Article

Identification of the Adolescent Male Voice: Unchanged vs. Falsetto

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Abstract

The purpose of this study was to examine the ability of preservice music educators ($N = 61$) to classify recordings of male adolescent singers as either unchanged or falsetto voice on identical pitches. Prior to beginning the task, a survey was given to collect demographic information (sex, major concentration, academic classification, and vocal experience), as well as pre- and post-task questions asking participants to provide descriptors of the adolescent male falsetto and unchanged voices (Price, Yarborough, Jones, & Moore, 1994). Upon completion of the classification task, participants were asked to provide confidence ratings on their responses. Participants' responses indicated more agreement on unchanged voice samples than falsetto. Preservice males were in greater agreement in their responses than females. Preservice males that had participated in elementary/middle school music programs were in greater agreement with the panel of experts than those who had participated only in high school programs.

Keywords:

unchanged voice, falsetto, adolescent male voice, vocal maturation, changing voice

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The challenges associated with the vocal maturation process of the adolescent male have long been studied. Among those studies are several comprehensive approaches to the male adolescent voice (Cooksey, 1985, 1992; McKenzie, 1956; Swanson, 1977) as well as publications regarding techniques for working successfully with the changing voice in the choral classroom (Barham & Nelson, 1991; Brinson & Demorest, 2014; Killian, O'Hern, & Rann, 1995; Stockton, 2014). Killian and Wayman (2010) concluded the need for more training in identifying the correct stage of vocal maturation, more specifically, the ability to differentiate between the use of falsetto and the unchanged voice when voicing adolescent male singers in an attempt to provide a more successful choral experience. Discriminating between falsetto and an unchanged voice can be a difficult process due to the misperception of identical pitches with different timbres (Price, Yarbrough, Jones, & Moore, 1994). If teachers are not able to differentiate between vocal timbres, vocal classification may be difficult. Teachers not able to accurately discriminate between falsetto and unchanged voice could plausibly harm or limit the vocal experience by having students perform literature singing out of their range, or in a limited range, over time causing vocal strain, vocal fatigue, and through repetition developing long-term bad singing habits (Crocker, 2000; Smith-Vaughn, Hooper, & Hodges, 2013; Spurgeon, 2002). Teaching students to access their falsetto voice in a healthy unstrained manner could be a rewarding technique for singers to extend their range. However, students singing consistently in that range without connection to their emerging modal voice could have limited experience and possible delay vocal continuity of their full voice. Therefore, the ability to identify student's use of the falsetto voice can be an important catalyst for altering teaching strategies to assist in a more successful vocal experience. Students who are not able to complete assigned tasks by teachers, in this case, singing, may become increasingly frustrated resulting in lack of personal confidence, confidence in their teacher, and conceivably act out causing classroom disruptions. With increased frustrations, students may also become disinterested, even negative, when singing and plausibly conclude their experiences by dropping out of choral programs (Freer, 2016; Killian, 1999; Wolfe, 2016).

The unchanged voice is the vocal state before the onset of vocal maturation (Leck, 2009). John Cooksey's proposed theory (1977; 1985) divides the maturation process into six different stages of development (See Figure 1). Throughout the maturation process, changes
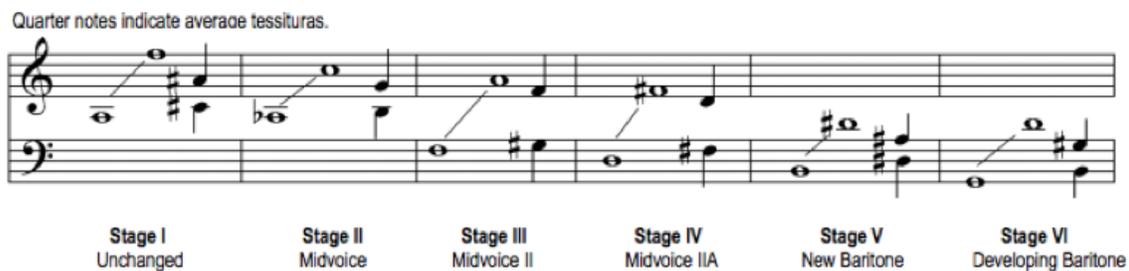

