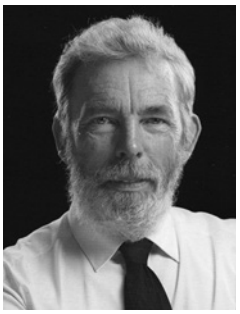
Beautiful Swansongs of English Cathedral Music: Adolescence and the Boy "Treble" Voice

Martin Ashley



Martin Ashley

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For they, when they perceive that they must die, having sung all their life long, do then sing more than ever, rejoicing in the thought that they are about to go away to the god whose ministers they are.
(Plato, *Phaedo*, 360BCE)

INTRODUCTION

Traditional English choral practice has for centuries relied on the ability of a boy to retain a soprano singing voice whilst simultaneously sporting a lowered speaking voice. A major advantage of this practice is that boys of some maturity and musical experience are available to lead younger boys on the soprano line in choirs where adults sing the lower parts of a demanding and sophisticated repertoire. Earlier voice change may be a threat to this tradition, and English boy choristers as young as twelve now live in peril that their next performance may also be their "swansong"—the last time their soprano voice (usually called "treble" in England) is heard. It might be thought that the swansong of a boy well into puberty might be a painful experience for singer and listener alike, yet such singing has been described as "beautiful," and some boys at least appear to manage it without discomfort, visible strain, or apparent ill effect. Two questions are addressed in this paper: 1) Exactly how do boys sing soprano once their voices have begun to change? 2) Is it advisable for them to do so?

APPROACHES TO ADOLESCENT VOICE CHANGE AND THE ENGLISH CHORISTER

Singing teachers working in English cathedrals fall broadly into two camps. Some draw on John Cooksey's "eclectic" scheme to identify pubertal development stages beyond which boys should not sing "treble."[1] Others rely more on judgments based on observation of posture or strain, changes in tone and registration, and enquiries regarding comfort or fatigue. A recent study by the present author found widely disparate practice across seven English cathedrals. Some adhered fairly closely to Cooksey's scheme. Others disregarded it completely.[2]

Prominent amongst those urging caution as puberty progresses is Jenevora Williams. Williams completed a landmark study of a "major London cathe-

dral" in 2010. The principal thrust of her influential study was with the "occupational health" of boys considered to be professional singers. The boys were reported as singing for a minimum of 16.6 hours per week, made up of 12 hours in rehearsal and 4.5 hours in performance.[3] This was described as "an intensive professional context" and the condition of the boys likened to that of professional adult sopranos.[4] Though the London cathedral at which the study took place was a particularly busy one, the hours worked by the boys are not dissimilar to those in other prestigious English cathedrals and collegiate choirs.

Contrary to some expectations, it was found that the London choristers were by a significant degree vocally the healthiest when compared with nonboarding choristers in a provincial cathedral choir, nonchoristers in a boarding school and nonchoristers in a day school. Nevertheless, in spite of the relative health of the London boys, Williams has stated a clear position with regard to the adolescent boy soprano more generally.

> Some vocal patterns evident in adult singers are as a result of having sung the wrong vocal part in choirs; in boys, this is normally from staying too high for too long.[5]

Although the possibility of actual physical damage to the voice is not discounted, the principal concern is with the use of falsetto to maintain the soprano range after puberty. She writes,

> There is anecdotal evidence to suggest that boys who continue to sing in their falsetto voice, instead of dropping gently into tenor or baritone singing, may engender certain compensatory vocal behaviours. These will include: high larynx position and pharyngeal constriction as a result of continually straining for high pitches and less effective vocal fold closure, arising from falsetto phonation.[6]

There is no evidence of this being the case at the London cathedral where the original study took place. Indeed, conducting research in the same cathedral six years later, the present author found that half the top year (English Y8, US Gr7, ages 12.5–13.5) had been dismissed from the choir before there could be any danger of this occurring. The problem is more likely to be found in smaller choirs, particularly amateur ones. Less care may be taken of individual voices and the conductor's needs may be prioritized over those of the singers, particularly when these are in short supply.

An alternative view is presented by Colin Baldy who sees no harm in what he calls the "supercharged falsetto" of the final year chorister. Indeed, he regards the "enormous amount of noise" they are able to produce as "rather a nice final flourish for them".[7] The "enormous amount of noise" may even be a significant factor in maintaining a viable balance between adult and boy singers. Given that overall sound output is subject to logarithmic scaling, it is the case that a relatively small number of powerful adolescent voices will be of more use than over double the number of smaller boys. Ternström, for example, calculates that doubling the number of singers increases the sound level by only 3dB.[8]

It would be wrong to think of such singing only as "enormous noise." Morrision, coaching the boys at another of London's cathedrals, feels that sometimes the older boys' falsetto can be "very beautiful."[9] With regard to health she thinks that they know their range and can be sensible. 'They will know if they have to mime above E5".[10] Boys are thus credited with some agency with regard to their own vocal health.

HOW ENGLISH CHORISTERS SING

Kenneth Phillips defines a particular mode of singing that he calls "English choirboy". He recognizes a "beautiful quality in the upper register," whilst at the same time rejecting what he calls the "infamous English voice break."[11] Phillips suggests that there is a deliberate policy to ignore the lower register. He asserts that "most of them are not permitted to use even a mixture of chest and head voice, the head voice sound is extended below pitch [C_3] as low as possible."[12] "Not permitted" is an interesting choice of phrase. The positions encountered by the author appear more to be that whilst the typical English chorister is not actually "prohibited" from using a mixed register, neither is he taught to do so. He is simply left to his own devices, acquiring his "beautiful quality in the upper register" in the main through imitation of the older boys in the choir.

Phillips modifies his argument by quoting a 1977 source that suggests that at least some English choir directors have come to prefer a so-called "Continental sound" that "introduces some chest mixture into the

pure upper register, thus producing a more robust middle quality and the ability to sing an alto part"[13]. Although the "Continental sound" results in "the ability to sing an alto part," this is in theory only. It remains the belief in England that all boys must somehow be "trebles," regardless of the actual range of their voices. This belief contrasts starkly with practice in Germany where boys might be divided into sopranos and altos between the ages of 7 and 10 when "polyphonic singing is first practiced."[14]

Significantly, the only major English cathedral where boys regularly sing alto remains the Roman Catholic Westminster. Anita Morrison, who teaches singing to the current Westminster boys, stated that she teaches boys to mix their register downwards because " . . . down towards E_4 it'll become very breathy because the folds just won't phonate properly [in thin configuration/cricothyroid action]."[15] In most other choirs, however, the repertoire most regularly performed leads to the relative neglect, not just of the alto notes, but of the important lower mezzo soprano range (i.e., A_3–D_4) that constitutes the bottom reach of most boys' voices. David Flood, who conducts the prestigious Canterbury Cathedral choir, agreed with this assessment, stating that " . . . an exception might be when we do *Ceremony of Carols* [Britten]. Then I select the boys who can comfortably reach that range. I discourage them from pushing their voices down."[16]

