

Pitch-matching Performance of Junior High Boys:

A Comparison of Perception and Production

The ability to match pitch is one of the most fundamental skills in vocal music. The absence of this skill is one of the most challenging problems that vocal music teachers and their students face. This problem can be compounded in adolescent boys by the difficulties associated with the male changing voice. Consequently, pitch-matching problems and potential solutions have been the focus of a number of research studies. Early literature on this problem used such pejorative terms as “tone deaf” or “monotone” to describe students who had difficulty matching pitch (see Welch, 1979 for a review of earlier research). More recently scholars have labeled these students as “uncertain” or “inaccurate” singers. Researchers have looked at a number of factors that might influence pitch-matching performance including age, experience, gender, model characteristics, and perceptual skills.

Most of the research on pitch-matching has been done with children in elementary school settings. Results from these studies have indicated that age is an important variable with pitch accuracy increasing with age in the early elementary grades (Green, 1990; Klemish, 1974; Petzold, 1966). Gender has not consistently been found to be a significant factor as both boys and girls can exhibit accuracy problems (Yarbrough, Bowers & Benson, 1992). Other studies have looked at the impact of various singing aids such as vertical keyboards (Jones, 1971, 1979), hand signs or solfège (Yarbrough et al. 1991), perceptual training (Porter, 1977; Apfelstadt, 1984) and visual feedback (Welch, Howard & Rush, 1989) as possible solutions, but with mixed results.

Characteristics of the Vocal Model

A considerable body of research has explored the importance of model characteristics in children's pitch-matching. Studies have examined children's accuracy matching a woman's vocal model compared to a piano model (Hermanson, 1972), flute model (Petzold, 1966), male vocal model (Green, 1990; Sims, Moore & Kuhn, 1982; Small & McCachern, 1983), and a child vocal model (Green, 1990; Yarbrough, Bowers & Benson, 1992). Studies have also explored the effects of a male falsetto model (Montgomery, 1988/89; Price et al. 1993; Yarbrough, Morrison et al. 1995) and vibrato versus non-vibrato vocal model (Yarbrough, Bowers & Benson, 1992). Results indicate that children in grades 1 through 6 match best to a female vocal models, male falsetto is a better stimulus than lower octave male models and both child vocal models and the presence of vibrato can hamper the accuracy of uncertain singers.

Boy's Pitch Matching

While much of the research has been done with elementary children, several of the studies on model characteristics have included secondary age children (Bowers, 1993; Price et al. 1993; Yarbrough et al. 1991; Yarbrough, Morrison et al. 1995). Two of these studies focused on boy singers. Bowers (1993) examined the influence of male and female models in different ranges. She found that all boys responded best matching pitches located around middle C and that uncertain singers responded more accurately to the baritone model than to a female model. Yarbrough, Morrison et al. (1995) explored the effect of a male falsetto timbre versus male regular octave vocal model or sine tone on the accuracy of uncertain boy singers in grades K-8. For this study, the authors measured time spent singing correct pitches of a minor third interval and number of

correct intervals sung. They found a significant effect for grade with older students (grades 5, 7 & 8) performing the best. Grades K through 7 did much better at matching the falsetto models than the other models, while grade 8 performed best when matching the regular octave vocal models.

Perception versus production

A common assumption about inaccurate singers is that they lack strong perceptual skills: “good ears”. Studies that have compared pitch-matching perception and production skills, however, suggest that the relationship between the two may not be very strong. Geringer (1983) measured the pitch discrimination and pitch-matching skills of preschool and fourth-grade students. He found that fourth-graders did better on the pitch-matching task overall, but there was no significant relationship between pitch discrimination scores and pitch-matching performance. Geringer & Witt (1985) compared the tuning performance and perception of high school string players with those of collegiate and professional players. They found the same lack of relationship between perception and performance, though the more experienced subjects had a higher percentage of agreement. Two recent studies have compared the tuning accuracy of wind players on pitch perception and pitch production tasks (Yarbrough, Karrick et al. 1995; Yarbrough, et al. 1997). Students were tested by tuning to a target pitch using either their instrument (production) or a pitch knob on a variable-pitch keyboard (perception). In both studies, years of experience significantly affected tuning accuracy and students performed better on the perception task than they did on the performance task, but there was no significant relationship between a subject’s performance on the perception task and their performance on the production task.

The purpose of this study was to compare junior high boys' performance on a two pitch-matching tasks involving singing (production) and tuning a knob (perception) to further explore the relationship between pitch perception and pitch production. The choice of junior high boys as subjects stems from the particular difficulties some boys experience in matching pitch as they undergo the physical changes associated with vocal maturation. The research questions were: 1) Is there a difference in perceptual ability between certain and uncertain singers? and 2) Are perception or matching scores affected by the singing range of the subject?

