

# The Effect of Conductor Lip Rounding on Individual Singers' Lip Postures during Sung Latin /u/ Vowels: A Pilot Study

James F. Daugherty and Melissa C. Brunkan

## Abstract

The purpose of this pilot study was to assess potential effects of conductor lip rounding of /u/ vowels on the lip postures of individual singers. Participants ( $N=62$ ) sang a cappella the opening phrase in the melody line of Mozart's motet "Ave Verum Corpus," while watching a videotaped conductor under two conditions: (a) conducting gestures with neutral facial affect (baseline condition) and (b) the same conducting gestures plus conductor lip rounding on the /u/ vowels of "verum" and "corpus" (experimental condition). Participants were video-recorded in each condition. A panel of experienced voice teachers ( $N=6$ ) rated each participant on a 7 item scale (a lot less to a lot more) with respect to degree of lip rounding evidenced in the experimental condition on sung /u/ vowels.

Results indicated increased lip rounding by all participants on at least one of the sung Latin /u/ vowels, regardless of age, choral singing experience, and other demographic factors, with no participant evidencing less lip rounding in the experimental condition on either /u/ vowel. Means for the /u/ in "corpus" tended higher than means for the /u/ in "verum." Means for female lip rounding were higher than male means. Participant means were higher for singers with 3 or more years of private voice lessons. Most participants ( $n=54$ , 87.10%) noted some difference in conductor behaviour between the two conditions, yet only 29% of participants specifically and accurately described the difference.

Results were discussed in terms of the theory "what they see is what you get" in choral singing contexts, limitations of the study, and suggestions for further research.

## Introduction

A segment of contemporary choral pedagogy materials evidences a marked, testimonial belief, informed both by anecdotal observations and some findings and theories in brain research, that "the whole body is the conducting gesture" and "what they (the singers) see is what you get" (Eichenberger & Thomas, 1994)." To date, however, there are few empirical studies that test such a theory in particular choral singing contexts.

Some research has indicated a possible neurobiological basis for imitative behaviour. In a landmark study, Di Pellegrino, Fadiga, Fogassi, Gallese, and Rizzolatti (1992) investigated the inferior frontal cortex of a macaque monkey brain. The researchers found that neurons in this part of the monkey's brain fired not only while performing grasping activities, but also while simply observing the same grasping action being performed by a human being, leading them to nickname such nerve cells "mirror neurons" because of their imitative functioning.

Fadiga, Fogassi, Pavesi, and Rizzolatti (1995) found that human participants displayed significantly increased levels of motor evokes potentials (MEPs) while observing particular actions. Various functional magnetic resonance imaging (fMRI) studies have shown that observation of finger, hand, arm, mouth, or foot movement activates motor areas of the frontal cortex (for example, Buccino *et al.*, 2001; Grafton, Arbib, Fadiga, & Rizzolatti, 1996; Iacoboni *et*

*al.*, 1999; Manthey, Shubotz & von Cramon, 2003; Rizzolatti *et al.*, 1996; Stevens, Fonlupt, Shiffrar, & Dacety, 2000).

Chartrand and Bargh (1999) reported a three-phase investigation of what they termed the “chameleon effect.” Results indicated (a) participants tended to mimic a confederate engaged in the same activity, (b) enjoyed the interaction with confederates more when engaged in mimicry, and (c) that participants more likely to imitate actions were also more likely to evidence a high level of perspective taking. Other studies (for example, Brass, Bekkering, Wohlschlagel, & Prinz, 2000; Greenwald, 1970) have found that people are faster in producing imitative or mimic type responses when the triggering stimulus shares features with the response.

Of particular interest to the present investigation were various studies that examined mirroring or chameleon-like effects in facial and mouth expressions. Some studies (for example, Meltzoff & Moore, 1977; Parker, 2007) found that infants spontaneously display imitation of simple facial gestures such as opening the mouth and protruding the tongue. Results from two studies (Fadiga, Craighero, Buccino, & Rizzolatti, 2002; Watkins, Strafella, & Paus, 2003) found that participants who listened to or watched speech evidenced increases in the muscle potentiation of their mouths.