A focus almost entirely on the upper part of the voice becomes increasingly an issue as the speaking pitch begins to lower. It is here that a more complex picture than that presented by John Cooksey emerges. According to Cooksey, the voice attains a "full, rich soprano-like quality" and "reaches its pinnacle of beauty, power and intensity" immediately before the onset of puberty, typically around eleven years of age. Thereafter, it begins to deteriorate, becoming "breathy and strained" in its upper register with a tone quality that is "thinner and not as rich in harmonic partials in that range".[17]

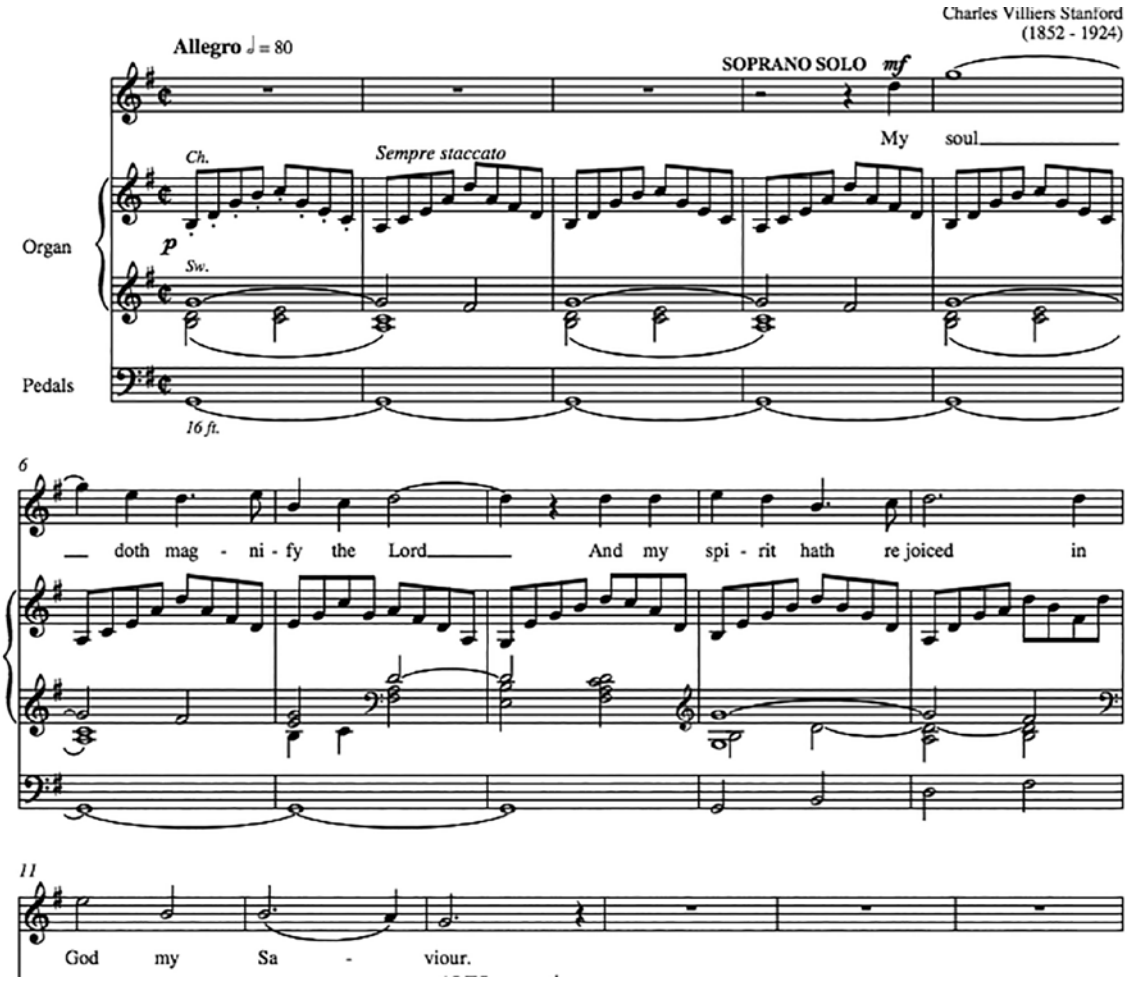
This is the period during which the average lowest singing note fell from A_3 to E_3 for the boys in Cooksey's sample. Cooksey does not link the initial loss of upper register quality to falsetto. He states that it is not until Stage II of mutation (Midvoice II) that the falsetto voice first appears. By Stage III the modal singing voice extends on average down to D_3 (146.8 Hz) and the speaking voice is distinctly deepened with a mean SF0 (speaking voice fundamental) of 185 Hz. Some English choral directors have become wary of zealous singing teachers advocating that a boy ceases to sing treble almost as soon as Cooksey's Stage I is detected.[18] To the contrary, their experience is that English boys currently enjoy their "golden year" during Y7 (US Gr6, age 11.5–12.5) often continuing into Y8. The predicted loss of quality in the upper register is not perceived as occurring.

Cooksey's work was carried out with the average high-school boy in mind. It was not a study of intensive engagement in choral work. Cooksey himself reported that 86 grade 7 boys (UK Y8) were chosen from two high schools; 41 of these were enrolled in a choir whilst 45 had no singing experience or training.[19] None had experienced the intensive daily singing routine of an English chorister. Williams appears to have discovered an explanation for chorister longevity related to the efficiency of vocal fold closure.

> Based on Cooksey's information (2000) on the stages of voice change, it was expected that evidence of falsetto phonation would emerge as they entered the mid-point (Stage lll) of change. This appeared not to be the case with trained professional boy singers: the boys continued to sing with efficient vocal fold closure in the upper ranges . . . The waveform had more similarities with that of an adult female or an adult trained countertenor. It is suggested that the training these boys received as children enabled them to shift into a hybrid form of phonation, seamlessly bridging the gap between child and adult.[20]

Only four boys in Williams's sample were at this stage, yet all four exhibited the "hybrid phonation," "closer to children and adult females" at soprano pitch. Effectively, what would be a falsetto phonation in most adolescent voices is taking a form similar to that of the unchanged voice. The consequence is that it is hard for many listeners to tell apart the upper register of an unchanged voice and a changing voice that has developed the hybrid phonation. Ron Morris, a renowned Australian speech therapist, audiologist, and countertenor, has also worked with boy choristers in prestigious English cathedrals. He offers an explanation for this "head voice" illusion very similar to that of Williams.

> We're fairly confident that "head voice" is M2 with good fold closure. The crucial difference is that these



Example 1. Charles Stanford, *Magnificat in G*, mm. 1–15.

> boys (adolescent boy sopranos) have learned to achieve higher CQ [closed quotient] which is why it sounds like "head voice." The boy who's just forcing falsetto will sound thin and constricted and of course have no expressive control at all.[21]

A further significant consideration concerns what happens when the Stage III voice reaches its main falsetto-modal *passaggio*. It might be expected that this will greatly trouble the singer, because the hybrid phonation is lost at the point where the new modal voice begins. Once again, the English chorister experience is at some variance with Cooksey's norms. According to Cooksey, the modal-falsetto *passaggio* is between F_4 and C_5, with the majority beginning at about A_4. Example 1 shows Stanford's well known setting of Stanford's *Magnificat in G*, a classic showpiece for the mature solo "treble." Whilst the opening bars might be sung in falsetto or hybrid phonation, the approach to the cadence at bar 11 cuts right across the *passaggio* suggested by Cooksey. Yet a good many English choristers with baritone speaking voices manage the entire piece in their upper register. Phillips's contention that "the head voice sound is extended below pitch c2 (C3) as low as possible" would seem supported by such a feat.