Figure 1. *Cooksey (1985) Stages of Male Vocal Development*
Vocal Ranges (whole notes) and Tessitura (quarter notes)

occur both in the appearance of the body and internally to the vocal mechanism. Noticeable vocal changes, like lowering of pitch and appearance of vocal gaps, are often due to increased testosterone during the onset of puberty causing the vocal folds to grow in length and thickness (Markova et al., 2016). This audible difference marks the end of the unchanged voice. When describing unchanged male voices directors use terms like clear resonant tones, unforced, full and rich, controlled, wide ranges (sometimes over two octaves), soloistic ability, and they even suggest that the male voice is most brilliant before the onset of the vocal change process (McRae, 1991, Swanson, 1977).

Defining falsetto can be difficult due to differing professional perspectives (Jackson, 2005). According to Cooksey, Beckett, and Wiseman (Cooksey, 1985), the onset of the falsetto voice may occur during the maturation process in Stage II - Midvoice II. However, some students may not access it until later stages when the voice stabilizes. Cooksey (1992) notes, the most common starting range for falsetto as E4 (330 Hz) to B4[1] (495Hz), but even this cannot be determined until the voice somewhat stabilized in Stage III - Midvoice IIA. Several sources have identified the qualities of falsetto to include: breathy, hooty, unstable, light, pure, female like, and like a big flute (Brinson & Demorest, 2014; Ekstrom, 1959; Stanley, 1958; Winsel, 1966).

Cooksey (1992) concluded students' progression through the six stages were sequential, but may occur at different rates. The age of vocal maturation onset is of debate. Several studies conducted in the United States support the onset of vocal maturation occurring approximately between 10 and 11 years of age (Fisher, 2010; Killian 1999; Killian & Moore, 1997; Killian & Wayman, 2010). Additional research involving English choristers supports an onset at the approximate age of 13 (Ashley, 2013a; 2013b). Therefore, generalizations of vocal categorization and access to different registers like falsetto based solely on age could be faulty. Researchers examining both ethnicity and age (Fisher, 2010) have found that in general African-American males start the vocal maturation process earlier than Hispanic males followed Caucasian males. Application of these generalizations could be useful in anticipating different qualities of the voice and possible access to different registers like falsetto. For example, an African-American male could have a greater chance of using his falsetto voice at a younger age than a Caucasian male.

Timbre allows individuals to distinguish between tones with an identical pitch, duration, and loudness (Radocy & Boyle, 2012); therefore timbre is an important consideration when asking an individual to aurally distinguish between the unchanged and falsetto voice on the same pitches. The physical production of tone in the unchanged and falsetto voice is different, resulting in different timbres (Deguchi, 2011). Roederer's Theory of Perception (Traube, 2006) states that timbre can be categorized into two sections: (a) new sounds, and (b) past sound already in the memory bank. Listeners' connecting to previously stored sounds like the modal male voice (adult voice) and the male falsetto voice (commonly de-

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[1] For the purposes of this study the scientific pitch notation system (Young, 1939) and Hertz values will be utilized throughout the document

fined as the highest possible register in a changed voice or child-like voice) can differentiate with a 95% accuracy (Colton, 1970). Muckey (1915) concluded string players could relate to the characteristics of the voice due to the physiological similarities and resulting timbres through vibrations in the body. Perceived connections of new sounds can add a layer of difficulty in the evaluation process. For example, Rinta and Welch (2009) found that when assessing the speaking and singing voice of the same individual sometimes it was perceived as being produced by two different people. Whether listeners can distinguish between an unchanged male voice and a falsetto voice singing the same higher range pitches has not been examined empirically.

