingness*, there was only a highly significant main effect of the complexity of paintings, such that the most complex ones were liked the least, with the other two levels statistically indistinguishable.

Interestingness and pleasingness ratings were positively and strongly correlated in eight cells of the 3 X 3 (painting X music complexity levels) matrix ( $r$ s between .51 and .81), the exception being the complex-complex cell ( $r = .17$ ) — precisely the one in which the highest interestingness ratings were obtained.

The study thus clearly established that the effect of the complexity of paintings interacts with the complexity of the concurrent music, at least with regard to the paintings' judged interestingness.

The intriguing differences between the two rating dimensions made it particularly important to explore the combined effects of music and visual art in a social-emotional context. Also, the ecological validity of the judgment findings would increase considerably if subjects were placed in an experimental situation that gave rise, in a controlled, standardized manner, to emotions that at least mimicked those experienced in real life — the seemingly reasonable conjecture being that average people's daily exposure to both music and visual aesthetic stimuli is often preceded or accompanied by socially-induced moods or emotions.

Therefore, in the first phase of a complicated experiment (with Amy Stewart) that has recently been completed, 12 subjects were randomly assigned to each of three emotion-including conditions: 1. Positive Excitation; 2. Neutral-Mood Control; and 3. Social Challenge. All 36 subjects were seen individually; treatments were administered by two female experimenters. In the neutral condition, subjects counted backward by 3s from 100, neither praised nor molested in any way. In the Positive

Excitation condition, they counted backwards by 7s (a more difficult task), but were lavishly, generously, and convincingly praised throughout, in a standardized manner. (In pilot testing, this procedure had been found to improve the subjects' mood to a significant degree.) Finally, in the Social Challenge condition (Flath-Becker & Konečni, 1984), subjects were constantly, but convincingly, harassed and reprimanded for being slow and inaccurate, arbitrarily told to repeat parts of the string of numbers, etc. This procedure is rather stressful for the unsuspecting subjects and results in considerable resentment, if not outright anger, on their part.

After undergoing one of the three procedures of differential emotion-induction, all subjects rated the interestingness and pleasingness of paintings of different complexity while listening to excerpts of piano compositions of different complexity. Except for the fact that the subjects were treated individually, this phase was identical to the previously described study.

The design of this experiment thus allowed that the intricate third-order interaction effects on aesthetic preference, involving music, visual art, and emotional context (including *lingering* emotions), be examined in detail.

## Results

For both pleasingness and interestingness, statistically significant three-way interactions of the experimental variables were obtained. The full presentation and discussion of these complex results considerably exceed the scope and space limitations of the present paper. Therefore, only a third of the results — that for the 12 *neutrally-treated* subjects — will be presented. This corresponds to what I talked about at the Novorossijsk conference in September 1994.

Pleasingness. A highly significant main effect of the complexity of paintings was obtained, such that the rated pleasingness was an inverted-U function of complexity: Paintings of medium complexity were considerably preferred to simple and complex paintings, which were liked about equally. This is a quite standard finding in the psychology of art, it generally replicated our pilot results, and, contrary to expectations, it was *not* modified by the concurrent presence of different music: The three curves for the different complexity levels of music were all of the inverted-U form and they, more-or-less, fell on top of each other. In other words, there was no main effect of music complexity, nor an interaction with visual complexity.

Interestingness. Two significant main effects and a significant two-way interaction were all obtained for this dependent measure (again largely

replicating the pilot results). Complex paintings were rated as more interesting than those of medium complexity, which were, in turn, rated as more interesting than the simple paintings. The complexity of the concurrent music played a part in the ratings of the paintings, such that the paintings seen in the presence of music of high and medium complexity were judged as more interesting than those paired with simple music. However, the interpretation of the main effects is modified by the significant interaction. The curves for paintings of low and medium complexity showed a linear increase from simple to medium to complex music (with the curve for the medium-complexity paintings having a steeper slope). In sharp contrast, interestingness of complex paintings was an inverted-U function of the complexity of the concurrent music.

### Discussion

Whereas the pleasingness results were relatively standard, the findings for interestingness were what I believe to be the first unequivocal demonstration that the ratings of paintings can be influenced by the collative characteristics (here, complexity) of a concurrently present, different art form (here, music).