Williams's study included no boys beyond Stage III. The next section, however, reviews English choristers singing pieces such as Stanford's *Magnificat in G* with Stage IV voices, possibly even Stage V.

METHODOLOGY

Two types of objective measure are used in the present study. The first is the acoustic spectrogram supple-

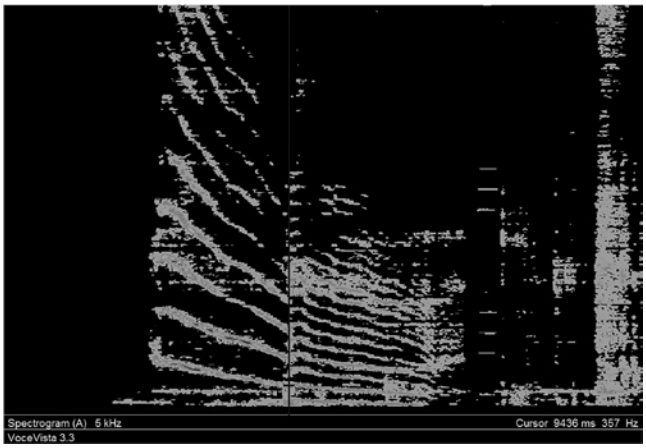


Figure 1. Age: 12:05 SF0: 130Hz.

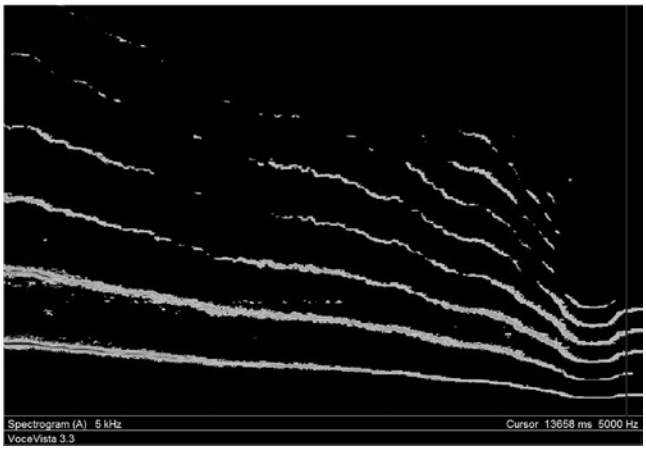


Figure 2. Boy Chorister Downglide; Age: 09:11 SF0 226 Hz (Sound Example 1, www.nats.org).*

mented by audio waveform; the second the laryngeal waveform as generated by electroglottography. The primary purpose of these tools is to provide an objective picture of what a voice is doing, through which judgments might be made with regard to the potential health risks to the singer. A secondary purpose is to provide a dispassionate reference against which perceptual judgements of singing samples can be compared.

The acoustic spectrogram

The acoustic spectrogram is useful in two ways for the present study. First, when generated from a vocal glide, the spectrogram will reveal transitions between registers. Second, the spectrogram and associated long-term aver-

All sound examples for this article have been saved as a playlist, available at https://soundcloud.com/official-nats/sets/beautiful-swansongs-of-english-cathedral-music-audio-examples.

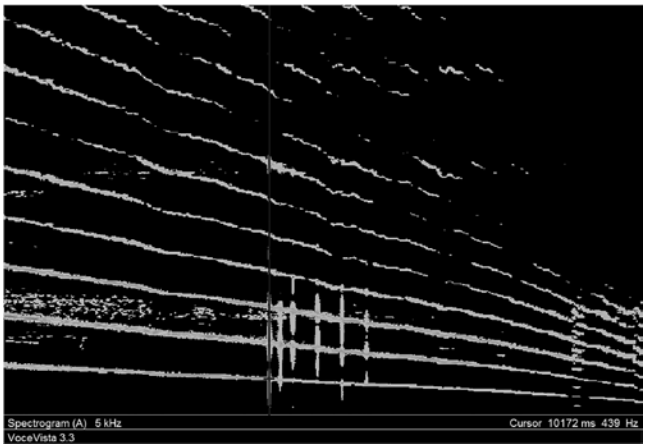


Figure 3. Boy Chorister Downglide; Age: 13:01 SF0 203 Hz (Sound Example 2, www.nats.org).

age spectrum (LTAS) can indicate actual voice timbre through display of the relative strengths of harmonics. Both the unchanged boy voice and adult modal voice display a large number of closely spaced harmonics. A falsetto voice is likely to display fewer harmonics and a stronger fundamental tone (F0). Figure 1 shows a downglide throughout the vocal range by a twelve-year-old English boy who is *not* an intensively trained chorister. Voice change in this case is at a relatively advanced stage (SF0 130 Hz). The break between falsetto and modal registers is very clear in the spectrogram and occurs at 357Hz where the cursor line is placed.

This is now compared with two similar exercises by boy choristers. The first (Figure 2) is a nine-year-old who appears to have just one register that he employs throughout his range. Figure 3 show the same task for a chorister aged 13:01. His SF0 was 203Hz and his range was from $F^{\#}_3$–B_5. These data approximate those given by Cooksey for Stage II, indicating that puberty has begun. There is still no clear break in the downglide, though there is a region of instability beginning where the cursor is placed at 439 Hz. This is not found in the younger boy.

The Lx Waveform generated by Electroglottography (EGG).

Figure 4 shows typical waveforms for an adult voice as detected by the Voce Vista system used in this study. The higher note (E_4) is sung in falsetto. It will be seen that the Lx waveform has a near symmetrical shape. The left-hand opening slope and right-hand closing slope are very close in steepness. This indicates little difference