Often novice teachers are placed in middle school classrooms consisting of young singers advancing through a variety of vocal maturation stages with the expectation to provide successful choral experiences and meet the students' mental (Ramsey, 2016), emotional (Killian, 1997), physical (Smith-Vaughn et al., 2013), and vocal needs (Reames, 2001; Wolfe, 2016). Choral educators of all levels, especially those teaching the changing voice population benefit from information and understanding of the voice to help guide students vocally, select quality literature, and provide for a good choral experience. Accurate identification of vocal register is an essential building block to ensuring this success, and mastering the differentiation between the falsetto and unchanged voices could help reinforce a positive singing experience for the student through the entirety of their range (Killian, 1997). The purpose of this study was to examine the accuracy of preservice music educator's classification of adolescent males' use of unchanged and falsetto voice on identical pitches. There were four specific research questions addressed:

1. How well do preservice music educators agree with experts on the classification of falsetto and unchanged vocal samples on identical pitches?
2. Does singing experience, sex, educational classification (freshmen, sophomore, junior, senior, graduate), or major concentration (band, strings, vocal) of the preservice music educators indicate differences in agreement levels?
3. How confident are preservice music educators in their agreement with expert's classification of falsetto and unchanged voices?
4. What descriptors do preservice teachers use for falsetto and unchanged voices?

Methodology

The methodology was divided into two sections: (a) the development of the stimulus recordings of boys' voices, and (b) the preservice music educators' classification task.

Development of the Stimulus Recording

The stimulus recording was crucial to this study. Individual singers consisting of sixth, seventh, and eighth-grade boys ($N = 31$) were recorded demonstrating a vocalise of a diatonic major 1-5-4-3-2-1 pattern on an "ah" vowel on a range of starting pitches to ensure

coverage of the entirety of their range. Each student was first asked to count backward from twenty to one to find their primary speaking pitch. The researcher on the piano identified the primary speaking pitch while the participants were counting. The same piano was used throughout the recording process. An expert male singer then modeled the vocalise utilizing the falsetto voice, which research has shown to be effective for pitch matching accuracy (Green, 1990; Price et al., 1994). Students then sang the vocalise, starting on their primary speaking pitch, moving up by half steps to the top pitch of his range and then repeating the process down the scale to obtain the bottom pitch of the student's range. Although students self-select a stopping point at the top of their range, encouragement was given to provide greater energy and release in an attempt to more accurately reach the extent of their range (Cooksey, 1985; Killian & Wayman, 2010). For consistency, the microphone mechanism (Edirol R-09 digital recorder) was placed approximately thirty centimeters from the student lips (Castellengo, Lamesche, & Heinrich, 2007; Titze & Winholtz, 1993).

After the uncompressed 44.1 kHz 16-bit two-channel WAV file recordings were collected for each of the 31 boys, a panel of experts ($N = 4$) evaluated the singing samples by listening to the entirety of the recordings, identifying aurally the use of falsetto or the unchanged voice and rating the obviousness of the sample on a Likert scale from 1 (not obvious) to 10 (very obvious). The panel of experts consisted of two male and two female professionals with an average of 12 years of teaching experience in choral music education. All had extensive successful experience in teaching adolescent males in the classroom and individual settings. It is important to note that the panel of experts was able to listen to the expanse of the singers recorded range when evaluating the perceived use of falsetto or unchanged voice. As expected, changed voices demonstrated lower pitches and some, not all, could move into falsetto (Cooksey, 1985). A mean of the experts' ratings for each sample was calculated to identify the four most obvious examples of falsetto and the four most obvious examples of unchanged voice.

