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Debbie Lynn Wolf
Philadelphia Biblical University

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by
Debbie Lynn Wolf
Philadelphia Biblical University

The purpose of this research was to improve understanding of the musical abilities of kindergarten children and to establish a hierarchy of rhythm patterns performed by these subjects.

The "Rhythm Pattern Performance Test" (RPT), an investigator-designed music achievement test for kindergarten subjects, examined the ability to perform rhythm patterns in imitative response to a recorded model. The test consisted of thirty recorded rhythm patterns, and required approximately four minutes to administer to each subject. Subjects (N =165) were audiotape recorded as they listened and imitated each of the patterns; their recorded responses were evaluated by two independent judges using a six-point continuous rating scale.

A hierarchy of the rhythm performance patterns was established by examining difficulty levels for all RPT patterns. Rhythm performance pattern difficulty was determined by meter; duple meter patterns are easier than triple meter patterns for most subjects in kindergarten.

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Before children learn to read, they will have developed an extensive speaking and listening vocabulary which serves as a resource for learning a reading vocabulary. Similarly, before children learn to read music, they will have developed a performing and listening musical vocabulary which may serve as a resource for music reading experiences. Whereas, in speech, children will have learned the meaning and use of words, in music, children will have learned musical patterns.

The importance of acquiring a vocabulary of musical patterns is explained by Carterette and Kendall (1999):

> Apparently musicians have learned techniques to discern patterns more efficiently than nonmusicians; . . . In other words, musicians have learned strategies and stored more patterns related to musical structure than nonmusicians have, but being a musician is not associated with different cognitive or perceptual processing systems (p. 757).

The basic units of meaning in musical patterns are tonal patterns, pitches sung without rhythm variance, and rhythm patterns, rhythms chanted without pitch variance:

> The development of an oral vocabulary (by rote) of significant tonal and rhythm patterns constitutes the experience through which meaning is given to music (Gordon, 1971, p. 66).

Gordon (1967) believed that tonal patterns and rhythm patterns constituted the foundation for musical understanding and communication:

> In accordance with his basic musical aptitudes to develop tonal sense and rhythmic feeling, a person acquires a rote vocabulary of tonal and rhythm patterns. The development of a rote vocabulary of significant tonal and rhythm patterns constitutes the experience through which music meaning is associated with music notation; just as a rote vocabulary of the spoken word constitutes the vehicle by which meaning is given to the written word (p. 4).

The development of a vocabulary of tonal patterns and rhythm patterns provides a more efficient means for music comprehension than conceptualization of isolated pitches or durations (Attneave & Olson, 1971; Cuddy, 1971, 1982; Deutsch, 1969, 1970, 1972, 1975, 1980, 1999a, 1999b; Dowling, 1984, 1999; Gordon, 1967; 1997; Grutzmacher, 1987).

Accordingly, to foster musical development in the primary grades, music educators should encourage children to learn and remember tonal patterns and rhythm patterns essential to musical structure.

Gordon (1974) examined how children audiate tonal patterns and rhythm patterns in an eight-year investigation (1974, 1976, 1978). His research led to the development of a taxonomy of audiated tonal patterns and rhythm patterns and identification of the difficulty levels of individual audiated patterns. Gordon's taxonomy of audiated tonal patterns and rhythm patterns remains the apogee of pattern research, but no parallel taxonomy of tonal and rhythm performance patterns has been established, although several studies have identified difficulty levels of tonal performance patterns (Jones, 1979; Lai, 1999; Sinor, 1984) and rhythm performance patterns (Bradford, 1995; Lai, 1999).

A definitive hierarchy of performance patterns would affect many aspects of music education and research, including curriculum development, repertoire selection, assessment of normal development and achievement level, and development of creative skills. Because many rhythmic music experiences are planned for kindergarten children by classroom and music educators, the development of a hierarchy of rhythm performance patterns of kindergarten children is critical to promote successful participation.

Rhythm pattern performance through chanting has been determined to be the most appropriate type of imitative response for children in preschool, kindergarten, and primary grades (Frega, 1979; Rainbow, 1981; Schleuter & Schleuter, 1989). The neutral syllable "bah" has been used successfully with kindergarten children (Bradford, 1995) and primary grade children (Lai, 1999).

Tempo affects the performance of imitative rhythm patterns. Accuracy improves with a

faster rather than a slower tempo, but either extreme of tempo produces negative results (Greishaber, 1987; Walters, 1983). Lai (1999) identified duple meter to be easier for primary grade children to perform than triple meter as did Bradford (1995) for kindergarten children.

