

The Perceived Effects of Specified Singer Gestures on Singers' Vowel Production

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Abstract

The purpose of this study is to examine selected perceptual measurements of the effects of four specified singer gestures on male collegiate singers' ($N = 27$) performance on the [u] vowel. Two of these singer gestures involved inactive stationary gestures and two other gestures involved active gestures. In addition to inactive and active gestures, using both hands and only one hand was imbedded in the four gestures. Finally, singers were audio recorded using their most preferred gesture. After collectively singing the [u] vowel with each gesture, each male singer individually rated each gesture on a 1-10 Likert scale according to quality of resonance. The choir was audio recorded during each motion, and expert listeners ($N = 12$) rated the randomized audio files on quality of resonance. The results indicated that singers and expert listeners both rated the active two-handed gesture as eliciting the most resonant sound and the stationary one-handed gesture as eliciting the least resonant sound. Expert listeners rated the recording as most resonant when singers chose individually preferred gestures.

Keywords

singer gestures, resonance, male collegiate singers, choir rehearsal techniques

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Background

Kinesthetic movements are a recommended pedagogical device in choral rehearsal (Apfelstadt, 1985; Benson, 2011; Briggs, 2011; Dickson, 1992; Jordan, 2008; Peterson, 2000; Wis, 1999). Wis (1999) illustrated that "Choral directors teach not only in an abstract medium (music), but also work with an abstract instrument (voice). Therefore, expanding rehearsal techniques with the physical domain along with verbal domain is beneficial" (Wis, 1999, p. 2). Numerous choral music pedagogues have recommended the use of kinesthetic movements for teaching musical elements in a choral rehearsal setting: internalizing rhythm (Dickson, 1992; Peterson, 2000), keeping steady pulse (Apfelstadt, 1985), shaping various musical phrases (Apfelstadt, 1985; Manganello, 2011; Peterson 2000), dynamic contrast (Manganello, 2011; Peterson, 2000) and intonation (Apfelstadt, 1985; Briggs, 2011).

In addition to the musical elements, pedagogues have also illustrated the effects of kinesthetic engagement in teaching vocal techniques: vowel formations (Benson, 2011; Briggs, 2011), blending choral sound (Peterson, 2000), breathing mechanism (Apfelstadt, 1985; Manganello, 2011; Peterson, 2000), resonance (Skoog, 2004), posture (Benson, 2011; Jordan, 2008), and achieving various tone qualities (Benson, 2011; Jordan, 2008). Apfelstadt (1985), Briggs (2011), Jordan (2008), and Hylton (1987) especially emphasized the benefits of regular use of kinesthetic gestures in warm-ups: relaxing physical tension, creating group sound, and preparing singers mentally and physically to sing. Silvey (2014) also examined that kinesthetic gestures that emphasize vowel formations and intonation allow students to be musically sensitive and detail oriented.

When the rehearsal is effective and efficient, the use of kinesthetic gestures also enables singers to engage in the choral rehearsal (Briggs, 2011; Manganello, 2011; Peterson, 2000). This active engagement enables singers to take ownership of their growth (Peterson, 2000) and have positive

attitudes (Briggs, 2011; Dickson, 1992; Manganello, 2011). As a result, gestures help create a positive rehearsal atmosphere (Peterson, 2000). Many practitioners have recommended the use of kinesthetic gesture in the choral rehearsal as an instructional device for teaching musical elements and vocal techniques. It is also likely that gestures engage singers in the rehearsal process and convey to singers that singing results from the coordination of the whole-body, not only the voice.

While there is much anecdotal evidence supporting the use of singer gesture, especially during the choral warm-up, relatively few research studies have provided empirical data regarding perceptual measures from both choir members and expert listeners of choral sound. Cook-Cunningham and Grady (2017a, 2017b) conducted a series of research studies examining the effects of singer gestures during warm-up on acoustic and perceptual measures of choir sound. The first study (Cook-Cunningham & Grady, 2017a) was conducted with collegiate choirs ($N = 3$) participating in three warm-up procedures—vocal only, physical only, and vocal and physical combination. The acoustical results demonstrated that the majority of the choirs sang with more resonance and closer to the targeted pitch after completing the vocal and physical combination warm-up session. Singers also expressed their preferences for the warm-up that combined vocal and physical procedures. The researchers (Cook-Cunningham & Grady, 2017b) replicated the previous study with two children's choirs and one high school choir, indicating similar results to the first investigation. In the third study, Grady and Cook-Cunningham (2018) investigated the effects of choral warm-ups, especially under two conditions, vocal only and vocal plus physical combination, on acoustic and perceptual measures of four collegiate choirs. Similar to their first two studies, the results demonstrated the majority of the singers performed with more resonance and preferred the warm-up with singer gesture.