The sample recordings were then digitally edited utilizing Audacity 1.2.6a software to include only the three vocalise excerpts beginning on E4 (330 Hz), F4 (350 Hz), and F#4 (370 Hz). The same pitches for each of the recordings were selected to focus the listeners' assessment on the differences between the timbres of the perceived use of unchanged and falsetto voices. The specific pitches, E4 (330 Hz), F4 (350 Hz), and F#4 (370 Hz), were selected because of clarity of recording and the common existence of falsetto and unchanged voices observed on these pitches in past studies (Cooksey, 1985; Price et al., 1994). A split-half format (Research Methods Knowledge Base, 2008) was utilized to control for possible learning and order effects yielding sixteen total vocalise excerpts ($N = 16$) for the classification stimulus recording. Unknown to the preservice teachers, the stimulus recording consisted of the original eight edited vocal excerpts (falsetto - 4 and unchanged - 4) in a random order followed by the repetition of those same eight samples in reverse order. Each sample was approximately ten seconds in duration followed by ten seconds of silent response time. The total time of the stimulus recording was approximately five minutes.

Preservice Music Educator Assessments

The preservice music educator participants were undergraduate and graduate students from two southwestern universities ($N = 61$). The participants are from a state that certifies all-level (K-12) and all areas of major concentration (band, strings, and vocal); therefore, all self-declared preservice music educations students qualified to participate. Thirty males ($n = 30$) and thirty-one females ($n = 31$) participated in the study. The study procedure consisted of four sections: (a) participant demographic survey; (b) pre-task questions; (c) stimulus classification and (d) post-task questions.

Participant Survey/Pre-task Questions. The participant survey was designed to collect demographic information including major, sex, primary instrument, singing experience (school, church, private, etc.), primary major concentration (strings, band, or vocal), and academic classification (junior, senior, etc.). Preservice music educator's singing experience was assessed for elementary school choir, middle school/junior high choir, high school choir, university choir, church choir, community choir, solo/ensemble contest, solo or ensembles for special occasions, voice lessons, and other. Originally, participants were asked to place the number of years of experience in each area; however, due to confusion, many only placed check marks. Therefore, a ranking system of 0 to 3 was derived to classify their experience.

0 – No experience

1 – Little experience – elementary, middle school/junior high choir, or a semester of collegiate choir

2 – Moderate experience – little experience + high school choir or church choir or community choir

3 – High level of experience – moderate experience + solo/ensemble contest / solo or ensemble for special occasions + voice lessons

The following pre-task questions were vital in the gathering common language used in conveying characteristics of the unchanged and falsetto voices, and assisting with the participant's focus on the topic. The preservice music educators were asked two questions.

1. What characteristics of sound do you listen for when determining if you hear the use of falsetto?

2. What characteristics of sound do you listen for when determining if you hear an unchanged voice?

For this study it was assumed that the participants had some background related to this terminology; and therefore, falsetto and unchanged voice were not predefined as to reduce material that may influence their responses.

Stimulus Recording Assessment. The participants' aural classification of the stimulus recording was the primary focus of the study. The task took place in reserved music computer labs with independent computers (iMac 8.1 Intel Core 2 Duo) allowing for the participants to assess the stimulus recordings through external headsets (Koss SB/40) with little outside influence.

Upon the completion of the pre-task questions, the monitor asked the participants to follow along as he/she read aloud:

> You will hear a series of adolescent male singers. After you have heard each sample, please determine if what you are hearing is an example of an unchanged voice or a falsetto voice. After making your choice, mark the confidence of your decision on a scale from 1(uncertain) to 10 (certain). You will have ten (10) seconds between each sample. Do you have any questions?

All monitor directions and response forms were piloted for language and understanding with both experienced choral music educators ($n = 4$) and preservice music educators ($n = 10$). Directions were modified for greater clarity, and the time between recordings changed from twenty to ten seconds.

Post-task Questions. Post-task questions were restatements of the pre-task questions requesting descriptors of the falsetto and unchanged voices. The purpose was to provide participants the opportunity to expand upon the characteristics of the unchanged and falsetto voices they may have identified while listening to the stimulus recording. An additional post-assessment Likert scale (1 = uncertain / 10 = certain) question addressed the estimation of overall confidence in the responses made during the assessment process (Price et al., 1994).