Imitative rhythm pattern performances improve with maturation (Gardner, 1971; Klanderman, 1979). As children mature, they progress from remembering only a portion of a pattern, regardless of its significance within the pattern, to remembering the most significant features of the pattern (Klanderman, 1979). Symmetrical phrases become easier to remember than asymmetrical phrases, and characteristic features appear to become more important in recreation.

Bradford (1995) investigated the aural and oral difficulty levels of nineteen selected patterns from Gordon's rhythm taxonomy among 102 kindergarten subjects age five to seven years in an early childhood center. Patterns for the aural and oral tests were randomly selected from among the 61 patterns of Gordon's rhythm taxonomy designated as easy in the usual duple, usual triple and unusual paired classifications. Selected patterns were only two macro-beats in length, and represented the functions of macro/micro beat and division/elongation.

For the oral test, the nineteen patterns were recorded on an audio-cassette prepared by the investigator. Patterns were chanted using the syllable "bah" at the same tempo as the aural test, and arranged in the same order to assure that factors of item placement and fatigue effect were constant in both measures. Recorded performances were scored by three independent judges using a three-point rating scale: responses received three points if the pattern was performed correctly, two points if the pattern was performed correctly with the exception of the duration of one note, and one point if the pattern was performed incorrectly.

A comparison of the means of the oral test revealed duple meter patterns received the

highest score, triple meter patterns received the middle score, and unusual paired patterns received the lowest score which suggests that the order of oral pattern difficulty from easy to difficult is as follows: duple meter, triple meter, unusual paired meter. Additionally, patterns featuring macro/micro beat function received higher oral scores, and therefore, can be considered easier than patterns featuring the division/elongation function.

While this study provides some insights in taxonomy development for kindergarten aural and oral rhythm patterns, Bradford reported limited variability in oral response scores, which restricts the generalization of these results. More difficult patterns would have provided a broader understanding.

Lai (1999) examined the relationship between music aptitude and music achievement of 51Taiwanese subjects in primary grades and the performance difficulty and discrimination levels of performance patterns. The criterion tonal patterns and rhythm patterns for the oral tests were derived from the cassette recording, *Developing Musicianship* (Grunow, 1997). The rhythm patterns consisted of macro/micro beats, division, and division/elongation, 24 in duple meter and 24 in triple meter. Patterns were performed using a neutral syllable and were recorded. Subjects listened to a criterion pattern and then attempted a vocal reproduction which was audiotape recorded. Two independent judges using two continuous five-point rating scales (tonal and rhythm) scored all of the performances twice.

Lai found that duple meter patterns were performed better than triple meter patterns, as did Bradford (1995), and that rhythm performance improved with maturation. Macro-micro beat functions were easier to perform than division and division/elongation functions, as was found in the Bradford study.

Lai reported difficulty levels of rhythm patterns to range from .12 to .98. Following

Gordon's (1976) example of identifying difficulty levels of patterns as easy, moderately difficult, and difficult through comparison to standard derivation, Lai identified patterns as belonging to levels based on the results of item analysis. The small sample size limits the application of Lai's study, but it provides a basis for the present study in design and magnitude of performance patterns.

The purpose of this research is to improve understanding of the musical abilities of kindergarten children and to establish a hierarchy of rhythm patterns performed by kindergarten children.

PROCEDURES

The *Rhythm Pattern Performance Test* (Wolf, 2002), an investigator-designed music achievement test for kindergarten subjects, examined the ability to perform rhythm patterns in imitative response to a recorded model. The test consisted of thirty recorded rhythm patterns, and required approximately four minutes to administer to each subject. Subjects were audiotape recorded as they listened and imitated each of the patterns; their recorded responses were evaluated by two independent judges using a six-point continuous rating scale.

For a greater application of the research results reported by Lai (1999), rhythm patterns in duple and triple meter were considered. The test featured rhythm patterns with macro/micro beats, elongations, divisions, and divisions and elongations in similar forms for duple and triple meter. Macro/micro beat function refers to the beat and its division into two or three parts; elongation refers to the extension of a macrobeat; division refers to the subdivision of a microbeat; and division/elongation refers to any combination of division and elongation functions.

A selection method similar to that of Jones (1979) and Sinor (1984) was followed in an

effort to select the most appropriate patterns for *RPT*. Three kindergarten and first-grade curriculums (Beethoven, et al., 2000; Boyer-Alexander, et al., 2000; Taggart, Bolton, Reynolds, Valerio, & Gordon, 1998) were surveyed to examine the rhythm patterns most frequently used in standard method books. Although the results of the survey revealed sparse representation of triple meter and a predominance of rhythm patterns in duple meter in two of the three curriculums, lists were compiled of the most common patterns. From these lists, patterns were selected that could be used in similar forms for duple and triple meter.

