

Phonemic Awareness and Musical Pitch Discrimination: Related?

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Problem

Defining the relationship between the processes of phonemic awareness and musical pitch discrimination would be very important to the fields of reading and music education. A clarification of how these processes are similar in nature could allow for other types of research and applications of using music to help children learn phonemic awareness as part of their pre-reading skills. This study will investigate whether systematic musical pitch discrimination training can aid and speed development of phonemic awareness skills in children aged four years old.

After I received my Bachelor of Arts degree in music at The University of Georgia, I worked as a Kindergarten and Pre-Kindergarten teacher for two years at a private school. It was during these years that I made an observation: the children who were the best singers were also the ones with the best grasp of phonemic awareness. Even before beginning my Master of Education program at The University of Georgia, I wanted to look into this topic of research. In my exploration, I found only one study which examined the relationship between of these topics. However, the study I found was the exact model of the research I intended to plan. Now, I will be able to build off of this previous study to find if musical pitch discrimination can aid the process of gaining phonemic awareness.

The term phonemic awareness refers to the ability to manipulate the spoken sounds in language. For the purposes of this study, musical pitch discrimination will be defined as the ability to detect and report differences in musical frequencies.

The assumptions of this study include that the children are able to grasp both phonemic awareness and musical pitch discrimination skills. Another is my ability to effectively teach the musical pitch discrimination skills. It is assumed that all of the children have normal range hearing, between 0 and 20 decibels of loss. The children must be able to hear at least 20 decibels of sound within the frequency range of 1,000 to 4,000 Hertz.

Implications of this study can include a few important things. This may help researchers discover new ways to assist children's literacy skills. Pre-school and early elementary classes could use musical pitch discrimination skills to systematically work on training children to hear the differences which exist both in music and speech. Another educational implication would be carefully structured musical training as an essential part of young children's school curriculum (Lamb & Gregory, 1993).

Review of Related Literature

Phonemic Awareness

Pre-readers need to become aware of the sounds that make up spoken words (McKenna & Stahl, 2003). Without this understanding of how speech is made up of a sequence of small sounds, there is no logic to our written system (Yopp & Yopp, 2000). Emergent readers need phonemic awareness to understand the symbolization of spoken language (Richgels, 2001). This is one of the reasons why phonemic awareness is seen as one of the most important foundations of reading success (Yopp & Yopp, 2000). Phonemic awareness occurs when children grasp the idea that letter sounds can be manipulated to create new words (Fisher & McDonald, 2001). Phonemic awareness is

part of phonological awareness, which is “the awareness of the sound structure of language in general” (Yopp & Yopp, 2000, p.130). Phonological awareness refers to any size unit of sound in language, while phonemic awareness refers specifically to the phoneme. Children should enter school having phonemic awareness or be taught it during kindergarten. Phonemic awareness is not connected with written language and is entirely an auditory skill. The relationship between reading and phonemic awareness is reciprocal; as reading level increases so does phonemic awareness (2003). Phonemic awareness has been a proven crucial element for success with the written form of the language; learning to read (NRC, 1998). The level of a child’s phonemic awareness when entering school may be the single best predictor of success in learning to read (Adams, 1990). Measures of phonemic awareness correlate with reading success throughout a child’s academic career and may be the most important causal factor in separating normal and disabled readers (Adams, 1990). This has been demonstrated in several languages in addition to English (Adams, 1990). While phonemic awareness is important, it is also difficult to acquire (Adams, 1990). However, phonemic awareness is a skill that can be taught. Phonemic awareness instruction teaches children how to attend to and manipulate speech sounds in words (NRP, 2000). Teachers can do several types of activities that all work on building phonemic awareness skills for children. Adams outlines the types of phonemic awareness skills as rhyming games, word segmentation, sound deletion, phoneme blending, phoneme manipulation, oddity tasks and phoneme substitution (1990).

Using Music to Teach Literacy Skills

There have been plenty of articles written describing how to use music to aid teaching of certain pre-literacy skills. In these studies, music has been used in many ways to help children with different aspects of literacy. Fisher and McDonald examined the use of songs to provide phonological awareness activities (2001). In this article the authors suggested how music can be used for several pieces of early literacy instruction, including concepts of print, a sense of story and sequence, phonemic awareness, background knowledge and vocabulary, basic spelling patterns, and early writing activities. Fisher asserts there is no better way than music to provide young children a captivating entrance into the world of phonemes. Words are played with in songs through being shortened, lengthened, repeated, sung high, low, loud, and soft. Lyrics are rhymed and altered in many ways—all connected to language play, or language development (2001).

In their article, Hansen and Bernstorff have paralleled the similarities of reading text and reading music, and how reading music can help in text reading (2002). Their article discusses the similar decoding skills that are used in reading both music and text. Dena Register did a correlational study to see if music therapy among 4 and 5 year olds increased their pre-literacy concepts (2001). In her findings she stated music therapy greatly aided children in print concepts and prewriting skills (2001). This research demonstrates one way musical training or therapy can aid those children struggling with pre-reading activities. Systematic use of music in early childhood classrooms provides another way to teach these important skills (Register, 2001). Giving children an alternate

way of learning pre-reading concepts allows more children to learn in the style in which best suits them.