Resulting data consisted of participants' demographic information, classification of either falsetto vs. unchanged for the examples on the stimulus recordings, confidence ratings of preservice music educators' assessments, and pre and post-task descriptors of falsetto and unchanged voices. All participants agreed to the process and sharing of data as stated in the Internal Review Board certification document.

Results

The preservice music educators classifications were evaluated based on the expert's classification of adolescent males' as either unchanged or falsetto voice on identical pitches.

Each participant had a possible score of 8 for entire task (4 falsetto and 4 unchanged) Demographic data, collected as a part of the pre-assessment survey, indicated preservice educator's singing experience, sex, educational classification and major concentration.

Subjects answers on the first eight examples were first compared to the second eight to determine intra-rater reliability. A Spearman-Brown Prediction Formula reliability analysis (r_s = .749) supports a moderate intra-related reliability within the split-half test design.

A repeated measures analysis of variance was conducted to compare the accuracy of preservice music educators' identification of unchanged and falsetto voices. There was a significant within-subject difference in the accuracy of identification between unchanged (M = 82.92, SD = 21.34) and falsetto voices (M = 71.67, SD = 24.56); $F(1,59)$ = 11.78, p = .001 with participants being much more accurate at correctly identifying unchanged voices.

Research question two was concerned with what backgrounds variables may influence classification accuracy. First, preservice educators were either categorized as upper-level (senior and graduate), students (n = 23), or lower-level (freshmen, sophomore, and junior) students (n = 36). A two-way mixed analysis of variance found no significant difference in accuracy between lower-level (M = 73.96) and upper-level students (M = 83.15); $F(1, 57)$ = 3.33, p = .073 and no significant interaction between education level and voice type $F(1, 57)$ = .04, p = .842. Accuracy of the identification of the unchanged and falsetto voices was also analyzed between male (n = 30, M = 80.83) and female (n = 30, M = 73.75) preservice music educators, and found to have no significant difference $F(1, 58)$ = 2.08, p = .155 and no significant interaction between voice type and sex $F(1, 58)$ = .14, p = .709.

The successful identification of the unchanged and falsetto voice may also differ based on major concentration. Preservice educators self-identified their major instrument area as either vocal, band, or orchestra. Preservice educators were divided into vocal (n = 29) and instrumental (n = 31) for analysis. A two-way mixed analysis of variance found no significant difference in accuracy between vocal students (M = 77.16) and instrumental students (M = 77.42); $F(1, 58)$ = 0, p = 1.0 and no significant interaction between major instrument and voice type $F(1, 58)$ = 2.34, p = .132.

Another potential influence on voice classification ability is singing experience. For the analysis,singing experience categories were collapsed from four to two creating Little/Moderate and High levels of experience. A two-way mixed analysis of variance found no significant difference in accuracy between little/moderate singing experience (n = 36; M = 75.36) and high level students (n = 23; M = 80.00); F(1, 58) = .85, p = .360 and no significant interaction between singing experience and voice type F(1, 58) = .5, p = .482. However, analysis did indicate a significant difference in the responses from male participants with elementary (n = 32; M = 85.94) and/or middle school/junior high school vocal music experience, and those without elementary and/or middle vocal experience (n = 28; M = 75); $F(1, 58)$ = -1.99, p = .05. See Figure 2 on page 74.

Research question three dealt with participant's confidence in their classifications. These ratings were given on a Likert scale from 1 (not confident) to 10 (very confident) (Price et al.,

1994). Figure 3 illustrates the parallel relationship of the major concentration areas by the accuracy of their responses and confidence rating means. Although not significantly different, string participants had the highest confidence rating and level of identification accuracy; vocalists had the second highest ratings and level of accuracy, and band participants had the lowest confidence rating and the least accurate identification of the vocal samples.