Even though Cook-Cunningham and Grady's series of research studies revealed positive correlations when using singer gesture during the choral warm-up sessions, the specific types of gestures employed were not detailed in the studies. Brunkan (2012) investigated the effects of three singer gestures on acoustic and perceptual measures of singing in solo and choral contexts.

The author conducted two separate experiments for choral singing and solo singing. The choral singing participants ($N = 31$), consisting of both collegiate males ($n = 15$) and females ($n = 16$), sang three songs with three different gestures with the [i] vowel. "Over the Rainbow" was sung with a low, circular gesture, "Singing in the Rain" was sung with an upward pointing gesture, and "Hawaiian Rainbows" was sung with an arched hand gesture. The results indicated that the low, circular gesture and the upward pointing gesture displayed significant acoustic changes in amplitude within both choral and solo singing. The singers from both choral and solo singing experiments agreed that there were positive effects when using gestures in singing activity. In her later study, Brunkan (2016) examined the effects of a specific gesture, low circular arm gesture, on choral sound and singers' physical movements using motion capture devices. Participants sang the same excerpt under two conditions: no motion, then a low, circular arm gesture. The results were similar to her previous study; most singers ($N = 33, 67.37\%$) sang more in-tune when adding the movement to their singing. Thus, Brunkan concluded that singing with this specific gesture could affect choral sound (intonation and tone quality). Brunkan (2016) encouraged future researchers to explore singers' individually preferred gesture instead of designated gestures.

Although a few research studies provide empirical data regarding the effects of singer gestures in choral singing (Brunkan, 2012, 2016; Cook-Cunningham & Grady, 2017a, 2017b; Grady & Cook-Cunningham, 2018), there are limited empirical resources available concerning: specific singer gestures designed to improve choral tone (resonance), the effects of each specified singer gesture on perceptual measurements, the comparison of given gestures with singers' individually preferred gestures, or a comparison between tenors and basses and between music majors and non-music majors. The purpose of the current study was to examine the effects of four specified singer gestures (active vs. stationary and one hand vs. both hands) on selected perceptual measures (two sets of ratings from collegiate male singers and expert listeners) of choral resonance with the [u] vowel sound and to compare singers' individually preferred gestures with expert listeners' ratings of choral resonance. Additionally, the researcher analyzed potential differences between tenors and basses, and between music major and non-music major singers.

Thus, the researcher compared the singers' individually preferred gestures with expert listeners' ratings of choral resonance.

The following research questions guided this investigation. The researcher considered two perceptual measures of choral resonance from choir members and expert listeners with the following questions:

1. Are there any differences in resonance among the four specified singer gestures (active vs. stationary movements and one hand vs. both hands)?
2. Are there any perceptual differences in resonance between tenor and bass, and between non-music majors and music majors?
3. Are there any differences among the four specified singer gestures and the singers' individually preferred singer gesture based on expert listeners' perceptual measure of choral resonance?
4. Are there any perceptual differences in resonance between choral singers and expert listeners?

Method

Participants ($N = 27$) were male singers at a large southwestern university. Because pilot study (Redacted) revealed that male and female singers responded differently to singer gestures, this study was limited to male university choral singers. The choir members reported an average of eight years ($M = 8.30$, $SD = 3.84$) of choral experience prior to the study. All choir members demonstrated their sight singing ability and their vocal technique when they auditioned for choir membership at the beginning of the semester. They were placed in voice sections based on their audition (tenor = 11, bass = 16). Expert listeners ($N = 12$) consisted of experienced choral educators with an average of 14 years of teaching experience ($SD = 3.18$).

As a choir, the men sang the [u] vowel on F# below middle C under five gestural conditions. The [u] vowel is a closed and back vowel and it has the lowest first and second formant frequencies of all vowels. As a result, choral pedagogues have found that it is challenging to create resonance

on the [u] vowel (Davids & LaTour, 2012). Because of this natural closeness and backness of the [u] vowel, it might more readily be affected by gestural changes in resonance than a more forward vowel. Therefore, the singers sang the [u] vowel with five singer gesture conditions to examine any differences on choral resonance.