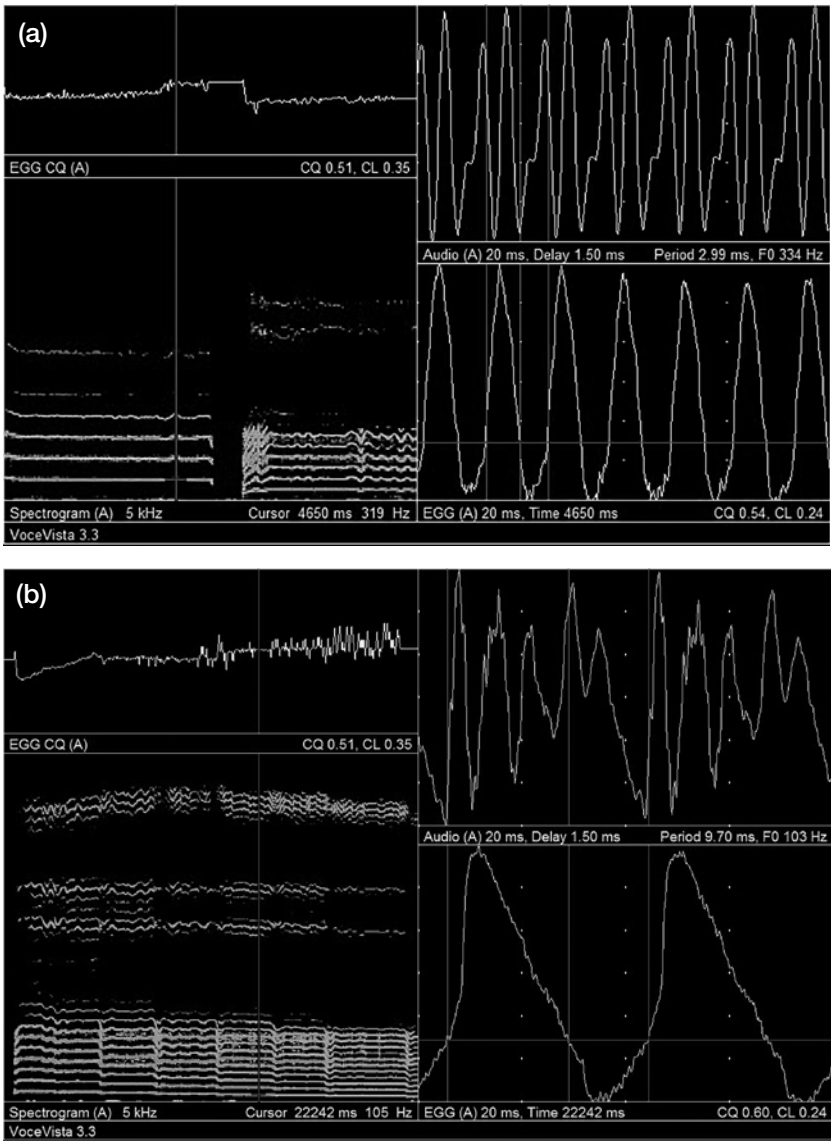


Figure 4. Lx Waveforms Adult Male Voice. (a) E_4 falsetto voice; (b) A_2 modal voice.

between the time taken for the glottis to close and open again. In adult voices this characterizes falsetto style phonation, being indicative of edge contact. Figure 4b shows the note A_2 well down the modal range. The waveform is now asymmetrical. The right-hand opening slope is gentler, indicating that whilst the folds "snap" quickly together, the opening phase takes longer as the folds are "peeling" apart.

The spectrographic and EGG patterns shown here indicate what may now be looked for in the voices of four boys studied by the author. All four boys remained as "trebles" in their respective cathedral choirs throughout voice change, not leaving the choirs until a Stage V SF0 had been reached. The boys were asked to perform a test battery of glides, scales, and vocalises, and to contribute an example of actual singing. Speaking fundamental pitch (SF0) was measured by counting backwards and a reading task. The Praat software was used for accurate pitch analysis. Self-selected tessitura was measured by requesting the boy to sing the words "You owe me five pounds" to the tune of "Happy Birthday" with no starting note given. Finally, anthropometric data including height, weight, neck circumference, and vital capacity were gathered.

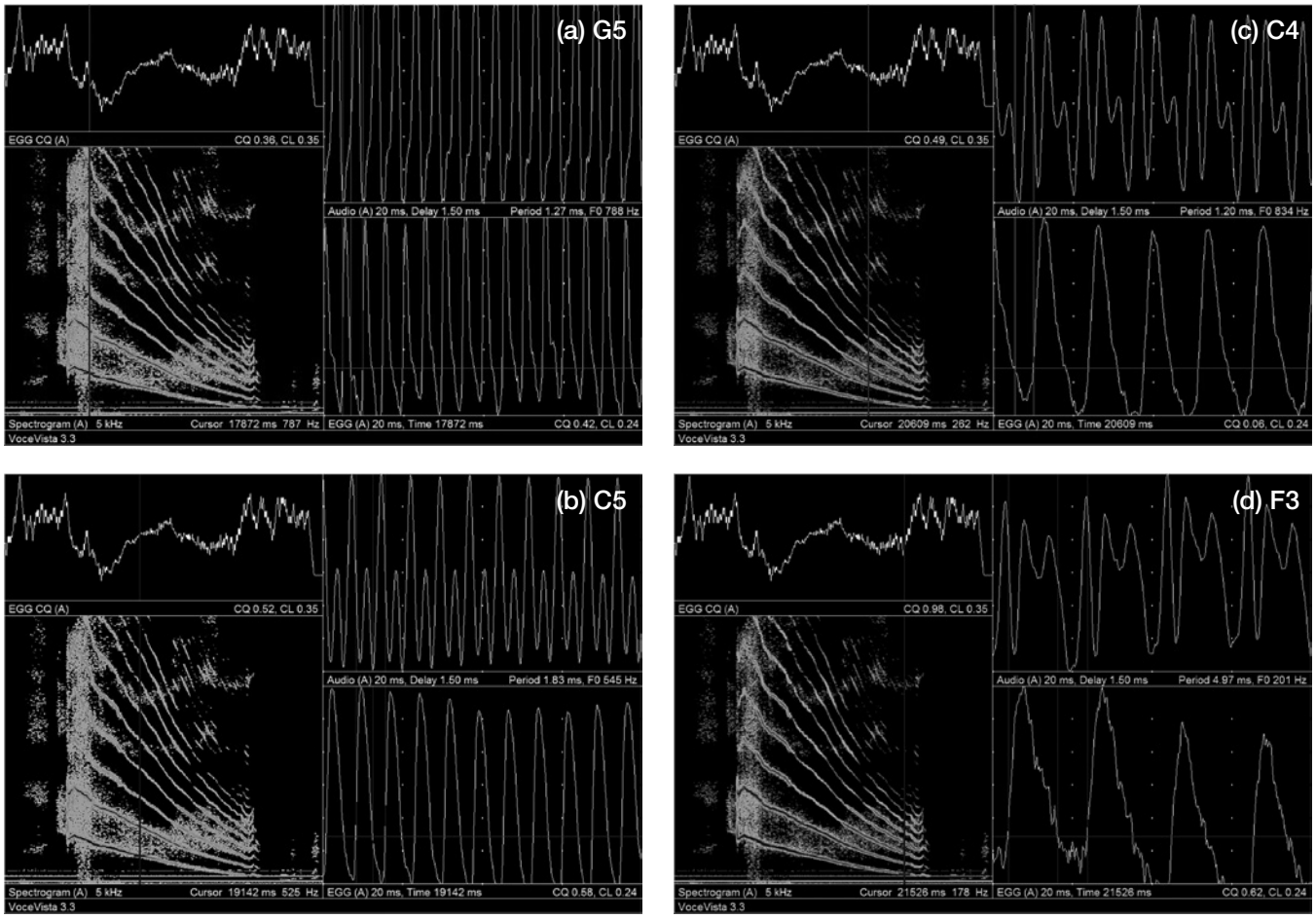


Figure 5. Glide Sequence, Chorister One, age 14:01.