In efforts to determine if there was a common language around male vocal timbre, participants were asked to provide open-ended falsetto and unchanged voice descriptors pre and post classification task. Visual observation by the testing proctor revealing that participants appeared more confident in their descriptive responses after having assessed the recording stimulus, and preliminary analysis revealed more contradictions in the pre-task responses. For these reasons, the data presented in Table 1 on page 75 includes only participant post-task responses (N = 112). The responses were compiled for each the un-changed voice and falsetto. Like terms, or terms similar in meaning were labeled as rep-
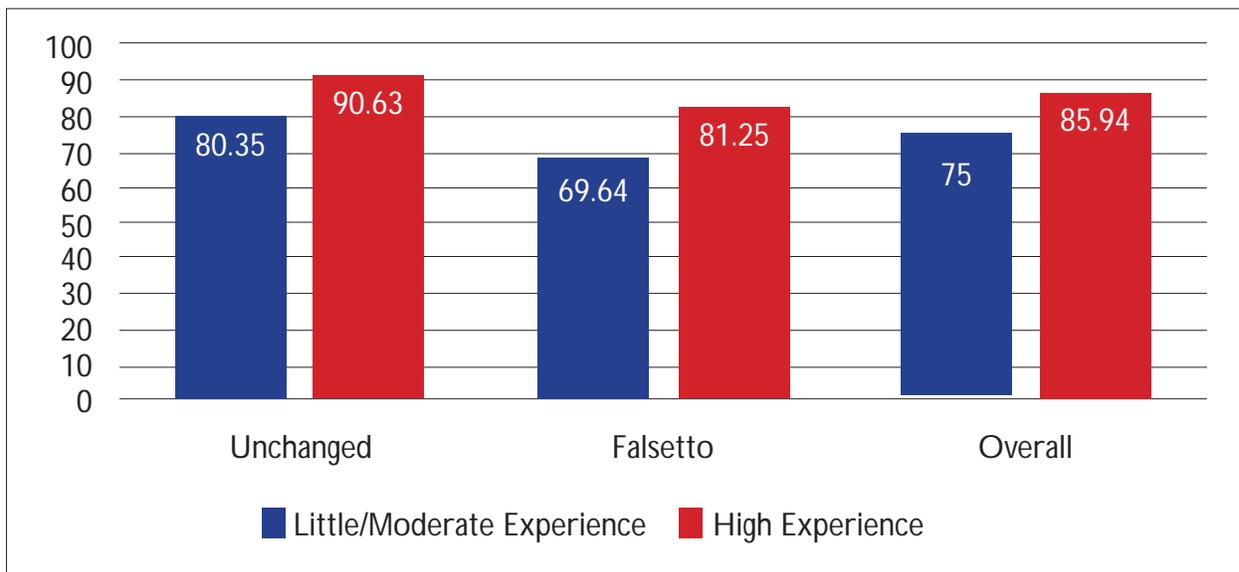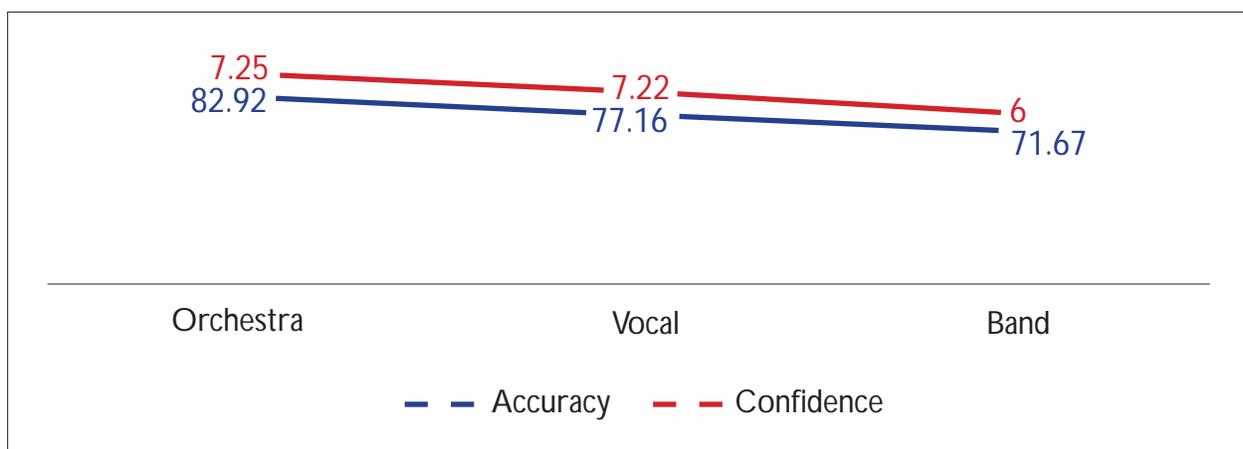

