EMPIRICAL STUDIES OF THE ARTS

EXECUTIVE EDITOR:
Colin Martindale, Ph.D.

Volume 10:1

Can Composers Express Emotions through Music?

William Forde Thompson and Brent Robitaille

Baywood Publishing Company, Inc.
26 Austin Ave., Box 337
Amityville, NY 11701
Call (516) 691-1270 • Fax (516) 691-1770

EMPIRICAL STUDIES OF THE ARTS, Vol. 10(1) 79-89, 1992

CAN COMPOSERS EXPRESS EMOTIONS THROUGH MUSIC?*

WILLIAM FORDE THOMPSON

BRENT ROBITAILLE

York University
North York, Ontario

ABSTRACT

This study investigated the possibility that musical composers can reliably convey distinct and definable emotional qualities through pitch, temporal and loudness information contained in a musical score. Five musical composers were provided with a list of six terms relating to emotional states. The terms were: joy, sorrow, excitement, dullness, anger and peace. Each composer was asked to compose short melodies embodying the emotional qualities described by the six terms. Fourteen listeners were played the melodies, and were asked to provide judgments relating to their emotional quality. Melodies were judged to embody the emotional quality intended to be conveyed. Unintended emotional qualities were judged to be present in melodies in varying degrees. The notion that emotional qualities can be effectively conveyed through music is discussed.

The relationship between music and emotions has been discussed extensively and is generally agreed to be strong [1-8]. In these discussions, music is often viewed as an artistic medium through which emotional meaning can be conveyed to listeners [2]. The emotional quality of a musical performance is influenced both by the information represented in the musical score—the composer's contribution—and by the expressive actions of the performer. The relative influence of these two factors on the emotional quality of music has yet to be established.

*This research was supported by the Natural Sciences and Engineering Research Council of Canada.

Two theoretical issues may be discerned in the literature pertaining to emotions and music. The first issue relates to the observation that listeners often experience an emotional *response* to music. Such emotional responses may have a physical correlate, such as increased heart rate, or tingling sensations. The second issue relates to the notion that music can effectively *communicate* qualities associated with emotions. That is, regardless of whether a listener experiences an emotional response to music, the listener nevertheless may be able to describe the music in terms of emotional connotations. As Budd suggests, "it is unnecessary for someone to feel triumph, sadness or joy if he is properly to characterize music by the names for these emotions" [1].

EMOTIONAL RESPONSES TO MUSIC

Music has a remarkable ability to elicit emotional and physical responses from listeners [9, 10]. Sloboda investigated some of the physical experiences associated with emotional responses to music [11]. These physical experiences, which included shivers down the spine, laughter, tears, and goose pimples, were found to occur in large percentages of music listeners. Moreover, specific experiences were associated with identifiable aspects of musical structure. For example, shivers down the spine were associated with enharmonic changes, new or unprepared harmony, and sudden dynamic or textural changes.

Some emotional responses to music have a high degree of intensity, and may be defined as "peak experiences" [12, 13]. In a study of peak experiences relating to music listening, Gabrielsson asked listeners to describe the most intense experience to music they had ever had [14]. Descriptions by participants were highly varied (e.g., feelings of weightlessness, excitement, affirmation, etc.), but it was clear that peak emotional responses to music were quite common and were generally very positive experiences.

Two of the psychological theories linking emotion and music focus on arousal responses. Berlyne emphasized the relevance of information complexity to the appreciation of music, suggesting that for each individual, there is an optimal level of structural complexity that gives rise to a moderate and hence desirable level of physiological arousal [15]. Some empirical support for Berlyne's optimal-complexity model has been provided for musical stimuli by Smith and Cuddy [16].

Mandler also suggested that emotional responses can be understood in terms of arousal levels [17]. According to his view, expectancies are generated for upcoming events through the formation of event schemata. When expectations are broken, arousal occurs. This arousal response acts as a signal to initiate the cognitive process of forming new and more appropriate schemata for the current input. The revised schemata allow the listener to anticipate subsequent events. In music, changing and developing materials ensure that cognitive schemata are

continually being modified throughout a piece, giving rise to a dynamic pattern of arousal levels and to the experience of emotion.