The complexity of music enhanced the interestingness of simple and medium paintings multiplicatively. However, while complex paintings paired with complex music were rated as more interesting than similar paintings paired with simple music, they were found to be less interesting than the complex paintings paired with music of medium complexity. In other words, complex paintings viewed and judged in the presence of music of medium complexity were found to be the most interesting of all in the part of the experiment involving the neutrally-treated subjects. (Furthermore, this finding cannot be attributed to a "ceiling" effect.)

Historically, psycho-aesthetic studies of the hedonic impact of paintings have not incorporated the simultaneous presence of music or other art forms, despite the fact that, in the "real world", paintings and other artistic visual objects are often enjoyed in the presence of music, either as an integral part of the art medium in question, or as the intentional or incidental aspect of the viewing situation. The present results — at least for interestingness — show that the validity and generality of theoretical statements linking the characteristics of paintings to their appeal and impact are seriously compromised by not taking the concurrent music into account.

The analogous point is that, traditionally, psycho-aesthetic research on paintings has been carried out with research participants in a neutral emotional state. To the extent that much exposure to visual and other art in

the real world occurs as part of the stream of daily life and is accompanied by various, sometimes pronounced, emotional states, my contention is that the results of such prior research are misleading. The experience and appreciation of art simply do not take place in an emotional vacuum.

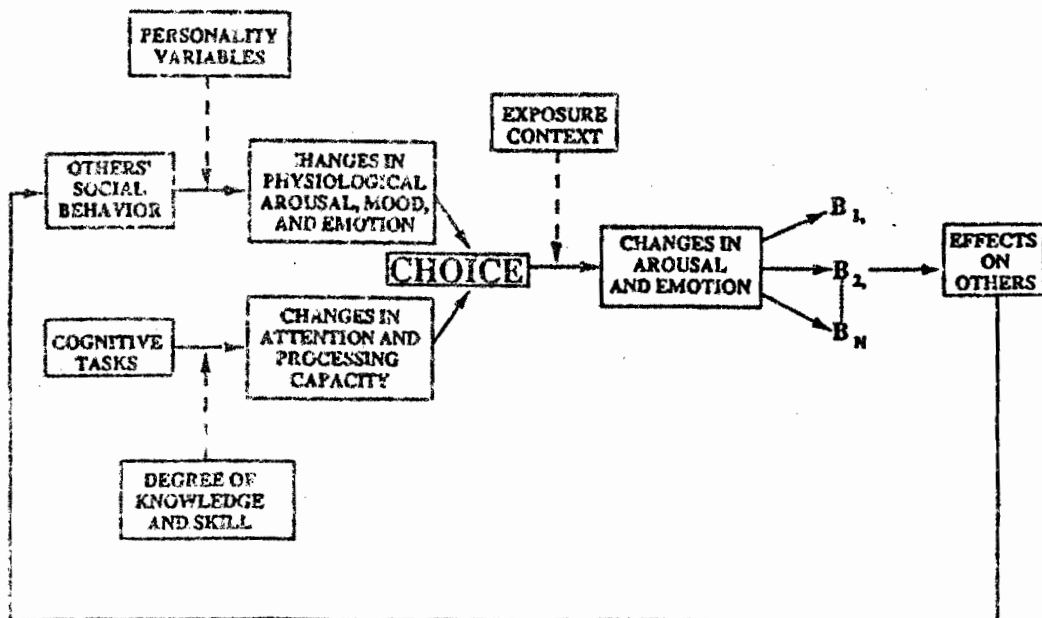
Such criticisms of prior studies and theoretical generalizations derived from them are based on the findings of the experiments described in the introductory section, as well as on the results for the subjects in the Positive Excitation and Social Challenge conditions of the present experiment (not reported here). Because the results for the two conditions involving the experimental manipulation of the subjects' emotional state differed both from each other and from those for the neutrally-treated subjects, three-way interactions on both rating dimensions were obtained. In a broader sense, the present results challenge seemingly elegant, but evidently simplistic, psycho-aesthetic models with few parameters and favor a perhaps more cumbersome, but more accurate and general, cognitive-emotional model (Konečni & Sargent-Pollock, 1977).

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# MODEL OF AN AESTHETIC EPISODE



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