Specific characteristics of rhythm patterns in *RPT* include meter (duple or triple) and function (macro/micro beat, elongation, division, and division/elongation). Patterns were paired with contrasting patterns in reverse order but with the same rhythm function to provide diversity in difficulty and content. Patterns were also selected with parallel beginnings or endings to provide additional basis for comparison. The characteristics of the rhythm patterns are presented in Table 1.

Table 1. *RPT Rhythm* Pattern Characteristics

	Number of Items	Macro/micro Function	Elongation Function	Division Function	Division/Elongation Function
Total Score	30	12	10	4	4
Duple meter	15	6	5	2	2
Triple meter	15	6	5	2	2

Rhythm patterns were recorded by a soprano chanting on a neutral syllable "bah" in both duple and triple meters over macrobeat taps produced by a metronome set at M.M. 67, which is the same tempo rhythm patterns are presented in *PMMA* (Gordon, 1979).

Each rhythm section began with a recording of eight metronome taps establishing tempo. Practice examples followed, which were included on the *RPT* recording prior to the test

patterns to introduce each section (duple or triple) and to familiarize the subject with each meter. Because each section was introduced in similar form, the order of the test could be varied to control for fatigue due to test length, or improvement due to repetitive practice.

Scores of varying degrees of accuracy were preferred to describe a normal distribution of music achievement, but dichotomous scores (correct or incorrect) were necessary to determine difficulty levels. Thus, a rating scale comprised six points to allow for degrees of accuracy, and an equal number of possible correct and incorrect points. The three lowest points (1-3) were considered inaccurate performances and the three highest points (4-6) were considered accurate performances. Patterns were awarded six points if the rhythm pattern was chanted accurately, with all rhythms performed precisely on the macrobeat; five points, if the rhythm pattern was chanted accurately, but without precision, slightly off the macrobeat; four points, if the rhythm pattern was chanted accurately but with uncertainty, and without alignment with the macrobeat; three points if the rhythm pattern was chanted with correct meter and tempo, but with one rhythmic error; two points, if the rhythm pattern was chanted with correct meter and tempo, but with more than one rhythmic error, and one point, if the rhythm pattern was not completed, or was chanted with inaccurate meter or tempo.

The sample consisted of 165 subjects in kindergarten in intact classes from six suburban public elementary schools in two school districts representing populations of middle class socio-economic backgrounds. One school district provided kindergarten music instruction by a music specialist in weekly 30-minute sessions; the other school district did not.

The music achievement measure, *Rhythm Pattern Performance Test* (*RPT*), (Wolf, 2002), was administered individually by the investigator to all subjects during the spring semester, who were audiotape recorded as they echoed the rhythm patterns. Recorded tonal pattern

performances were evaluated by two independent judges, both experienced elementary vocal music educators, using a six-point continuous rating scale. To examine intrajudge reliability, twenty percent of the performances were judged twice; to examine interjudge reliability, the first set of ratings of the two judges for all subjects (N = 165) were compared.

RESULTS

All reliability coefficients for *RPT* were satisfactory. Intrajudge reliability coefficients were .93 and .92. The interjudge reliability coefficient was .93.

The mean score of the first judge's ratings of all performances (*N* = 165) was reported as 94.88 (SD = 22.0) of a total possible score of 180; coefficients of skewness (.378) and kurtosis (-.013) were not extreme. Thus, a normal distribution of *RPT* scores was demonstrated.

As reported in other studies of pattern difficulty (Gordon, 1974, 1976, 1978; Lai, 1999), the rhythm patterns of the present study were assigned to categories (easy, moderate, difficult) according to the mean and standard deviation of the pattern difficulty levels. Performance difficulty levels were determined for each *RPT* pattern: the mean difficulty level was 41 (*SD* = 21). The patterns determined to be difficult included patterns with difficulty levels one standard deviation or more below the mean (difficulty levels 2-19); moderate, difficulty levels between one standard deviation below and above the mean (difficulty levels 20-62); and easy, difficulty levels one standard deviation or more above the mean (difficulty levels 63-79). Table 2 presents the range of rhythm pattern difficulty levels for the categories: difficult, moderately difficult, and easy. Table 3 presents the hierarchy of rhythm performance patterns.