THE COMMUNICATION OF EMOTIONS THROUGH MUSIC

In addition to eliciting emotional responses in listeners, music can be viewed more generally as a medium through which emotional qualities can be conveyed—a sort of "language of the emotions" [4, 5, 7]. In an early investigation of this notion, Hevner obtained adjective checklists from listeners for five musical performances [18]. Eight groups of adjectives were associated with the music presented. Hevner examined some of the aspects of musical structure that appeared to influence adjective choices. Richness of harmony, rhythmic character, and mode (major vs. minor) were all found to influence how listeners described the musical passages.

Gabriel [19] provided a useful discussion and assessment of Cooke's theory of music [4]. Cooke argued that specific aspects of melodic structure can be reliably described with respect to specific emotional connotations. For example, a descending minor scale passage connotes an acceptance of and yielding to grief. In Gabriel's study, listeners were asked to rate the suitability of Cooke's descriptions of numerous melodic fragments. The results provided little support for Cooke's hypothesis of the emotional connotations of melodic fragments.

This report further examines the communication of emotions by music. The aims of this investigation were motivated by two observations. First, despite a substantial literature relating music to human emotions, research has not examined a most basic question: can specific emotional qualities be intentionally communicated from composers to listeners through the medium of music? Second, research on music and emotions has generally considered emotional connotations of recorded performances of music. In such recordings, harmonic texture, orchestration, melodic structure, performance variations, and other factors combine to form a complex set of influences on a listener's response. Although some attempts have been made to isolate aspects of music which influence judgments of emotional quality [e.g., 11, 18], research focussing on less complex sets of musical variables may provide a useful contribution towards understanding how emotional qualities are conveyed in music.

To address these issues, we assessed the possibility that distinct and definable emotional qualities can be reliably communicated from the sound information contained in the notational and dynamic markings indicated in a musical score. Thus, the study focused on musical composition—specifically, the composition of brief melodies—and excluded variables associated with harmonic texture, orchestration, or the expressive contributions of a musical performer.

The investigation was carried out in two stages. First, five musical composers were provided with a list of six terms relating to emotional states. Each of the composers was asked to compose brief melodies that would convey, as clearly as

possible, the emotional qualities described by the six terms. Second, listeners were played each of the melodies precisely as notated, and were asked to provide judgments relating to their emotional connotations. The success of the composers in communicating the intended emotional qualities to listeners was then assessed.

STAGE 1: COLLECTION OF COMPOSITIONS

Method

Subjects — Five highly trained musicians volunteered to compose short melodies for the investigation. The musicians ranged in age from twenty-six to seventy-three, and had an average of 28.6 years experience either performing or composing music. Three of the five musicians had trained in composition at a tertiary institution.

Procedure — Each composer was given a list of six terms relating to emotional states. These terms were: joy, sorrow, excitement, dullness, anger, and peace. Composers were given two weeks within which to compose short melodies that would communicate the emotional qualities associated with the terms provided. A melody was defined simply as a monophonic texture, that is, a texture in which no more than one note was sounded at the same time. Composers were asked to complete compositions in the form of musical scores, that is, with notation, key signatures, tempi, and any other relevant indications such as dynamic markings and ornamentation.

OVERVIEW OF COMPOSITIONS

Melodies composed by composer 1 are illustrated in Figure 1. The intended emotion is listed above each melody. Melodies composed by the other four composers were of comparable length. In communicating the emotional quality of joy, the five composers generally wrote within a strongly tonal framework. Joyful melodies tended also to involve a sense of movement through rhythmic variation. The primary features of melodies intended to convey sorrowfulness were slow tempi, and implied minor and chromatic harmony. Melodies intended to convey excitement generally involved fast tempi. Three of the five melodies intended to convey excitement also involved a progressive increase in the number of intervalic leaps and high pitches. Melodies intended to be dull were generally very tonal, and were characterized by stepwise motion, or simple triadic movement. In melodies intended to convey anger, an emphasis was seen on rhythmic complexity, and implied chromatic harmony or atonality. Melodies intended to convey peacefulness were mostly very tonal, were slow in tempi, and often involved stepwise motion leading to melodic leaps. Three of the five "peaceful" melodies also involved triplets.

