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Problem Finding, Creativity Style and the Musical Compositions of High School Students

ABSTRACT This study sought to understand the effect of problem finding and creativity style on the creative musical product. Participants (N = 32) were categorized by creativity style (adaptor or innovator) using the *Kirton Adaption-Innovation Inventory*. The participants completed two musical composition problems involving two different degrees of problem finding behaviors: an open (ill defined) and a closed (more defined) problem. The resulting products were scored for creativity by three judges using a modified version of Amabile's "consensual assessment technique." A repeated measures analysis of variance (ANOVA) was used to analyze the data. The independent variables were composition problem type and creativity style, and the dependent variable was the creativity score on the open and closed problems. No significant differences due to problem type, creativity style, or the interaction of the two factors was found. This research supports the assertion of Kirton that adaption-innovation theory is a measure of creativity style rather than creativity level, but calls into question its use in individual creativity style.

INTRODUCTION

In view of the renewed interest in music creativity (MENC, 1994), it is important for music teachers to understand how students go about being creative. The issue of interest for educators is how to structure a creative task to encourage and facilitate creativity. The literature on creative problem finding (Getzels, 1964; Getzels & Csikzentmihalyi, 1976; Moore, 1985; Csikzentmihalyi & Getzels, 1988; Reitman, 1965; Wakefield, 1992) suggests that the structure of a problem is important to the creative process. Structure refers to how "open" or "closed"

the problem and the solution may be; that is, the nature and extent of any parameters in a problem. The literature also suggests that a person choosing a more open problem will have a more creative product.

Educators are also continually aware of the personal characteristics a learner brings to a situation. In the case of a problem finding and problem solving approach to creativity, the concept of *creativity style* appears to be important. If a student has a general preference for the amount of structure present in the problem finding/problem solving process, then the creative process and product may be affected. That preference is addressed in adaptation-innovation theory as proposed by Michael Kirton (1976). This theory suggests that there is a bipolar continuum on which people can be placed according to their creativity style. Adaptors like to "do things better" and innovators like to "do things differently" in problem solving situations. The construct being measured is not *level* of creativity, but rather *style* of creativity. Kirton suggests that neither style is inherently better or more creative, but that everyone is creative.

The research model thus predicts that subjects with an adaptor creativity style will be more creative with a closed problem, while subjects with an innovator creativity style will be more creative with an open problem. The variables to be examined then are problem finding, as represented by the open and closed problem, and creativity style, as measured on the adaption-innovation continuum. The purpose of this study was to investigate the effect of type of problem and creativity style on the musical compositions of high school musicians, with particular respect to creativity.

METHOD

From a pool of 74 high school band students who took the *Kirton Adaption-Innovation Inventory* (KAI) the 16 strongest adaptor scores and the 16 strongest innovator scores were chosen to complete a composition task. For purposes of this study, the following problems were constructed: (a) *Open problem*, compose a melody, (b) *Closed problem*: compose a melody that uses mostly white keys on the keyboard, is in 3/4 time, is energetic, and is approximately 12 to 20 measures long, In the composition portion of the study, Open and Closed Problem Instruction Sheets, Yamaha DX100 synthesizers, headphones, Sony Superscope Portable Tape Recorders, cassette tapes, *Student Information Form,* and pencils and music staff paper were used.

Students were taken from the instrumental class in groups of two or three to complete the composition tasks on a synthesizer. Students were then asked to complete the "open" and "closed" musical composition problems which were presented in written form. The students had 15 minutes per task, and were timed by a stopwatch. The two tasks were completed in one continuous session. Half of the students received the "open" musical problem first, and half received the "closed" problem first. Problem order was determined by random preassignment in the adaptor and innovator group—that is, half of the innovators and half of the adaptors received the open problem first. After the student completed the melody, he or she recorded it on a cassette tape. At the conclusion of the taping of the melodies, the student filled out the *Student Information Form*, which gathered (a) demographic information about the participants, and (b) ratings by the participants of their own compositions.

Three expert judges listened to all 64 melodies using a different randomly compiled tape for each judge. The judges used a modified version of Amabile's (1982) "consensual assessment technique," and rated each melody on the dimensions of originality, craftsmanship, and aesthetic value using a seven-point scale. Scores of the judges were totaled to obtain a "creativity" score for each melody. The operational definition was that a creative product is what qualified judges say it is within the bounds of originality, craftsmanship, and aesthetic value. Interjudge reliabilities (Cronbach alpha coefficient) were Originality, .84; Craftsmanship, .77; and Aesthetic value, .76 for a combined .807 (Cronbach, 1984, p. 169).

It was assumed that previous piano or other keyboard instruction was not a factor in the composition tasks. This assumption was based on the following reasoning: (a) students were asked to compose only a single-line melody, and therefore the need for piano technique was less important, and (b) the synthesizer used was different from a piano because it did not have full-size keys, included just 49 keys, was not velocity sensitive, used a "slider" operated by the left hand to control volume, and had 24 different timbres available. It was assumed that the motivation and musical sophistication of the subjects were not confounding factors because of the repeated measures design of the study.