Music enhances the learning of pre-reading and writing skills through the use of nursery rhymes, rhymes in songs, and reading musical texts. In addition, music and songs help young children encode and retrieve information which normally might be too difficult for them to remember by other types of learning.

Pitch Discrimination

Studies have been done on frequency discrimination in adults and children. The ability to discriminate the frequency or pitch of sounds is considered to be critical for normal speech understanding (Thompson et al, 1999). Phonological processing abilities have been found to be the most critical skill in developing decoding abilities and later reading efficiency (Walker et al, 2002). Evidence has been found stating deficits in auditory perception may accompany reading and spelling problems (Walker et al, 2002). These deficits have also been shown to have a negative influence on the development of reading abilities and continue to exist in adults with reading disorders despite years of remediation (Walker et al, 2002). Some studies done on frequency discrimination in relation to speech perception state that speech sound discrimination is developed by age six, but that speech perception skills change with auditory experience (Kraus et al, 1999). Musical pitch may be different. In a study where participants listened to musical excerpts, Demorest and Serlin found that musical novices showed no age related differences in the perception of pitch variations while demonstrating an age related increase in sensitivity to rhythmic variations (1997). In this

study, musical novices were tested from grades 1, 5, and 9, as well as musical novices who were elementary education majors at the beginning of their required music course. They played a Schubert melody and its variations to their subjects and asked them to rate on a scale of 1 (identical) to 20 (completely different). The melody varied randomly in both rhythm and pitch. The researchers found no significant differences between any of the age groups in responses to pitch changes (Demorest & Serlin, 1997). This lends credibility to the idea that pitch discrimination abilities exist early and do not change significantly through one's lifetime. Studies have shown that infants have abilities in pitch discrimination between two notes (Olsho, 1984). Distinguishing whether age has an effect on musical pitch discrimination is still an area of controversy.

Study of Musical Sound Discrimination and Phonemic Awareness

Lamb and Gregory (1993) have performed the only study I found using both musical pitch discrimination and phonemic awareness. They did a study on the relationship of musical sound discrimination (pitch) and reading ability. They conducted a correlational study on five and six year olds. They administered a reading test, a phonemic awareness test, and a test of musical pitch discrimination. In this study, musical pitch discrimination was defined as the ability to determine if a set two pitches or chords that are played are the same or different. The notes or chords lasted 0.5 seconds and the second set followed the first note or chord after a silent period of approximately 0.5 seconds. Before starting the musical test, the researcher asked the children if they understood the words same and different, and also asked a few non-musical questions requiring the answer of same or different. If the researcher was satisfied with their

understanding, they then tested the child’s musical pitch discrimination as described above. They also administered a reading test. Their reading test consisted of four parts. They included: concepts about print, word matching, letter sounding, and word reading where the children were encouraged to sound it out. The final test administered was a test of phonemic awareness skills. It was a shortened version of the test of Phonemic Awareness by Stuart-Hamilton. They found that the children who possessed high phonemic awareness had higher scores on the reading tests than those who had difficulty with the phonemic awareness test. This information is in congruence with studies that have been done relating phonemic awareness and reading ability. Also, the children scoring highly on the pitch discrimination also did well on phonemic awareness and the reading test. They found a moderately high degree of correlation between how well children could discriminate pitch and perform these pre-reading and reading tasks. Their findings suggest that pitch discrimination is related to phonemic awareness. They stated “an ability to perceive slight differences in phonemes thus appears to depend on the ability to extract information about the frequencies of the speech sounds. It is reasonable to assume that such an ability is related to the discrimination of pitch differences in music” (Lamb & Gregory, 2003, p. 24).

<u>Correlational</u> <u>Coefficients</u>	Phonemic Awareness	Simple Reading	Phonic Reading
Pitch	0.60	0.77	0.56

All $p < 0.05$

Lamb and Gregory's (1993) study was a first step towards discovering if music education can be structured to include more clear literacy and educational goals. There are limitations in this study. This study did not prove any type of causal relationship. This study only tested children to find if skill levels of both phonemic awareness and pitch discrimination were correlated. While the children received no training in either phonemic awareness or pitch discrimination, phonics instruction was emphasized in their classroom and school. This could have affected their amount of knowledge. Their sample size was small, consisting of only 18 children, nine male and nine female. All of these children were from the same class and had the same instructor. Their research does not show if systematic pitch training can assist children with learning phonemic awareness skills. It also does not show whether children who do not possess phonemic awareness will be able to discriminate pitches.