STAGE 2: EVALUATIONS OF COMPOSITIONS BY LISTENERS

Method

Subjects — Fourteen participants, moderately trained in music, took part in the listening phase of the experiment. Participants ranged in age from twenty-three to seventy-three. Ten of the participants played a musical instrument. All participants reported normal hearing.

Apparatus and stimuli — The information contained in each of the musical scores provided by the five composers was entered onto an Atari computer, using the sequencer software "Notator." Dynamic and tempo changes were implemented at places indicated in the score. Where no dynamic changes were indicated, the standard key-press velocity was used, that is, 64 on a key-press velocity scale of 1-127. Tempi were set as indicated by composers.

The information entered into the sequencer program was output as sound through a MIDI interface connected to a Ensoniq EPS sample player, using the sampled grand piano sound. The resultant thirty melodies were recorded in random order, under computer control, onto cassette tape.

Procedure — After hearing each melody, listeners were asked to rate, on six separate scales ranging from 1-7, the extent to which the melody conveyed the qualities of joy, sorrow, excitement, dullness, anger and peace. A rating near 1 indicated that the melody did not convey the emotion indicated beside the rating scale. A rating near seven indicated that the melody strongly conveyed the emotion indicated beside the rating scale.

RESULTS AND DISCUSSION

Table 1 displays the mean ratings collapsed across listeners and composers. Ratings are displayed in a 6 x 6 matrix. Columns in the matrix refer to the six types of melodies, where column 1 refers to melodies intended by composers to convey joy, column 2 refers to melodies intended to convey sorrow, and so on. Rows in the matrix refer to the six types of ratings provided by listeners, where row 1 refers to ratings of the extent to which each melody embodied the quality of joy, row 2 refers to the ratings of the extent to which each melody embodied the quality of sorrow, and so on. Ratings along the diagonal, shown in boldface, are expected to be relatively high, based on the prediction that composers are capable of effectively communicating the intended emotion to listeners.

Results were first subjected to an ANOVA with repeated-measures on all three factors: rating type, composer, and melody type. A main effect of rating type suggested that, across melodies and composers, there was a significant difference in the extent to which listeners perceived the six emotional qualities in the melodies presented, $F(5,65) = 8.19$, $p < .001$. Orthogonal contrasts suggested that