RESULTS

Chorister One

Age: 14:01, SF0: 157Hz, Lowest Terminal Pitch (LTP): D_3 (Sound Example 3, www.nats.org)

Chorister One was studied longitudinally with data points at ages 11:10, 12:02, 12:06, 12:08, 12:11,13:03, 13:08, 13:09, 14:01, and 14:07. Stage III was reached at 14:01. Figure 5 shows a complete downglide beginning on note G_5 and ending on note F_3. It will be see that the spectral lines remain unbroken throughout the glide, similar to the unchanged and Stage II chorister voices in Figures 3 and 4. The Lx waveform similarly shows little change, asymmetry just beginning to show at the lowest pitch (F_3).

Figure 6 shows the speaking voice (a vowel at 168 Hz). This differs slightly from the singing voice at the same pitch in that the opening slope is more obviously beginning to develop an adult form. A possible implication is that Chorister One is avoiding any transition to the modal voice he uses in speech.

During the assessment, this boy revealed that he was aware of a newly emerging lower voice, but was deliberately avoiding its use.

n: That G there's not very comfortable for you.
C1: No.
n: Why not?
C1: I'm trying to do it in a more, er [pauses], what d'you call it voice, I'm trying to go Ah instead of Ah, Ah, trying to keep it in the treble voice.
n: Aha, so there's another voice there is there <n>?
C1: Well [laughs], I suppose so.
n: I think there is, actually.

Although continuing to sing soprano in the choir (until age 14:07), a recording of a well known alto verse part

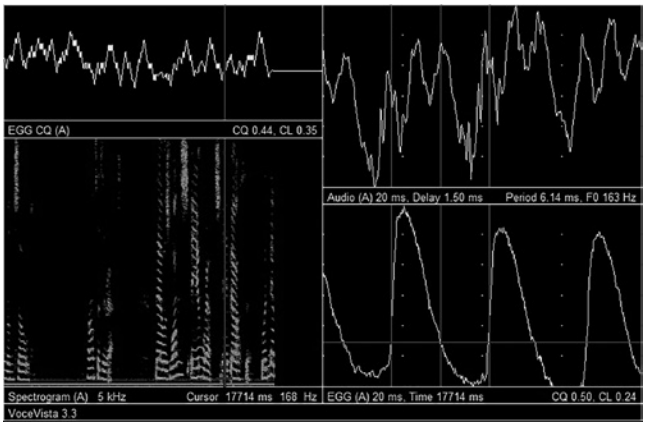


Figure 6. Speaking voice: a vowel at 168 Hz.

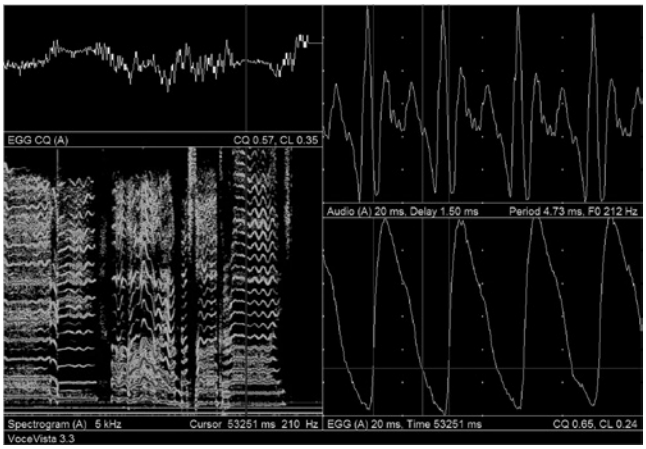


Figure 7. Modal Alto Voice: Chorister One (aɪ of "Christ" at pitch $A^{\flat}_3$).

(Gibbons, "This is the Record of John") was made at 14:01 in order to explore the lower reaches of the voice (Sound Example 4, www.nats.org). Figure 7 shows the note $A^{\flat}3$ on the aɪ vowel of the word "Christ." Spectrogram, Lx waveform and audio wave now indicate modal phonation.

This chorister was clearly able produce good tone in the alto range through the use of the low reaches of his modal voice and was also able to sing up to the $B^{\flat}_4$ of this piece with no difficulty in the *passaggio*. He could, therefore, have been a boy alto. However, a later interview at age 15:06 confirmed the extent to which he appears to have been socialized into the English way.

> Well, certainly looking back on it, the tone quality of the voice isn't one that I've ever explored or used since we did that recording and so it seems, it's a really weird voice. I didn't think that I could produce it . . . Um, I certainly prefer the counter-tenor to the boy alto, I have to say, 'cos that, countertenor is a countertenor for a reason, it's a man because of a tone that the man produces . . . I think what the composers have written for the alto register was intended for a male alto, certainly in cathedral music

Chorister Two

Age: 13:09, SF0: 119Hz, LTP $A^{\#}_2$

Chorister Two was seen once at the age of 13:09. There had been reported disagreement between the cathedral choir director and the school singing teacher. The SF0 of 119Hz is characteristic of a fully changed voice. The singing teacher felt that the boy should no longer be singing soprano, but the choir director wished him to continue as head chorister. The boy himself expressed the desire to complete the school year as a soprano.

Figure 8 shows a downglide unlike those of any of the previous choristers. There is an obvious transition from falsetto to modal at around 212Hz. The pattern differs from the nonsinger in Figure 2 whose break occurs considerably sooner in the glide at 357Hz. Chorister 2 appears to be carrying his falsetto voice rather lower; indeed, he carries it to slightly below the bottom of the mezzosoprano range (A_3 at 220Hz). All scales were sung in falsetto voice, taking this phonation to the surprisingly low pitch of C_3. Non-use of the modal voice in singing appeared to be a learned behavior for this boy.

The tessitura test was performed at "treble" pitch in falsetto, key $F^{\#}_4$. Given his low SF0, the boy was asked repeat this test in his lower voice. This proved something of a challenge as he was clearly not used to employing this

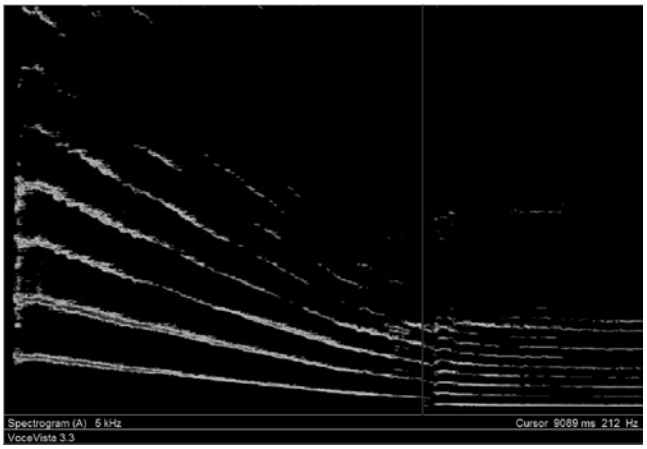


Figure 8. Downglide Spectrograph, Chorister Two.

voice for singing. Though able to phonate in a modal voice between tenor $C^{\#}$ and tenor $G^{\#}$ he could not manage the octave leap, the middle $C^{\#}$ not sounding. For a test piece, he performed a section of the "Pie Jesu" from the Durufle *Requiem*, range $F^{\#}_5$ down to B_4 (Sound Example 5, www.nats.org). This was sung in falsetto with considerable power and assurance—undoubtedly a demonstration of the "enormous amount of noise" of which Baldy writes.