For children who have difficulty with phonemic awareness, Lamb and Gregory's (1993) study now opens the road for further research to determine if systematic training of pitch discrimination could help children lacking phonemic awareness. Children with reading difficulties often have difficulty perceiving speech sounds (Godfrey et al., 1981). The skill of pitch discrimination is related to perceiving slight differences in speech. Other implications may include genetics. Since music has strong biological roots (Weinberger, 1998) deficiencies in phonemic awareness and musical pitch discrimination could be genetic which would allow for more careful monitoring of children who might have trouble with these skills. Perhaps children who have difficulties with phonemic awareness could benefit from musical pitch discrimination instruction. However, if the processes are similar, children with difficulties in phonemic awareness might also have

difficulties in learning to discriminate pitch. More research would have to be conducted in order to find if pitch discrimination training would assist children who have difficulty with phonemic awareness or if both skills would be affected by the child's learning difficulty. Research would have to be done to determine if there are benefits in pitch training for those struggling with pre-reading. Musical pitch discrimination training for pre-readers would allow them an alternate or additional way to learn to distinguish differences in music and speech. Perhaps simply having the reinforcement of a different approach would aid some children.

Students who receive training in musical pitch discrimination will receive higher scores on a test of phonemic awareness skills than students who do not receive the training. To discover whether musical pitch discrimination training can aid and speed development of phonemic awareness skills, I plan to conduct a quantitative study on young children.

Methodology

The type of study I propose is an extension of the research done by Lamb and Gregory which will research the effects of pitch training on phonemic awareness. I propose a quantitative study to compare the effects of systematic musical pitch discrimination training on pre-readers aged 4 years old. This would help to further determine the relationship between these two factors. This study would intend to see whether systematic musical pitch discrimination training would aid and speed development of phonemic awareness skills in children aged four years.

Research Methodology

I plan to study a group of approximately 40 children, with a control group of 20 children and an experimental group of 20 children. The sample will come from children in Pre-Kindergarten classes in Athens-Clarke County between ages four years and five years who are not yet readers. I hope to have a sample consisting of approximately half boys and half girls. The children will be randomly assigned to groups. All children will have their hearing tested and reported to the researcher, classroom teacher, and parents prior to the onset of the study.

I plan to use a randomized pre/post design.

R	O ₁	X	O ₂
R	O ₁		O ₂

Both groups will continue their regular classroom pre-reading instruction, including phonemic awareness instruction. The control group will receive no musical pitch instruction. The experimental group will receive instruction in pitch discrimination for a 12 week period. The experimental group will be given 20 minutes of instruction three days a week on musical pitch discrimination in a group setting of ten children.

Phonemic awareness will be operationalized through the Phonemic Awareness section of the Phonological Awareness Profile by LinguiSystems, Inc. All tests will be administered individually in a quiet room. These sessions will be tape and video recorded to allow for cross checking of assessment results.

The operationalization of the independent variable will be done by criteria. The musical pitch discrimination instruction will be focused to teach the concepts of:

- Listening and differentiating between notes as higher or lower than other pitches
- Listening and differentiating between same or different notes
- Describing two and three note chords as same or different
- Reproducing intervals by singing (both rising and falling intervals)
- Sound localization
- Sound discrimination

Tools for instruction of musical pitch training would also be needed. These may include a xylophone, hand drums, piano, film canisters for making shakers, an egg timer, a video camera, tape recorder, and a synthesizer or electric piano.

The Test of Phonemic Awareness has a score out of 95 possible items. I will score and record individual assessment scores. This information will be used to find the mean and standard deviation of each group.

I am planning on dealing with expectancy through the audio and video recording of the assessments. I will record the results during the assessment and then check the scoring through the video recording. Instrumentation and pre-testing are threats to the internal validity of this design. Selection, maturation, and contemporaneous events have been controlled through this design. Maturation will also be accounted for in the ANCOVA. Mortality is always an issue in research designs, but I have done my best to create in the design a situation where less mortality will occur. By having the

instruction for a short period during time at school, I hope to keep mortality from becoming an issue.

Results

On the pre-test, the control group had a mean of 45 and a standard deviation of 16.877. The experimental group had a mean of 44 and a standard deviation of 16.445. Both groups had an improvement on the post-test scores. Here, the control group had a mean of 60 with a standard deviation of 18.166 and the experimental group had a mean of 75.05 with a standard deviation of 10.531.

The analysis of covariance is the statistic which will be used to examine these results. This statistic is used to control for the differences between groups and adjust the post-test scores for the error part of the children's true scores. The ANCOVA will provide an adjusted post-test score that will account for these things.

Therefore, the hypothesis, that children who receive musical pitch discrimination training will have better phonemic awareness, is supported.

	Pre-Test Mean	Pre-Test St. Deviation	Post-Test Mean	Post-Test St. Deviation
Control	45	16.877	60	18.166
Experimental	44	16.445	75.05	10.531



Discussion

This research has shown musical pitch discrimination training to be a valid way of aiding the acquisition of phonemic awareness in this study with young children.

Hopefully, music and early childhood teachers will begin to incorporate this type of training with their young children.

Limitations of this study would be the sample size of 40 children. Different teachers administering the phonemic awareness instruction could potentially disadvantage some children in performing on the tests. Also, controversy concerning speech perception and age could potentially affect the results of this study.

More research will need to be done with a larger sample size. This would allow for the use of the Solomon design, where pre-testing is no longer a threat to internal validity. Research also needs to be done with different populations of children, including those who have language learning difficulties to see if musical pitch discrimination training will assist them with phonemic awareness.

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