The five singer gesture conditions (see Figure 1) included the four specified singer gestures (A-D) and a gesture chosen by individual singers. Two singer gestures (A, C) involved active gestures. In the first active gesture (A), each singer pinched his right-hand index finger and thumb together and placed these fingers in the middle of the forehead and pulled these two fingers away from the forehead (active gesture). In the third gesture (C), the men placed the left thumb on the left temple and the right thumb on the right temple with fingers extending upward and palms facing each other. Singers then moved their hands away from their faces (active gesture). Two other singer gestures (B, D) involved inactive stationary gestures. In the second gesture (B), singers curved fingers on both hands to make a letter "C" and placed the back of the palms on each cheek. In the fourth gesture (D), each singer placed his right hand horizontally below the nose with his elbow out. In addition to active (A, C) and inactive (B, D) gestures, using both hands (B, C) and only one hand (A, D) was embedded in the four singer gestures.

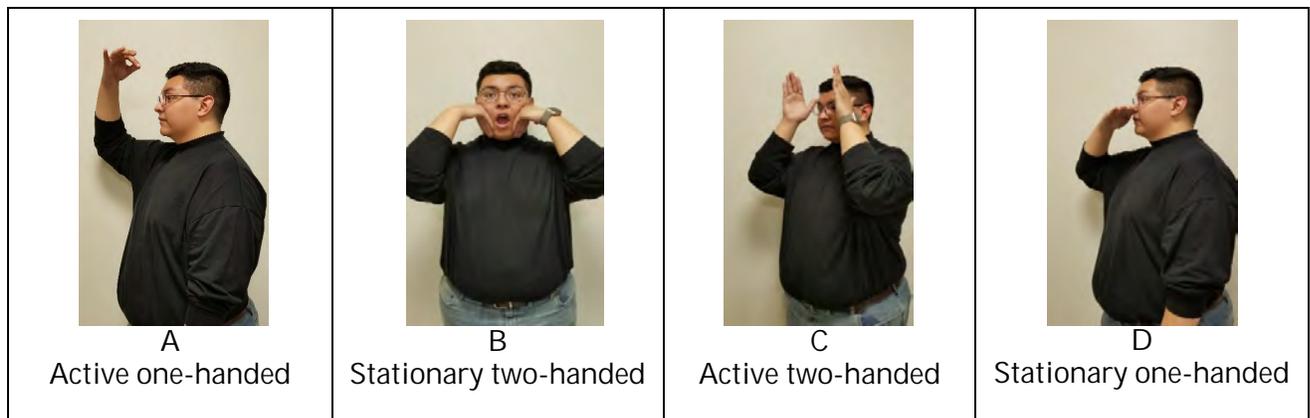


Figure 1. The four specified singer gestures.

This protocol was conducted during the choir's regular rehearsal and administered by one of the choir directors. All data collection was IRB approved by the researcher's university. The choir director modeled the four singer gestures on the [u] vowel on F sharp below middle C, and then

the choir members ($N = 23$) sang the [u] vowel once for each kinesthetic movement with the director. After singing the [u] vowel with each movement, each male singer rated each movement on a 1-10 Likert scale by amount of resonance, and then sang the [u] vowel again as a choir with each individual using the singer gesture he considered most resonant.

While the experiment was conducted, the researcher recorded the entire experiment with a canon HP 700 camcorder with a microphone to verify procedures and to allow subsequent randomization of sound files. The choir was video recorded throughout the experiment and the resulting recordings were edited into five audio files, which the twelve judges listened to individually. Each panel member listened to the audio files using headphones to isolate the sound on the recordings and to avoid distracting sounds. The randomized audio files included the vowel sung using the four singer gestures and singers' individually chosen gesture. Each judge individually listened to ten recordings (five audio files in random order, then played again in reverse order), and then rated each recording on a 10-point Likert-type scale anchored by no resonance (1) and the most resonance (10).

Results

Singer Gestures

I used a two-way between-subjects ANOVA to compare the two perceptual measures of choral resonance from choir members and expert listeners on the four specified singer gestures. Results indicated that there was a significant difference among the four specified singer gestures on choral resonance ($F [3, 35] = 3.44, p = 0.02$). Post hoc comparisons using the Tukey HSD test indicated that the mean score for the one-handed stationary gesture (D) ($M = 4.91, SD = 2.09$) was perceived as significantly less resonant than both of the active two-handed gesture (C) ($M = 6.75, SD = 1.98$), and the stationary two-handed gesture (B) ($M = 6.25, SD = 1.95$). However, the active one-handed gesture (A) ($M = 6.01, SD = 2.01$) did not significantly differ from the other three gestures. The two gestures judged most resonant were those using both hands, whether active or stationary. In terms of the two gestures using only one hand (A, D), the active gesture (A) was rated as significantly more

resonant than the stationary one (D). However, a comparison of the ratings from choir members and expert listeners revealed no significant differences ($F [3, 35] = 1.86, p = 0.15$).