This study employed a 2 X 2 factorial design, and a repeated measures analysis of variance (ANOVA) was used for statistical analysis. The independent variables were open and closed

problem type (the repeated factor) and creativity style (adaptor or innovator). The dependent variable was the creativity score received by the participants on the open and closed problems. Main effects and interaction between problem type and creativity style were examined at the .05 level of significance.

RESULTS AND DISCUSSION

Descriptive statistics can be seen in Table 1 and a summary of results can be seen in Table 2.

TABLE 1. Descriptive Statistics of Cells.

CREATIVITY STYLE	PROBLEM TYPE: Open Problem	PROBLEM TYPE: Closed Problem	
ADAPTOR	*n* = 16 Mean = 27.38 SD = 7.62	*n* = 16 Mean = 31.31 SD = 7.03	*n* = 32 Mean = 29.34 SD = 7.49
INNOVATOR	*n* = 16 Mean = 31.69 SD = 12.50	*n* = 16 Mean = 29.12 SD = 9.02	*n* = 32 Mean = 30.41 SD = 10.81
	n = 32 Mean = 29.53 SD = 10.42	*n* = 32 Mean = 30.22 SD = 8.04	

Note. Possible range for means is 9-63.

TABLE 2. ANOVA Summary Table.

Source	*df*	*SS*	*MS*	*F*	*p*
Between Subjects	31				
Adaptor-Innovator	1	18.06	18.06	.15	.70
Error between	30	3583.94	179.47		
Within Subjects	32				
Problem Type	1	7.56	7.56	.14	.71
Problem Type X A-I	1	169.00	169.00	3.18	.085
Error within	30	1596.44	53.22		

No significant differences were found for creativity style, problem type or interaction between creativity style and problem type. The lack of significant difference due to the main effect of creativity style can be predicted by adaption-innovation theory, since adaption-innovation is a *style* rather than a *level* measure. This outcome confirms the theoretical basis of the *Kirton Adaption-Innovation Inventory*; neither adaptors or innovators have an inherently higher level of creativity.

The research model predicted there would be a difference between open and closed problems. This unexpected lack of significant difference could be explained in two ways. First, the open and closed problems may not have been sufficiently different enough to provide a strong enough effect. The open problem (compose a melody) seems obviously open, but perhaps the closed problem needed even more constraints to make the compositional approach to the two problems different. Examples of additional constraints include: (a) using only the white keys instead of "mostly white keys," (b) a definite length in measures (or seconds)instead of "12 to 20 measures long," (c) specifying major or minor mode.

Second, the open and closed problems may not have translated into quantitative differences in problem finding. It is possible an experimental situation that allowed more substantive problem finding differences was needed to find significant differences. For example, perhaps prolonged exposure to each approach in a teaching situation before the experiment was carried out.

A strong thrust of the research model was the predicted interaction of creative style and problem type. No statistically significant interaction was found, although Adaptors received higher creativity scores under the closed problem condition, and Innovators received higher scores under the open problem condition. If an interaction exists, it was not detected in this study. However, this result calls into question the application of adaption-innovation theory to individual artistic creativity. A-I theory describes individual creativity style in group problem solving situations. It is possible that KAI is not an appropriate tool in the area of individual artistic creativity.

Repeated measures analysis of variance was used to determine if there were any significant differences in creativity scores based on the various demographic categories. No significant differences were found due to Grade [F (2,29) = .56, p = .58]; Age [F (3,28) = .21, p = .89]; Gender [F (1,30) = .66, p = .42]; or School [F (1,30) = .30, p = .59]. Repeated measures analy-

sis of variance was used to determine if there were any significant differences in creativity scores based on which melody was composed second (practice effect). No significant difference in scores was found [F (1,30) =. 2.78, p = .11].

The *Student Information Form* yielded responses in one category which varied noticeably from an expected equal split, based on the number adaptors and innovators. The question "Did it make a difference in what order you wrote the melodies?" was analyzed using the chi-square test for goodness of fit. The students showed a significant preference for the open problem, x^2 (1, n = 32) = 12.50, p ‹.05.

Of interest is the question that asked students which piece they liked doing the most. The open problem was chosen by 26 students and the closed by 6 students. This finding is in line with research by Smith (1993) that found a preference for "unprompted" (open) composition. This result is somewhat puzzling however, as it seems to be in opposition to what would be expected based on the creativity style of the students. A possible explanation might be that the open and closed problems were not equally appealing. It is also possible that the idea of "no constraints" may temporarily overrule what might match up best with the creativity style of the student.

The use of expert judges as was done with the "consensual assessment technique" appears to be a viable way of measuring musical creative thinking. Amabile (1982) was able to obtain interjudge reliability of .70 or above in most cases. The reliability in this study (.807) is consistent with these earlier results.

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