Figure 2. Male Singing Experience

Figure 3. Response Accuracy & Confidence Rating Major Concentration

Table 1. Post-Survey Descriptors of the Unchanged and Falsetto Voice

Post-Survey Descriptors					
Falsetto			*Both*	*Unchanged*	
	n =	*n =*		*n =*	*n =*	

Falsetto			*Both*		*Unchanged*	
	n =	*n =*		*n =*	*n =*	
Break/Cracky	12	8	Clear Sound	12	9	Consistent/Strong
Raspiness/Throaty	7	2	Strained	3	6	Natural
Less Confident	5	8	Breathy/Airy	8	5	Confident
Lighter	3	6	Intonation Challenges	1	1	Pitch, tone quality
Controlled	3				1	They seem to reach a peak earlier than with falsetto
Difference in timbre from top to bottom	1				1	Closer to speaking voice
A false sound, more developed sound	1				1	Pitch, tone quality
Falsetto to me sounds like playing a woodwind instr. You hear the natural range (or low range), and then you push the oc-tave key, and suddenly you play (sing) much higher.	1				1	The sound was set lower in their chest. More of an effort to reach the higher notes
Head voice	1					
A tug in the voice similar to a close pull on stringed instr.	1					
Hooty quality	1					
There is a deeper tone with falsetto. More mellow sound than unchanged, that thin sound	1					
Extra sense of un-naturalness to the voice, too high for the timbre, almost	1					
Tall sounding vowel and wasn't very bright	1					
	39	24		24	25	*N* = 112

etition. A panel of seven preservice music education majors reached a consensus that the term meanings were, in fact, the same or very similar. The resulting collection of terms/phrases represented the most often used descriptors or characteristics of sound for the unchanged and falsetto voice. The post-task descriptors differentiate the two voice types; one "consistent" and "natural" while the other is "throaty" and "raspy." However, descriptors such as "breathy," "airy," "clear" and "intonation challenges" were used to describe both the unchanged and falsetto voice.

Discussion

The primary purpose of this study was to examine the ability of preservice music educators to classify vocal samples as using either falsetto or unchanged vocal timbre. In this study, preservice music educators more often correctly identified unchanged voice (82.92%) than falsetto (71.67%). Possible reasoning for participants' higher percentage of agreement of the unchanged voice is, regardless of sex, all people have experienced the unchanged voice.

Given the relatively small sample and lack of random sampling, one should be cautious about generalizing these results beyond this study. Results from this project support the conclusion that preservice teachers seem to have a greater challenge distinguishing between falsetto and unchanged voice compared to Colton's (1970) examination of experienced and naive individuals' abilities to distinguish between falsetto and modal voice (95%). Results might have been more consistent if the preservice educators were allowed to assess the entirety of the student's range as the experts were. Due to possible inconsistencies in internal soundcards on iMac systems, it is also plausible the agreement rate could be higher utilizing a pre-amplified system to play the stimulus recording.