Expert Listeners

I conducted a one-way ANOVA to analyze expert listeners' ratings of the five recordings resulting from the four specified singer gestures and the singers' individually preferred singer gesture. Results indicated that there was no significant difference among the five gestural conditions ($F [4, 55] = 1.96, p = 0.11$). The highest rating from expert listeners was the singer' individually preferred gesture ($M = 6.66, SD = 1.09$), and the lowest rating was the stationary one-handed gesture which was the same as the results from the choral members (D) ($M = 5.54, SD = 1.40$). When singers picked their individually preferred gesture, 14 singers out of 27 (51.9%) chose the active two-handed gesture (C), 7/27 (26%) chose the stationary two-handed gesture (B), 5/27 (18.5%) chose the active one-handed gesture (A) and 1/27 (3.7%) chose the stationary one-handed gesture (D) (see Table 1).

To analyze the third set of data, I used a 2 (tenor and bass) x 2 (non-music major and music major) x 4 (four specified gestures) ANOVA. Results indicated that there was a significant difference ($F [3, 21] = 0.179, p = 0.025$) among the four gestures. Post hoc comparisons using the Tukey HSD test indicated that the one-handed stationary gesture (D) was significantly less resonant than the two-handed stationary gesture (B). Perceptions from tenors and basses differed with respect to the ratings of the most resonant gesture. More specifically, the tenors rated the two-handed active gesture (C) ($M = 7.31, SE = 0.74$) as the most resonant whereas the basses rated the two-handed stationary gesture (B) ($M = 7.04, SE = 0.64$) as the most resonant gesture, both of which were two-handed gestures. Similar results were found between music majors and non-music majors. Choir members who were music majors rated the two-handed active gesture (C) ($M = 7.09, SE = 0.56$) as the most resonant gesture while the non-music majors rated the two-handed stationary gesture (B) ($M = 7.5, SE = 0.77$) as the most resonant gesture. There was no significant difference between the four groups of participants.

Discussion

The male singers and expert listeners in this study rated the active two-handed gesture (C) as the most resonant. The results corroborated Atkins and Duke's (2013) research indicating that guiding sound to the microphone while the singers were singing improved perceived tone quality. A connection between emphasizing the singers' attention to a distal point may be related to the (A) and (C) singer gestures, moving the gestures away from the body. Atkins and Duke called for further research to discover whether the different length of a distal focus has an impact on the vocal mechanism. In the current study, the findings suggest that when singer gestures lead to a further distal point with an active gesture, singers and listeners both hear more resonance in choral sound. However, it should be noted that each study used a different vowel choice; Atkins and Duke chose an [a] vowel while this study used a [u] vowel.

The male singers and expert listeners rated the same active two-handed gesture (C) as the most resonant. This result challenges music educators to trust singers' own perceptions of choral sound. In our classrooms, teachers are often the main decision maker in terms of rehearsal techniques and problem solving skills. Results from the current study indicated that students were able to make the same decisions as expert listeners under these limited circumstances.

Another finding worth noting is that when students chose their individually preferred gesture out of the four given gestures, it was also the most resonant sound from the perspective of expert listeners. Students presumably were able to understand how each gesture worked within their own bodies and choose a single gesture that created the most resonance. When they were given an opportunity to select a gesture for themselves as part of the rehearsal procedure, they sounded more resonant. Consider that the singers rated each movement according to only choral resonance. Perhaps students might benefit from specified directions, especially when they are asked to listen to their own choral sound. Singers might also benefit from a specific thing(s) to listen for rather than general assumptions of good sound.

Results comparing different majors and voice parts illustrated that each group (tenors/basses

and music majors/non-music majors) expressed different preferences among the gestures. Each group selected a different gesture as their most resonant sound. This might be an indication of how each singer or voice part is different, and teachers should consider how singers may react different to certain rehearsal procedures. Results should be generalized with caution due to a small sample size and population limited to one institution. In addition to the size of the sample, the selection of the vowel and expert listeners may have also had an impact. Future studies using measurement with documented validity and reliability are warranted.

Implications for further research

These results show the necessity of further investigation exploring the effect of different types of singer gestures on singing vowels, such as [a], [e], [i] and [o]. Determining whether different singer gestures affect various vocal ranges differently could impact choral educators' ability to use singer gestures effectively. Expanding the number of participants and including gender and various age groups as factors might be considered for future stud. Finally, it may be beneficial to utilize specific targets when addressing intonation and resonance in the choral rehearsal, rather than simply asking general questions of the singers.

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