References

- Apfelstadt, H. (1984). Effects of melodic perception instruction on pitch discrimination and vocal accuracy of kindergarten children. *Journal of Research in Music Education, 32*, 15-24.
- Bowers, J. (1993, January). *The effect of vocal models and stage of vocal development on the pitch-matching accuracy of certain and uncertain male singers in grades six through eight*. Paper presented at the Southern Division, Music Educators National Conference, Savannah, GA.
- Geringer, J. M. (1983). The relationship of pitch-matching and pitch discrimination abilities of preschool and fourth-grade students. *Journal of Research in Music Education, 31*, 93-99.
- Geringer, J. M., & Witt, A. C. (1985). An investigation of tuning performance and perception of string instrumentalists. *Bulletin of the Council for Research in Music Education*, no. 85, 90-101.
- Green, G. A. (1990). The effect of vocal modeling on pitch-matching accuracy of elementary schoolchildren. *Journal of Research in Music Education, 38*, 225-231.
- Hermanson, L. W. (1972). An investigation of the effects of timbre on simultaneous vocal pitch acuity of young children (Doctoral dissertation, Teachers College, Columbia University, 1971). *Dissertation Abstracts International, 32*, 3558A.
- Jones, M. (1971). A pilot study in the use of a vertically-arranged keyboard instrument with the uncertain singer. *Journal of Research in Music Education, 19*, 183-194.

- Jones, M. (1979). Using a vertical keyboard instrument with the uncertain singer. *Journal of Research in Music Education*, 27, 173-184.
- Klemish, J. (1974). Treating the uncertain singer through the use of the tape recorder. *Bulletin of the Council for Research in Music Education*, no. 37, 36-45.
- Montgomery, T. D. (1989). A study of the associations between two means of vocal modeling by a male music teacher and third-grade students' vocal accuracy in singing pitch patterns (Doctoral dissertation, University of North Carolina Greensboro, 1988). *Dissertation Abstracts International*, 49/08, 2142A.
- Petzold, R. G. (1966). *Auditory perception of musical sounds by children in the first six grades*. (Cooperative Research Project 1051). Madison, WI: University of Wisconsin-Madison.
- Porter, S. Y. (1977). The effect of multiple discrimination training on pitch matching behaviors of uncertain singers. *Journal of Research in Music Education*, 25, 68-82.
- Price, H. E., Yarbrough, C., Jones, M., & Moore, R. S. (1993, April). *Effects of male timbre and falsetto and sine wave models on interval matching by inaccurate boy and girl singers*. Paper presented at the Tenth National Symposium for Research in Music Behavior, Tuscaloosa, AL.
- Sims, W. L., Moore, R. A., & Kuhn, T. L. (1982). Effects of male and female vocal stimuli, tonal pattern length, and age on vocal pitch-matching abilities of young children from England and the United States. *Psychology of Music, Special Issue*, 104-108

- Small, A. R. & McCachern, F. L. (1983). The effect of male and female vocal modeling on pitch-matching accuracy of first-grade children. *Journal of Research in Music Education, 31*, 227-233.
- Welch, G. F. (1979). Poor pitch singing: A review of the literature. *Psychology of Music, 7* (1), 50-58
- Welch, G. F., Howard, D. M., & Rush, C. (1989). Real-time visual feedback in the development of vocal pitch accuracy in singing. *Psychology of Music, 17*, 146-157.
- Yarbrough, C., Bowers, J., & Benson, W. (1992). The effect of vibrato on the pitch-matching accuracy of certain and uncertain singers. *Journal of Research in Music Education, 40*, 30-38.
- Yarbrough, C., Green G., Benson, W., & Bowers, J. (1991). Inaccurate singers: An exploratory study of variables affecting pitch-matching. *Bulletin of the Council for Research in Music Education, no. 107*, 23-34.
- Yarbrough, C., Karrick, B., & Morrison, S. J. (1995), Effect of knowledge of directional mistunings on the tuning accuracy of beginning and intermediate wind players. *Journal of Research in Music Education, 43*, 232-241.
- Yarbrough, C., Morrison, S. J., & Karrick, B. (1997). The effect of experience, private instruction, and knowledge of directional mistunings on the tuning performance and perception of high school wind players. *Bulletin of the Council for Research in Music Education, no. 134*, 31-42.

Yarbrough, C., Morrison, S. J., Karrick, B., & Dunn, D. (1995). The effect of male falsetto on the pitch-matching accuracy of uncertain boy singers, grades K-8.

Update: Applications of Research in Music Education, 14 (1), 4-10.

Young, R. W. (1952). *A table relating frequency to cents (deviation from the equally tempered scale on A-440 Hz)*. Elkhart, IN: G. G. Conn Limited.