Chorister Three

Age: 13:03, SF0: 109Hz, LTP $G^{\#}_2$.

Chorister Three was monitored during his final year in the choir and fully assessed at the end of the year, aged 13:03. At the beginning of the year, some concern had been expressed that his voice would not last more than a few weeks into the new academic year. This would be early change for a boy just going into Y8 and a sad loss for both boy and choir. The concern was justified. It was clear from height and weight measurements supplied by the parents and an SF0 assessment made by Speech Test (smartphone app devised by the author and a colleague that measures SF0) that the boy had already reached Stage IV by the end of Y7. Nevertheless, on the grounds that the boy reported no discomfort or fatigue attributable to singing soprano at Stage IV, the decision was taken to return to choir for the autumn term on the grounds that the voice should last until Christmas.

In spite of continued progression from Stage IV to Stage V, the boy remained in the choir for the whole year. A recording of the Stanford piece (see Example 1) was made in November, and a further Speech Test assessment the following month that showed SF0 to have fallen to 124 Hz (Sound Example 6, www.nats.org). There is an important difference to note between Choristers Two and Three. Whereas Chorister Two carries his falsetto to below the "treble" range in his glide, for Chorister Three the falsetto ends at 444Hz (A_4) and the glide then continues in baritone modal voice from 178Hz down (Figure 9). Between the two very distinct voices is a complete phonational gap of some 10 semitones (roughly $D^{\#}_4$ to E_3).

This difference between the approaches of the two boys is reflected in the tessitura test. Whereas Chorister Two employs falsetto to perform the test in a "treble" voice, Chorister Three selects a baritone range of B_2 to B_3, which he describes as "the one that came naturally

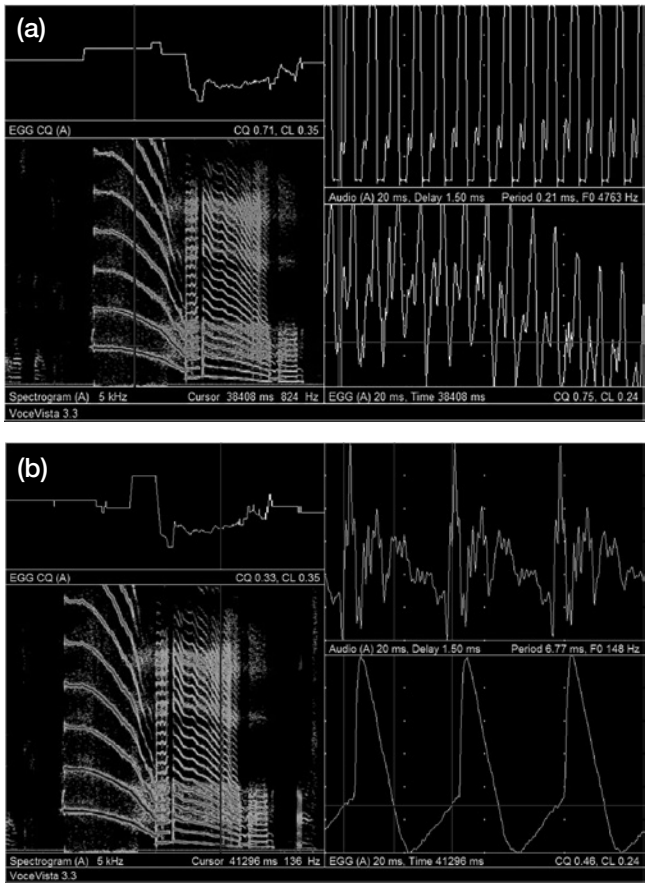


Figure 9. Glide Sequence, Chorister 3. (a) Downglide: Falsetto section; (b) Downglide: modal section.

to me." When invited to "sing what is unnatural, what the choir would expect" he pitches in the key of $B^{\flat}_4$. The range is thus F_4 to F_5 and the lower F_4 is successfully phonated in falsetto. The Stanford example, then, could still be sung even at this stage. The boy's comments, though, suggest that psychologically he has recognized his new voice and is facing a future as a different kind of singer (Figure 10; Sound Example 7, www.nats.org).

Chorister Four

Age: 13:11, SF0: 116.9Hz, LTP $A^{\#}_2$

Chorister Four sang in the same choir as Chorister Three and was assessed on the same occasion at the end of his last term in the choir. Although not quite 14, he was in the year above Chorister Three (Y9, US Gr8), being a late birthday. This boy recorded regularly throughout his career. As with Chorister Three, this is a Stage IV falsetto voice on the cusp of Stage V. No concern appeared to have been expressed about the boy's

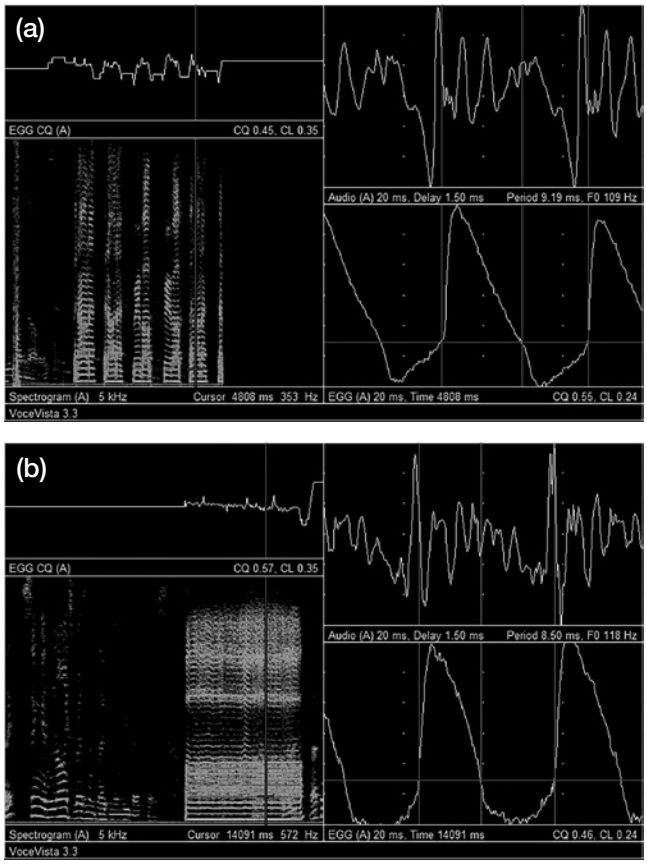


Figure 10. Chorister 3. Modal Voice: Speech (a) and low singing note (b).

continuance as a chorister during Y9, and no discomfort with singing or vocal problems were reported (Sound Example 8, www.nats.org). Figure 11 shows a downglide sequence. He was asked to begin this glide on a treble note he found comfortable. He chose A_4, illustrated in Figure 11a. This shows a clear falsetto pattern in both spectrogram and EGG. The falsetto phonation appears, as with Chorister Three, to continue to the bottom of the glide, although in this case there is a croaky fry phase. The lowest pitch recorded by the EGG signal was B3. Below this pitch the EGG signal disappeared due to movement of the larynx. The slight disturbance in the EGG signal for B_3 is probably due to disrupted electrical contact but shows continued falsetto (Figure 11b).

