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AUTHOR	Wolfe, Edward W.; Linden, Kathryn W.
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ABSTRACT

The purposes of this study were to: (1) investigate the feasibility of including convergent, divergent, and imaginary factors in models of creative thinking in music; (2) identify the relationship between the processes involved in musical creativity and motivation for musical activities; and (3) determine the generalizability of Amabile's Intrinsic Motivation Principle for Creativity to settings involving musical creativity. Forty third graders who exhibited a high level of convergent ability in music were administered the Intermediate Measures of Music Audiation-Rhythm (IMMA-R), Measures of Creative Thinking in Music (MCTM), and Sounds and Images (SI). These children were also given free time to play music on percussion instruments or to play with other toys. The amount of time a child engaged in music-making activities was designated as the Intrinsic Motivation Level (IML) for musical activities. IML scores were significantly related to MCTM scores and all subscales of the MCTM. All MCTM subscale scores were significantly correlated. T-tests revealed that highly motivated children performed better on divergent thinking tasks than did children exhibiting low motivation levels. Finally, SI scores were found to be significantly higher for boys than for girls. Three tables present study findings, and two appendixes present definitions of components of musical creativity and IML rating guidelines. (Author/SLD)

Investigation of the Relationship Between Intrinsic Motivation and Musical Creativity

Edward W. Wolfe

&

Kathryn W. Linden

Purdue University

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RUNNING HEAD: MUSICAL CREATIVITY

Abstract

The purposes of this study were (1) to investigate the feasibility of including convergent, divergent, and imagery factors in models of creative thinking in music; (2) to identify the relationship between the processes involved in musical creativity and motivation for musical activities; and (3) to determine the generalizability of Amabile's Intrinsic Motivation Principle for Creativity to settings involving musical creativity. Forty third-graders who exhibited a high level of convergent ability in music, were administered Intermediate Measures of Music Audiation-Rhythm (IMMA-R), Measures of Creative Thinking in Music (MCTM), and Sounds and Images (SI). These children were also given free time to play music on percussion instruments or to play with other toys. The amount of time a child spent engaged in music making activities was designated as Intrinsic Motivation Level (IML) for musical activities.

IML scores were significantly related to MCTM scores and all subscales of the MCTM. All MCTM subscale scores were significantly correlated. *t*-tests revealed that highly motivated children performed better on divergent thinking tasks than did children exhibiting low motivation levels. Finally, SI scores were found to be significantly higher for boys than for girls.

Investigation of the Relationship Between Intrinsic Motivation and Musical Creativity

Creative thinking skills and musical creativity are of primary interest to music educators. A central issue for those concerned with developing these skills in students is the relationship between the specific thinking processes that constitute musical creativity. Music education researchers (e.g., Gorder, 1980; Vaughan & Meyer, 1971; Vold, 1988; and Webster, 1989a) have suggested that the processes that compose musical creativity parallel those postulated by Guilford's (1957) classical theory of human creative cognition (e.g., fluency, flexibility, elaboration, and originality).

Webster (1989a) has presented the most comprehensive model of musical creativity to date. This model delineates the thinking processes and environmental conditions involved in musically creative thought. However, a problem arises when one wishes to interpret this model because it does not specify how its components interact when music is created. This problem is attributed to the small amount of research and literature concerning possible relationships among the components of creative thinking. Webster's model was adapted for use in our study (Wolfe, 1990), and we attempt to shed light upon the relationships between a few of the variables in this model by examining four of these factors (divergent ability, convergent ability, auditory imagery, and motivation). Formal definitions of these variables are presented in Appendix A.

The first purpose of this study was to investigate how these factors interact in musical creative thought. Theoretically, the cognitive elements (convergence, divergence, and imagery) should not be related if they are indeed separate factors that contribute to musical creativity. Unless these factors are found to be distinguishable, they must be considered redundant elements of any definition of musical creativity.

Therefore, we hypothesized that measures of divergent thinking, convergent thinking, and musical auditory imagery would not be significantly related.