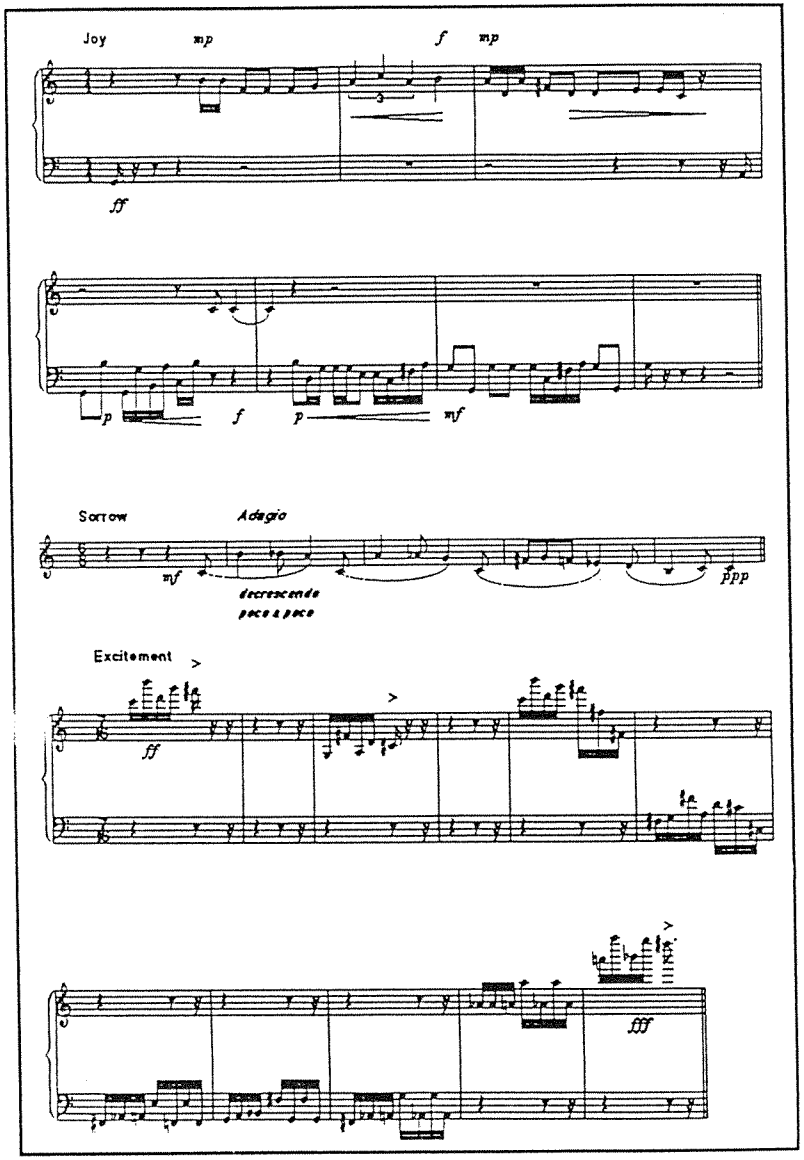

Figure 1. The six melodies composed by composer 1. The emotional quality intended to be communicated to listeners is listed above each melody.

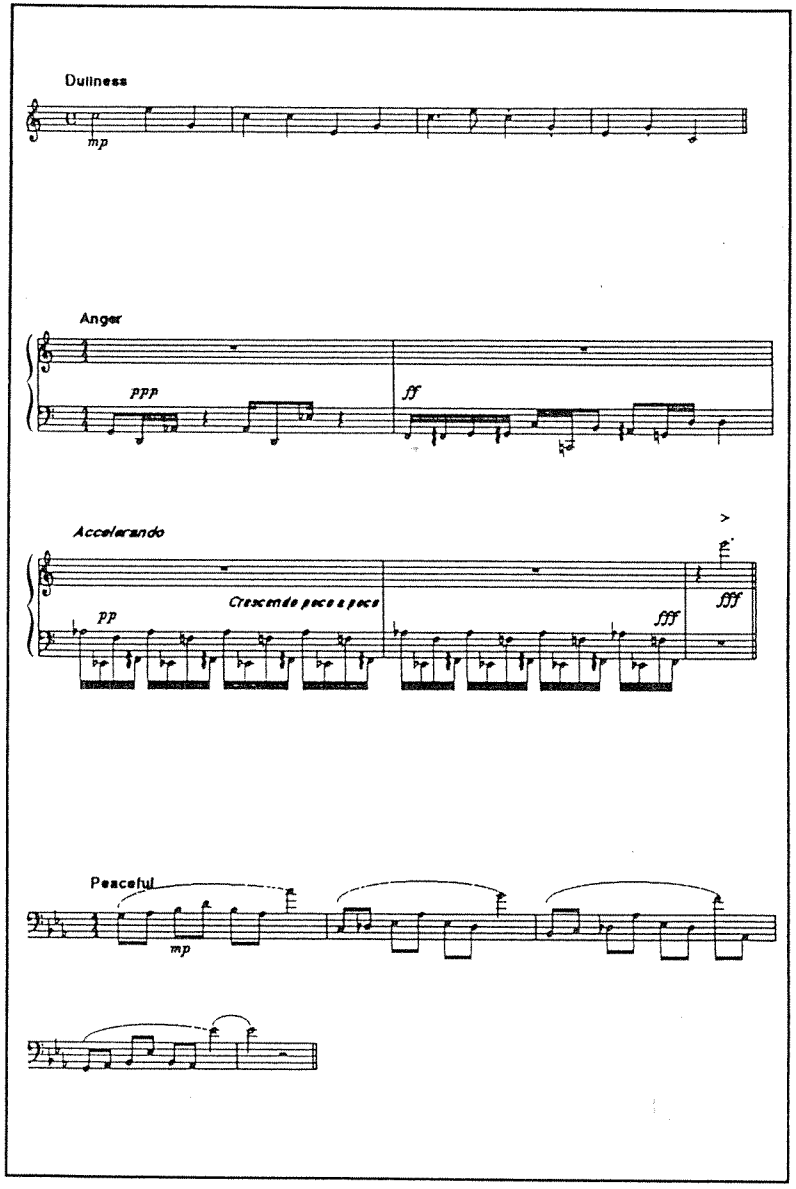

Figure 1. (Cont'd.)