As with all three previous choristers the effect of the downward glide is to draw down the falsetto-like phonation to the bottom of the mezzo-soprano range. Provided, therefore, that Chorister Four does not attempt to sing below A3, he should be able to sing an entire "treble" part in what sounds like a good "head voice." This, at least, is the case when the falsetto-like pattern is either being drawn downwards or the boy starts with the lowest note to be sung in falsetto.

Figure 12 shows the result of starting in the modal voice and singing upwards. The boy was asked to begin a scale of C major on the note C_3 (Tenor C). Figure 12a first shows the pattern of the boy's habitual speaking voice. The cursor is placed on F0 showing a frequency of 115Hz. There is a small "knee" at the end of the opening slope. Figure 12b shows a modal pattern carried upward as far as 315Hz (E4). Shortly afterward there is a break until the first note clearly heard in the upper voice, which is G_4. At this point the Lx waveform changes to a falsetto-like pattern with very steep opening and closing slopes similar to the "hybrid phonation" described by Williams.

DISCUSSION

The features common to all four choristers at the "swansong" stage (III, IV, and V in the Cooksey scheme)

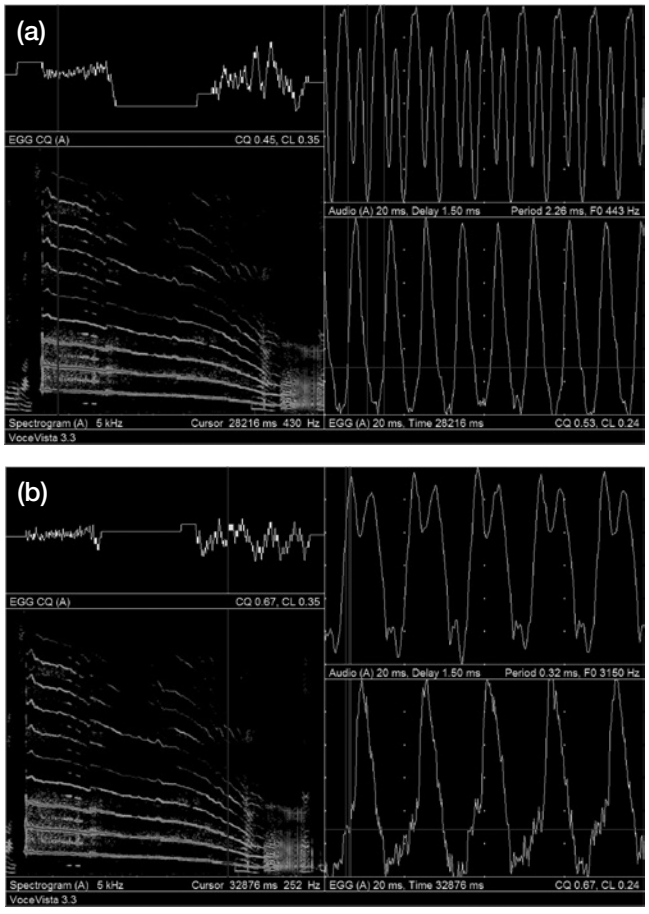


Figure 11. Glide Sequence, Chorister 4. (a) "Treble" starting note: A_4; (b) 252 Hz (B_3) Larynx descending.

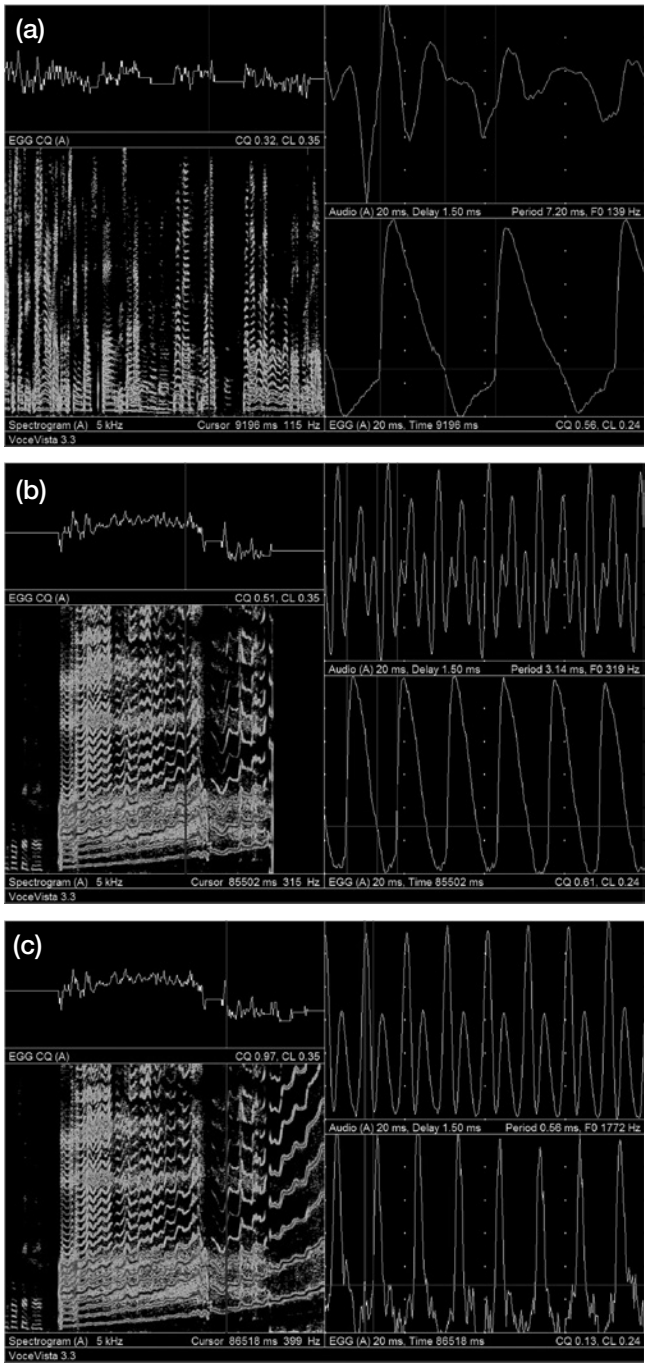


Figure 12. Chorister 4, Speaking Voice and Ascending Scale from C_3. (a) Speech voice quality from conversation; (b) Ascending scale, note before break (E_4); (c) Ascending scale, note after break (G_4).

appear to be, first sustained access to pitches at the top of the soprano range, and second, the ability to carry this voice quality evenly with adequate volume to the lowest notes required by the repertoire without "break" or "crack." There is some evidence to suggest that this may be the result of a habitual mode of singing acquired throughout a boy's time in the choir. In this way, speech voice quality and the emerging adult singing voice are excluded from the normal range of most English "treble" repertoire. The examples given in this paper therefore suggest that Kenneth Phillips is correct in his assertion that English boys extend their "head voice" as low as possible, with no mixed middle register.