The fourth factor, motivation, was investigated because of its apparent connection to creative thinking. Research concerning the effects of rewards on intrinsic motivation has shown that children who are offered a reward for performing an activity show less subsequent interest in that task than do children not offered a reward. Although subjects who expect the reward tend to create a greater number of products as a result of these activities, their products are judged to be lower in quality than those made by non-rewarded subjects (Greene & Lepper, 1974; Kernoodle-Loveland & Olley, 1979; Reiss & Sushinsky, 1975).

Amabile, Hennessey, & Grossman (1986) hypothesized that lessening one's intrinsic motivation for activities requiring creative thinking would lead to lower creative quality in the products of such tasks. They found that stories told by children given no reward for doing so were judged to be more creative than stories told by children who were given rewards for making up their stories. In a second study by Amabile (1982), pictures drawn by children who did not compete for prizes were rated to be more creative than those of children who did compete for prizes. These findings were supported in a number of studies (e.g., Hennessey & Amabile, 1988) indicating that children who participate in an activity because they are intrinsically motivated to do so tend to be more creative than children who are prompted to do so by being promised a reward.

Amabile's research demonstrates that there is a strong relationship between intrinsic motivation for an activity and one's level of creative performance. Hennessey & Amabile (1988) called this the Intrinsic Motivation Principle of Creativity, which also hypothesizes that extrinsic motivators may undermine the creative performance of people, particularly in areas emphasizing creative productivity. This phenomenon would most seriously affect students who find grades and similar extrinsically motivating forces to be an impetus to perform in school. Children whose expressiveness would be hindered the most are those showing the highest level of motivation for such activities (e.g., art and music) and, therefore, the greatest creative potential.

In consideration of Amabile's research, we hypothesized that intrinsic motivation for musical activities should be a strong indicator of overall creative potential and should be related to measures of creative thinking in music. Therefore, the second focus of this study was to determine the relationship between musical creativity and motivation, as well as determining the generalizability of Amabile's Intrinsic Motivation Principle of Creativity to the domain of music.

Methods

The subjects were 40 third-graders from five rural and suburban Midwestern schools. Six classes (N = 100) were selected from a pool of five school districts representing a variety of socioeconomic groups. These students took the Intermediate Measures of Music Audiation-Rhythm (IMMA-R) (Gordon, 1979) as an indicator of convergent musical ability. In order to reduce the amount of time each student was taken out of the regular class, it was necessary to choose only one of the tests from the IMMA battery. The Rhythm subtest was chosen because groups typically display larger standard deviations on this test than they do for the Tonal counterpart (Gordon, 1979). The increased magnitude of the standard deviation of the Rhythm subtest results in a greater chance obtaining a truly heterogeneous group and a more reliable test (Nunnally, 1978). Test-retest reliability (r = .90) and validity issues for the IMMA-R were reported by Gordon (1979). The observed KR20 coefficient for this study was r = .81.

From this pool of 100, 40 students were randomly selected from the upper 50% of the IMMA-R distribution as individuals demonstrating a high level of convergent ability in music. These subjects were presented with a paradigm designed to assess each child's level of intrinsic motivation for music. The situation, modeled after examples used in studies of intrinsic motivation (Greene & Lepper, 1974; Kernoodle-Loveland & Olley, 1979; and Reiss & Sushinsky, 1975), presented each child with a variety of activities during a dialogue with an examiner. A small rubber ball, a coloring book and crayons, and three small percussion instruments were given to the child as alternative forms of play. Although it is possible that a different assortment of toys would be perceived as more appealing to different children, these toys were chosen because they were judged to appeal to a majority of children and to represent a wide variety of play styles. The toys were presented so that they were as equally-attractive as possible. Preliminary analysis showed that there were no significant difference between the amount of time that each toy was used for play ($F = 1.71, 2, 39$). After the dialogue, the examiner left the room for five minutes while a video camera recorded the child's activities. The number of seconds a student spent engaged in music-making activities with the instruments was designated as the Intrinsic Motivation Level (IML). Rating guidelines for the students' activities are presented in Appendix B. Inter-rater reliability for this rating was estimated at $r = .95$.