Table 1. Mean Ratings of Emotional Qualities for Six Types of Melodies

	Type of Melody in Terms of the Emotion Intended					
Rating	Joy	Sorrow	Excitement	Dullness	Anger	Peace
Joy	**4.96**	1.83	3.99	2.99	2.16	3.07
Sorrow	1.89	**4.66**	1.60	2.40	2.63	2.77
Excitement	3.60	1.76	**4.34**	2.36	3.50	2.33
Dullness	2.39	2.94	2.67	**3.96**	3.60	2.59
Anger	1.73	1.74	2.33	1.64	**2.80**	1.49
Peace	2.81	3.74	2.30	2.80	1.99	**3.33**

anger was perceived less strongly in melodies than were other emotional qualities, $F(1,13) = 63.09$, $p < .001$.

A significant interaction between rating type and melody type indicated that different melody types conveyed different emotional qualities to listeners, $F(25,325) = 25.28$, $p < .001$. This finding is consistent with the prediction that melodies intended by composers to convey a given emotional quality should be assigned higher ratings of the intended emotional quality, and lower ratings of unintended emotional qualities.

To explore the latter prediction further, results were subjected to six separate analyses of variance—one for each rating scale. With respect to Table 1, these analyses assessed the statistical reliability of differences between means within each row. These six analyses will be discussed in turn.

RATINGS

Joy in Melodies

There was a significant overall difference between ratings of joy for the six different melody types, $F(5,65) = 33.26$, $p < .001$. Ratings of joy were higher for melodies intended to convey joy than for melodies not intended to convey joy, $F(1,13) = 54.11$, $p < .001$. Among melodies not intended to convey joy, melodies intended to convey sorrow were judged to have the lowest quality of joy, $F(1,13) = 38.36$, $p < .001$. A *post hoc* comparison also indicated that melodies intended to convey excitement were judged to be more joyful than melodies intended to convey dullness, anger or peace, $F(1,13) = 5.27$, $p < .01$.

Sorrow in Melodies

There was a significant overall difference between ratings of sorrow for the six different melody types, $F(5,65) = 38.75$, $p < .001$. Ratings of sorrow were higher

for melodies intended to convey sorrow than for melodies not intended to convey sorrow, $F(1,13) = 98.00$, $p < .001$. A *post hoc* comparison also indicated that melodies intended to convey dullness, anger, or peacefulness were judged to be more sorrowful than melodies intended to convey joy or excitement, $F(5,13) = 7.32$, $p < .005$.

Excitement in Melodies

There was a significant overall difference between ratings of excitement for the six different melody types, $F(5,65) = 29.41$, $p < .001$. Ratings of excitement were higher for melodies intended to convey excitement than for melodies not intended to convey excitement, $F(1,13) = 59.55$, $p < .001$. A *post hoc* comparison also indicated that melodies intended to convey joy or anger were judged to be more exciting than other melodies not specifically intended to convey excitement.

Dullness in Melodies

There was a significant overall difference between ratings of dullness for the six different melody types, $F(5,65) = 7.55$, $p < .001$. Ratings of dullness were higher for melodies intended to be dull than for melodies not intended to be dull, $F(1,13) = 28.32$, $p < .001$. It may be noted that melodies intended to convey anger were perceived to be quite dull. A *post hoc* comparison indicated that melodies intended to convey anger were rated as the dullest of the melodies not specifically intended to convey dullness, $F(5,13) = 3.27$, $p < .05$.

Anger in Melodies

There was a significant overall difference between ratings of anger for the six different melody types, $F(5,65) = 14.11$, $p < .001$. Ratings of anger were higher for melodies intended to convey anger than for melodies not intended to convey anger, $F(1,13) = 34.94$, $p < .001$. Among melodies not intended to convey anger, melodies intended to be peaceful were judged to embody the least amount of anger, $F(1,13) = 7.29$, $p < .05$.