A major consequence of this is that some of these boys effectively bypass voice change as conventionally understood. On their final day in the choir, they are singing soprano. On leaving the choir, they return to school after the summer break in most cases as young baritones. The "infamous English voice break" of which Phillips writes can therefore still be found in spite of growing awareness of voice change stages and provision of transitional youth choirs in some cathedrals. Why the English voice "break" should be considered "infamous" is a question that merits reflection. Writers such as Cooksey fear that boys lack the necessary resilience to persevere with their singing if told their voice has "broken." In spite of extensive literature searches, the present author has found no trustworthy statistical study that can confirm or refute such a proposition. None of the four boys featured in this paper felt it an issue. Two were particularly anxious to carry on singing, one was more focused on becoming proficient at the organ and the other professed himself content with his time as a chorister but intent on a career as a sea captain.

Meanwhile, were any of these boys to have given up on reaching Stage III they would have missed arguably the best years of their lives as choristers. Their pride in leadership and their beautiful "swansong" recordings would not exist. Given that English boys so rarely sing alto, the alternative they face in many cases is a minor role in a school choir where a repertoire chosen for the average high school boy holds little attraction for the boy who could sing the G as required, for example, in the Stanford *Magnificat*.

Nevertheless, the risk to voices is undeniable. A perplexing feature revealed by this study was that other boys in the same choirs did demonstrate discomfort and left the choir sooner as a result. Whilst the intensive use of the voices in repertoire with high tessitura seems a plausible explanation for the retention of a good soprano

range sounding like "head voice," it was confounded by the presence of boys with more conventional falsetto. The critical difference that has emerged in this study seems to be whether or not the boy has learned to maintain a high closed quotient (CQ). Such differences appeared to exist even when the conductor and singing teacher were the same people.

The boys who sing falsetto with low CQ are clearly at risk from such conditions as dried out epithelium. There can be little doubt that their style of singing is harmful and should be discontinued. For the boys who learn to sing with a high CQ it remains a divisive question for English singing teachers as to whether they should be allowed to continue. The fact that they show no posture defect, fatigue, or pain is decisive for some teachers.

The question of how the young man should sing immediately after the "break" is also unsettled. Whilst the traditional English "rest" has fallen out of favor, little serious research attention has been paid to the alternatives for skilled boys who have already missed out on the "cambiata" phase.

CONCLUSION

It has been possible to show how English boys sing soprano once their voices have begun to change. An answer to the question of whether it is advisable for them to do so is much harder. Were English choirs to adopt the wider European practice of boy altos, much of the heat might be taken out of the question. Such an eventuality seems presently highly unlikely. Nevertheless, if the age of voice change around the world were to continue to fall, choir directors in mainland Europe and the US might look to English practice as a means of finding soprano boys with sufficient experience to manage a demanding repertoire. The unanswered question the choral community faces is why some boys develop a high CQ during their falsetto phase whilst others of the similar age and physical development do not. It seems to be presently only a cruel turn of fate that some boys sing a beautiful "swansong" denied to age peers in the same choir. In an era where the timing of voice change appears to have slightly advanced, further research is much needed. Meanwhile universal application of the precautionary principle would be an ethical course and significant advance whenever a boy with falling SF0 is found on the soprano line.

NOTES

1. John M. Cooksey, "The development of a contemporary eclectic theory for the training and cultivation of the junior high school male changing voice: Part III developing an integrated approach to the care and training of the junior high school male changing voice," *The Choral Journal* 18, no. 4 (December 1977): 5–15.
2. Martin Ashley, "The English Choral Tradition and the Secular Trend in Boys' Pubertal Timing," *International Journal of Research in Choral Singing* 4, no. 2 (Spring 2013): 4-27.
3. Jenevora Williams, "The implications of intensive singing training on the vocal health and development of boy choristers in an English cathedral choir" (PhD dissertation, Institute of Education, The University of London, 2010); 37.
4. Jenevora Williams, Graham Welch, and David M. Howard, "An exploratory baseline study of boy chorister vocal behavior and development in an intensive professional context," *Logopedics, Phoniatrics, Vocology* 30, nos. 3–4 (July 2005): 158–162.
5. Jenevora Williams, "Teaching young voices safely," *Paper presented at the Foundations for Excellence* (Dartington Hall, UK 2011).
6. Ibid.
7. Colin Baldy, *The Student Voice: An Introduction to Developing the Singing Voice.* (Edinburgh: Dunedin Press, 2010), 79.
8. Sten Ternström, "Perceptual evaluations of scatter in unison choir sounds," *STL Quarterly Progress and Status Report* 32, nos. 2/3 (Summer 1989): 41–49.
9. Anita Morrison, in Martin Ashley, *Contemporary Choral Work with Boys*, 179–182.
10. Ashley, *Contemporary Choral Work with Boys*.
11. Kenneth H. Phillips, *Teaching kids to sing* (New York: Schirmer Books 2013), 93.
12. Ibid.
13. Richard Miller, *English, French, German and Italian Techniques of Singing: A Study in National Tonal Preferences and How They Relate to Functional Efficiency* (Methchen NJ: Scarecrow Press, 1977), 150.
14. Peter Hahn, *Staats-und Domchor Berlin: Ein Lesse-und Bilderbuch* (Berlin: OASE, 2004), 264.
15. Ashley, *Contemporary Choral Work with Boys*, 181.
16. Ibid., 186.
17. John M. Cooksey, *Working with the Adolescent Voice* (St. Louis MO: Concordia Publishing, 1992), 56.
18. Martin Ashley, "Technique or Testosterone? An Empirical Report on Changes in the Longevity of Boy Singers," Journal of Singing 67, no. 2 (November/December 2010): 137–145.

19. John M. Cooksey, "Voice Transformation in Male Adolescents," in L. Thurman & G. Welch, eds. *Bodymind and Voice—Foundations of Voice Education* (Iowa City, IA: The Voice Care Network, 2000), 218–238.
20. Williams, "The implications of intensive singing training . . . ," 292, 235.
21. Ron Morris, Personal Conversation with author (May 5, 2011).

Martin Ashley, PhD, is Emeritus Professor of Education at Edge Hill University, UK. Trained originally as a middle school music teacher he worked with boys' choirs in a variety of school and church contexts, including four years at Lincoln Cathedral School in the 1980s. In 1996 he moved into university work, becoming a Reader in Education at the University of the West of England Bristol, where he managed the Bristol Cathedral Chorister Outreach Programme and was awarded a UK research council fellowship to write the book, *How High Should Boys Sing*? After moving to Edge Hill, he was awarded a further large research grant to work with the National Youth Choirs of Great Britain on the subject of boys' changing voices. He has subsequently worked in collaboration with a pediatric specialist and phoniatrician on the timing of puberty and voice change. His current work is on boys' singing ranges in sixteenth century choral polyphony.