Torrance, Khatena, & Cunnington (1973) developed Sounds and Images as a measure of creative thinking. The test indicates the originality of a child's response to recorded auditory stimuli, and the instrument was shown to be a valid indicator of musical creativity by Torrance & Khatena (1969). Sounds and Images (SI) was administered to groups of eight children at a time. Subjects whose writing ability was deemed inadequate for this activity were assisted by examiners. Interscorer reliability estimates for SI were reported in the upper .90s, and alternate forms administered with a seven-day interval were correlated in the .80s (Torrance, Khatena, & Cunnington, 1973). Coefficient alpha for the present study was estimated at .61.

Measures of Creative Thinking in Music (Webster, 1989b), a measure of divergent thinking in music, was also administered to each student. The test measures four factors: (1) Musical Extensiveness (ME) - the amount of clock time used in each activity; (2) Musical Flexibility (MF) - the extent to which musical parameters (pitch, dynamics, and tempo) are manipulated; (3) Musical Originality (MO) - the extent to which a particular response is unique in terms of musical convention; and (4) Musical Syntax (MS) - the extent to which a response is musically logical. Responses to an examiner's questions are performed by the subject on a microphone, a piano, and a set of temple blocks.

Reliability and validity indices for the MCTM were established over a series of four studies (Swanner, 1985; Webster, 1983, 1987a, 1987b). Inter-rater reliability coefficients for the MO and MS factors range from .53 to .78, with an average r of .70. Cronbach Alpha reliability estimates range from .45 to .80, with an average alpha of .69. Test-retest reliability estimates range from .56 to .79, averaging .76. The Cronbach Alpha estimate obtained for this study was alpha = .77.

Results

Table 1 presents the Pearson Product Moment Correlations for all variables included in this study.

Insert Table 1 about here

The MCTM and IML correlation was significant beyond the .01 level. All correlations among the subscales of the MCTM (ME, MF, MO, and MS) and IML were also significant

($p < .05$). Correlations between IMMA-R, MCTM, and SI were not significant. Furthermore, no significant relationship between IMMA-R or SI and IML was observed.

Two groups were identified on the basis of the IML data. Children showing a high level of intrinsic motivation scored in the top 50% of IML scores and were assigned to the High Intrinsic Motivation group (HIM). Children in the Low Intrinsic Motivation group (LIM) were those in the bottom 50% of the IML distribution. Differences for each cognitive factor between these groups were analyzed with t-tests. A preliminary F-test indicated that the variances of the MCTM scores for the two groups were not equal. Therefore, the degrees of freedom of the t-test for that comparison were adjusted. These results are presented in Table 2.

Insert Table 2 about here

Scores on the MCTM were significantly higher for the HIM group than for the LIM group ($t = -2.79$, $p < .01$). No significant difference between the HIM and LIM groups was discerned for the IMMA-R or SI scores.

Because of observed qualitative differences in the performance of boys and girls during the testing sessions, a posteriori analysis was performed to detect gender differences. This analysis was performed using a general linear model (PROC GLM in SAS: Schlotzhauer & Littell, 1987), because the groups were of unequal size for gender. These results are presented in Table 3.

Insert Table 3 about here

A significant difference ($F = 6.55, 1, 36, p < .05$) between males and females was found for SI, with boys scoring significantly higher on average than did girls. All other gender differences were non-significant.

Discussion

The first point of interest in the results of this study is the lack of a relationship between convergence, divergence, and auditory imagery scores. The negligible correlations between these variables suggests that these are indeed three independent constructs. This finding is theoretically important because it justifies consideration of these cognitive factors as three distinct components in models of creative thinking in music. Unfortunately, the role played by each factor in musical creative production has not been investigated. Therefore, future studies should determine the relationship between each of these cognitive components and a variety of indicators of musical creativity (e.g., test scores, ratings of compositions and improvisation, etc.). Further research should also ascertain the effects of different types of training (that influence creative performance in music) on each of these cognitive processes.