Peacefulness in Melodies

There was a significant overall difference between ratings of peacefulness for the six different melody types, $F(5,65) = 12.89$, $p < .001$. Ratings of peacefulness were higher for melodies intended to convey peace than for melodies not intended to convey peace, $F(1,13) = 6.53$, $p < .05$. However, it may be noted that ratings of peace were higher for the melody intended to convey sorrow than they were for the melody intended to convey peace. Melodies intended to convey anger were judged to be the least peaceful of melodies not specifically intended to be peaceful, $F(1,13) = 93.21$, $p < .001$.

CONCLUSION

The results of this study indicate that composers are capable of communicating distinct and definable emotional qualities to listeners through the medium of music. Brief melodic compositions, played precisely as notated, were judged to embody the emotional quality specifically intended by the composer to be communicated to listeners. Unintended emotional qualities were judged to be present in varying degrees, but were judged to be significantly less evident in melodies overall than intended emotional qualities.

The present investigation focused on the sound information contained in a musical score. The expressive actions of musical performers, most of which are not specifically indicated in a musical score, may further amplify and add to the emotional qualities of melodies. Performers may enhance the emotional qualities suggested in the musical score by emphasizing the structural details of the composition, and performers may add new emotional qualities to the music by implementing expressive actions that are characteristic of their own performing style. An examination of how composition and performance interact to convey emotional qualities to listeners presents a challenge for further research.

REFERENCES

1. M. Budd, Motion and Emotion in Music: How Music Sounds, *British Journal of Aesthetics, 3*, pp. 209-221, 1983.
2. M. Budd, Music and the Communication of Emotion, *Journal of Aesthetics and Art Criticism, 2*, pp. 129-138, 1989.
3. M. Clynes, Music Beyond the Score, *Communication and Cognition, 19*:2, pp. 69-194, 1985.
4. D. Cooke, *The Language of Music*, Oxford University Press, London, 1959.
5. S. Davies, Is Music a Language of the Emotions?, *British Journal of Aesthetics, 3*, pp. 222-233, 1983.
6. W. W. Gaver and G. Mandler, Play It Again, Sam: On Liking Music, *Cognition and Emotion, 1*:3, pp. 259-282, 1987.
7. S. K. Langer, *Feeling and Form*, Scribner, New York, 1953.
8. L. B. Meyer, *Emotion and Meaning in Music*, University of Chicago Press, Chicago, 1956.
9. D. A. Hodges, Physiological Responses to Music, in *Handbook of Music Psychology*, D. A. Hoges (ed.), National Association for Music Therapy, Lawrence, Kansas, 1980.
10. A. Goldstein, Thrills in Response to Music and Other Stimuli, *Physiological Psychology, 8*, pp. 126-129, 1980.
11. J. A. Sloboda, Music Structure and Emotional Response: Some Empirical Findings, *Psychology of Music, 19*, pp. 110-120, 1991.
12. A. H. Maslow, *Religions, Values, and Peak Experiences*, Penguin Books, New York, 1970.
13. R. Panzarella, The Phenomenology of Aesthetic Peak Experiences, *Journal of Humanistic Psychology, 20*, pp. 69-85, 1980.

13. R. Panzarella, The Phenomenology of Aesthetic Peak Experiences, *Journal of Humanistic Psychology, 20*, pp. 69-85, 1980.
14. A. Gabrielsson, Intense Emotional Experiences of Music, *Proceedings of the First International Conference on Music Perception and Cognition*, pp. 371-376, Kyoto, Japan, 1989.
15. D. E. Berlyne, *Aesthetics and Psychobiology*, Appleton-Century-Crofts, New York, 1971.
16. K. C. Smith and L. L. Cuddy, The Pleasingness of Melodic Sequences: Contrasting Effects of Repetition and Rule-Familiarity, *Psychology of Music, 14*, pp. 17-32, 1986.
17. G. Mandler, *Mind and Body*, Norton, New York, 1984.
18. K. Hevner, Experimental Studies of the Elements of Expression In Music, *American Journal of Psychology, 48*, pp. 246-268, 1936.
19. C. Gabriel, An Experimental Study of Deryck Cooke's Theory of Music and Meaning, *Psychology of Music, 6*:1, pp. 13-20, 1978.

Direct reprint requests to:

William Forde Thompson
Department of Psychology
Atkinson College
York University
North York Ontario M3J 1P3
Canada