Overall the vocalists were not more accurate in their classification accuracy than instrumentalists which was rather unexpected. In fact, when separating instrumentalists into orchestra and concert band students, string concentration participants were marginally more accurate (85%) than vocal participants (80.49%). Several possible explanations exist. One possibility is related to the small population of the string concentration participants (n = 8). Cramer V calculation conveys a weak relationship due to population size supporting lack of representation to draw strong conclusions. Anecdotally, another consideration based on an early Muckey (1915) study, gives credence to the physiological similarities of string instruments and the vocal mechanism. These similarities could allow for the string and vocal concentration participants to assess the vocal stimuli in a very similar manner. The presented physiological similarities may also be an explanation of a string participant stating, "The voice does not immediately respond; it's like a tug on the string," as a description of falsetto.

Overall classification accuracy did not differ significantly by gender or amount of previous singing experience which was also surprising. However, when analyzing the elementary and middle school/junior high school levels (K-8th) of vocal experience compared to high school levels (9th-12th) of experience, chi-square indicated a significant difference in re-

sponse accuracy by singing experience for males, but not females.

Killian (1997) postulated, after interviewing 99 boys and men, having positive vocal experiences during this time helped with retention in singing and interest in choir. The ability to correctly assess vocal registers and provide students with the knowledge of vocal maturation and related characteristic sounds can be empowering for all future music educators.

Because timbre is an important consideration when assessing boys' voice (Traube, 2006); participants were asked to provide verbal descriptors of the unchanged and falsetto voices. Although most terms seemed to be universal, several were related specifically to the participant's major concentration (strings, vocal, and band). Three examples of those relating descriptions of the voice to their field of expertise were:

1) Band – (Falsetto example) "Clear, fluty sound…"
2) Strings – (Falsetto example) "The voice does not immediately respond, it's like a tug on the string."
3) Band – (Unchanged example) "Strong tone, smooth process between notes, clarinet tone."

The common descriptors gathered for falsetto through this study (i.e., break/cracking, raspiness/throaty, lighter, less confident) seem to support past assertions gathered by Cooksey (1985). The common descriptors gathered for the unchanged voice through this study (i.e., pure, natural, consistent/strong, and confident) also seem to align with past research (Ekstrom, 1959; Killian & Moore, 1997; Stanley, 1958; Winsel, 1966).

For this study, falsetto and the unchanged voice had these descriptors in common: airy/breathy, clear sound, strained and intonation challenges. These terms may be common descriptors because they are characteristics of the adolescent male voice as a whole, and not necessarily specific to falsetto or the unchanged voice. Anecdotally, based on a general conversation with the participants after the assessment, they had a difficult time defining falsetto but did not have a challenge providing descriptors of the falsetto voice sound. Preservice teachers seem to have a slightly different idea of what the unchanged and falsetto voice sounds like but use similar words when describing the use of the voices. Future teachers need purposeful experiences to place that sound in their memory bank and how to respond appropriately to help the students feel successful during the vocal maturation process.

Implications for Further Research and Teacher Training

Replication of this study regionally across the United States would provide for greater perspective and representation. One might also consider replication of this study with only vocal concentration participants or with a population that has an equal representation of all three concentrations (strings, vocal, and band). An additional study comparing inservice teachers' assessments would also be useful.

Teachers who can accurately identify the student who is no longer singing in the unchanged voice will likely do better job of repertoire selection. As alluded to in this experi-

ment, all music educators might benefit from further training in identifying characteristics of the different stages of vocal maturation and associated registers. Although the given descriptions of falsetto and the unchanged voice seem to have remained consistent with past research, working classroom definitions of the terms seem to remain nebulous. A qualitative study that gathers a group of vocal classroom teachers, compiling definitions of falsetto and the unchanged voice could provide for an interesting perspective.

Inaccurate vocal register identification could lead to the use of vocally limited literature possibly resulting in vocal damage through strain and possible fatigue, a lack of successful classroom situations, and decreased retention in structured music settings. Choral educators of all levels, especially those teaching the changing voice population, could utilize better timbral examples and descriptors to select more effective curriculum, correctly identify vocal classifications and associated registers, and make appropriate music selections allowing students to develop all parts of their voices.

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