A second observation from these data is that Amabile's Intrinsic Motivation Principle of Creativity does appear to generalize to musical creativity. All correlations between the subscales of the MCTM, the measure of divergent thinking, and intrinsic motivation were significant ($p < .05$). These results indicate that divergent production in music is related to intrinsic motivation for musical activities. This observation is supported by the fact that auditory imagery scores also displayed a moderate correlation with motivation scores. One focus of future research on this subject should be to investigate the effects that various rewards have on students' creative performances.

A third point of interest is that all correlations between the subscales of the MCTM; Musical Extensiveness, Musical Fluency, Musical Originality, and Musical

Syntax; were highly significant ($p < .001$). Similar relationships were observed by Schmidt & Sinor (1986). Given the strong relationship found between IML scores and MCTM subscale scores and the strong relationship between the scores on subscales of the MCTM, it seems as though the MCTM does not measure four different abilities. Rather, it seems probable that these subscales have considerable overlap in measuring divergent ability in music, and that divergent ability is strongly related to intrinsic motivation. This interpretation is supported not only by Amabile's Principle of Intrinsic Motivation for Creativity but also by the fact that the reliability estimates for the MCTM are actually lower than the correlations between some of its subscales. Therefore, further analysis of the scoring procedures and the factors assessed by the MCTM may be necessary before information obtained from this instrument can be satisfactorily interpreted.

Although convergence and imagery scores were not significantly different for the High- and Low-Motivation groups, the groups did show significant differences in divergent ability. Children who demonstrated a higher level of intrinsic motivation for music also performed better on tasks requiring divergent thinking than did children with low motivation. This finding strengthens Amabile's position that motivation and creative potential are strongly related constructs.

A final point to be considered is that no gender differences for either convergent thinking, divergent thinking, or motivation level was observed. Significant differences did appear between boys and girls on the imagination tasks, with boys scoring significantly higher than girls. These results suggest that boys and girls are similar with regard to the component of musical creativity, except for activities requiring auditory imagery. Without further investigation of this phenomenon, we can suggest no reason for this difference.

Conclusions

The potential for developing creative thinking skills and the opportunity for students to experience the satisfaction that results from creative expression are two important features that set music education apart from most school subjects. This study highlights the need for further development of means for assessing childrens' creative performance in musical settings. Alternative methods of assessment (e.g., product ratings, behavior ratings, etc.) should be investigated because of the inherent weaknesses of measuring a complex construct such as musical creativity in a sterile testing environment. Without reliable and valid methods of measuring creative thinking, our theories concerning this construct are suspect at best.

Contemporary testing approaches are still in experimental stages. However, our research has shown that these instruments are adequate for indicating the existence of three cognitive processes (convergent thinking, divergent thinking, and auditory imagery) in musical creativity, and at least one of these factors (divergent thinking) is strongly related to motivation for musical activities. How these cognitive processes interact in the creation of music and how they manifest themselves in the domain of music should be considered in future research in this area.

The most important finding in this study is the strong positive relationship observed between intrinsic motivation for musical activities and creative thinking in music. It has been shown that introducing an external reward to an individual who is intrinsically motivated to perform an activity may be detrimental to the level of motivation that person displays for subsequent engagements in similar tasks (e.g., Greene & Lepper, 1974). Because of the possibility of this damaging consequence, music educators in particular should be sensitive to the possible adverse affects that commonly employed classroom extrinsic rewards (e.g., grades, competitions, awards) can have upon the values that children hold for creative activities like music. Although no investigations have been made concerning the influences of these factors, it is expected that findings of such a study would agree with our hypotheses.