Table 2. *RPT* Rhythm Difficulty Level Range

	Difficult	Moderate	Easy
Kindergarten	2 - 19	20 - 62	63 - 79

Table 3. *TPRPT* Rhythm Performance Pattern Hierarchy

Item	Meter	Function	K
13	Duple	Macro/micro	E 79
9	Duple	Macro/micro	E 72
5	Duple	Division	E 74
16	Triple	Elongation	E 64
3	Duple	Macro/micro	E 64
1	Duple	Elongation	M 59
8	Duple	Division	M 59
6	Duple	Macro/micro	M 55
28	Triple	Macro/micro	M 54
12	Duple	Division/Elongation	M 52
10	Duple	Elongation	M 52
18	Triple	Macro/micro	M 51
24	Triple	Macro/micro	M 47
7	Duple	Division/Elongation	M 41
19	Triple	Elongation	M 41
4	Duple	Elongation	M 41
15	Duple	Elongation	M 40
2	Duple	Macro/micro	M 39
21	Triple	Macro/micro	M 33
11	Duple	Macro/micro	M 33
22	Triple	Division/Elongation	M 31
25	Triple	Elongation	M 29
30	Triple	Elongation	M 22
17	Triple	Macro/micro	M 22
20	Triple	Division	D 16
26	Triple	Macro/micro	D 13
23	Triple	Division	D 12
14	Duple	Elongation	D 10
29	Triple	Elongation	D 10

27	Triple	Division/Elongation	D 2
Average			41

The hierarchy of rhythm patterns reveal the following results:

1. Duple meter patterns were performed more accurately than triple meter patterns
2. Nearly all patterns identified as difficult patterns were triple meter patterns (83 percent of the difficult patterns were triple meter patterns)
3. Triple meter patterns were not easy for most subjects in kindergarten and primary grades.

No clear characteristics of difficulty emerged from the rhythm pattern hierarchy except the identification of duple meter as easier to perform than triple meter, which supports the research results of Bradford (1995) and Lai (1999).

The descriptive statistics for the characteristics of the rhythm pattern performances are presented in Table 4. As expected, duple patterns of all functions were easier to perform than triple meter patterns. Perhaps differences between duple meter and triple meter performance patterns would be less severe if subjects had more experiences with triple meter.

Table 4. *RPT* Rhythm Subtest Characteristics

		Items	Mean	*SD*
Total Score		30	94.88	22.00
	Duple	15	53.98	12.55
	Triple	15	40.90	11.16
Macro/micro		12	40.55	9.58
	Duple	6	22.66	5.64
	Triple	6	17.88	5.11
Elongation		10	30.72	7.58
	Duple	5	16.28	4.11
	Triple	5	14.44	4.30
Division		4	12.10	3.65
	Duple	2	8.07	2.57
	Triple	2	4.03	1.86
Division/Elongation		4	11.51	3.46
	Duple	2	6.96	2.31
	Triple	2	4.55	1.73

CONCLUSIONS

A sequence of easy to difficult performance patterns, developed as a difficulty hierarchy, was established among rhythm patterns performed by kindergarten children.

The rhythm patterns determined to be the easiest to perform were duple meter patterns; the most difficult patterns were triple meter patterns. Meter seemed to be the most important characteristic in determining rhythm pattern difficulty: other characteristics of rhythm patterns were not clearly identified by the difficulty levels.

Parents and teachers should be encouraged to chant rhythm patterns to young children. They should begin with the patterns identified in this study to be easy. An echo-response format as developed in this study should be followed, presenting patterns in an imitative game format to develop successful and enjoyable experiences in music-making.

A sequential curriculum based on the hierarchy of rhythm performance patterns developed from this study should be designed and implemented. A sequential approach beginning with the easiest and advancing to the more difficult rhythm patterns should be considered in curriculum development and repertoire selection and may provide an appropriate sequence of performance patterns for improvisation and creative experiences. The hierarchy of rhythm patterns determined by this study may serve as a resource for the development of performance assessment criteria for children in kindergarten.

The use of individualized echo chanting can be considered a viable means of music achievement assessment. The hierarchy of rhythm patterns developed in this research provides a basis for music achievement assessment among children in kindergarten. Music teachers could use these patterns to help identify subjects with high rhythm ability or to help identify areas of weakness to improve instruction.

The music curricular emphasis of duple meter should be restructured. Because children can successfully perform some duple and triple meter patterns, their early instruction should emphasize varied meters. Early opportunities to experience different meters should be part of every music curriculum. More songs and activities in triple meter should be made available for children in kindergarten.

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