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Appendix A:

Definitions of Components of Musical Creativity

Variable	Definition	Test
Convergent Ability	The facility and competence with which one uses knowledge acquisition and storage skills. This ability is quantifiable through measurements of the accuracy of one's tonal or rhythmic memory.	IMMA-R
Divergent Ability	The facility with which one produces numerous (fluency) different (flexibility) and novel (originality) answers to a given musical problem.	MCTM
Imaginative Ability	The facility with which experiential knowledge is utilized in the alteration of sounds which have been encountered through an individual's interaction with his or her environment.	SI
Intrinsic Motivation	The resulting tendency to engage in an activity which is brought about by an individual's interest, enjoyment, or satisfaction with performing the activity.	IML
Extrinsic Motivation	The resulting tendency to engage in an activity which is brought about by external pressures such as promised rewards and anticipated evaluation. (Wolfe, 1990)	--

Appendix B:

IML Rating Guidelines

Intrinsically Motivated Behavior for musical play includes any activity in which the child is examining the instruments, playing musical experts, or experimenting with various techniques for producing sounds with them. The foci here are actions which lead to sound production. This behavior should include any pause less than 15 seconds during which the child's attention is focused on the musical instrument and is immediately followed by one of the three criteria mentioned above.

Examples of Intrinsically Motivated Behavior for musical play:

- Holding the instrument and examining at it from different angles
- Touching specific parts of the instrument
- Banging or knocking one or more instruments together
- Banging the instruments with toys or other objects
- Singing or talking into the instrument
- Listening to sounds by holding the instrument up to the ear

Examples of behavior that is NOT intrinsically motivated:

- Swinging the instrument around the body
- Using the instrument as a toy to represent another object
- Using an instrument while playing with other toys or objects without producing sounds on the instrument
- Using the instrument for some purpose secondary to producing sounds. (e.g., as an article of clothing, as a weapon, as a vehicle, etc.) (Wolfe, 1990)

Table 1

Correlations Among Musical Creativity Variables

	SI	MCTM	ME	MF	MO	MS	IML
IMMA-R	.18	.05	.05	.11	.03	-.03	-.09
SI		.11	.09	.22	.03	.14	.21
MCTM			.997#	.81#	.76#	.66#	.42**
ME				.76#	.72#	.63#	.40*
MF					.91#	.73#	.46*
MO						.66#	.44**
MS							.34*

NOTE: N = 40, IMMA-R = Intermediate Measures of Music Audiation-Rhythm, MCTM = Measures of Creative Thinking in Music, SI = Sounds and Images, ME = Musical Extensiveness, MF = Musical Flexibility, MO = Musical Originality, MS = Musical Syntax, IML = Intrinsic Motivation Level.

* $p < .05$
** $p < .01$
\# $p < .001$

Table 2

Results of t-tests on Motivation Differences

Source	N	Mean	SD	DF	t
IMMA-R					
LIM	20	33.40	1.23	38	0.65
HIM	20	33.70	1.68		
MCTM					
LIM	20	245.80	76.99	30.5	- 2.79**
HIM	20	341.20	132.41		
SI					
LIM	20	23.15	7.80	38	0.89
HIM	20	23.50	7.78		

NOTE: IMMA-R = Intermediate Measures of Music Audiation-Rhythm, MCTM = Measures of Creative Thinking in Music, SI = Sounds and Images, HIM = High Intrinsic Motivation, LIM = Low Intrinsic Motivation

** $p < .01$

Table 3:

Gender Mean Differences

Source	DF	SS	MS	F
IMMA-R				
Gender	1	1.97	1.97	0.91
Error	36	77.79	2.16	
MCTM				
Gender	1	9771.79	9771.79	0.81
Error	36	435262.36	12090.62	
IML				
Gender	1	20111.78	20111.78	1.97
Error	36	367408.95	10205.80	
SI				
Gender	1	358.94	358.94	6.55*
Error	36	1945.27	54.04	

NOTE: IMMA-R = Intermediate Measures of Music Audiation-Rhythm, MCTM = Measures of Creative Thinking in Music, IML = Intrinsic Motivation Level, SI = Sounds and Images

* $p < .05$