Many other studies have suggested that people tend to mimic each other’s facial expressions in particular contexts (for example, Bavelas, Black, Lemery, & Mullett, 1986; Dimberg, Thunberg, & Elmehed, 2000; Surakka & Hietamen, 1998; Wallbott, 1991; Zajonc, Pietromonaco, & Bargh, 1982). Dimberg and Thunberg (1998) found that facial muscular engagement in responses to observed stimulus photos took place within 300 to 400ms. Dimberg, Thunberg, and Elmehed (2000) found that such engagement of facial muscles occurs without conscious awareness.

Comparatively fewer studies have focused on potential mimicking behaviour in musical contexts. Greschesky (1985) found, in a study of twenty high school bands, that nonverbal conductor emblems (for example, body movement, approving facial expressions, conducting gestures) were the most powerful independent variables affecting the musicality of instrumental music performances by these ensembles. Fuelberth conducted (2003a, 2003b, 2004) a series of studies in singing contexts on the effects of conductor gesture on singer tension. She found that several of these nonverbal gestures could either evoke tension or the perception of tension in singers.

Manternach (2009) explored potential effects of conductor preparatory gestures and conductor head and shoulder movements on the upper body movement of individual choral singers. Results indicated apparent differences in participant head and shoulder movement associated with both the direction of the preparatory gesture and particular head and shoulder movements displayed by the conductor.

### **Purpose of this Study, Research Questions, and Research Decisions**

The purpose of this pilot study was to assess potential effects of conductor lip rounding of /u/ vowels on the lip postures of individual singers. Participants ( $N=62$ ) were video-recorded as they sang a cappella the opening phrase in the melody line of Mozart’s motet “Ave Verum Corpus,” while watching a videotaped conductor under two conditions: (a) conducting gestures with neutral facial affect (baseline condition) and (b) the same conducting gestures plus conductor lip rounding on the /u/ vowels of “verum” and “corpus” (experimental condition).

To that end, the following research questions guided this investigation: (a) Do participants’ lip postures vary between baseline and experimental conditions?; (b) Do results vary according

to age, sex, singing experience, familiarity with the motet, chronology of the /u/ vowels, or experience in singing Latin?; and (c) Will participants be able to identify accurately the differences between the two conducting conditions?

We selected the sung Latin /u/ vowel for this initial exploration of potential singer mimicking of conductor facial posture for three reasons. First, /u/ can be one of the most readily visible vowels. Although /u/ is typically described as a “high, back” vowel, its clear enunciation by singers or speakers occasions exaggerating the acoustic effect of backness through some degree of forward lip rounding, which serves both to lengthen the vocal tract and lower the first three formants. In this regard, lip rounding on /u/ vowels has been advised in pedagogical contexts for visual clarity of both speech and song.

Secondly, it was thought use of the Latin /u/ might avoid, with participants whose first language is English, possible confounding variables in assessment of lip rounding presented by a variety of English accents or dialects. Moreover, while Latin has not been a widely spoken language in the modern era, sung Latin has remained prominent in choral repertoire and choral singing pedagogy.

Finally, a segment of the choral teaching profession has long endorsed cultivating formation of /u/ vowels with “lips pursed and rounded (Roe, 1994).” Some pedagogues have suggested that vocalizing with a properly rounded /u/ vowel produces a “rounded, richer, and less brilliant color,” the mastery of which “promotes lightness in singing and enhances blend,” while producing “a beautiful, flutelike tone conducive to training the head voice (Collins, 1999, p. 133).”

## Method and Procedures

### Participants

Participants ( $N=62$ ) constituted a convenience sample, with effort made to include females and males of varying: (a) ages, (b) previous choral singing experiences, (c) years of private voice study, (d) experience with singing in Latin, and (e) familiarity with the musical excerpt employed in this study. There were 39 females (62.90%) and 23 males (37.10%). Participants ranged in age from 14 to 62 years ( $Mdn=25$  yrs,  $M=34$  yrs, modal age=20 yrs), with most participants ( $n=37$ , 59.67%) ranging in age from 20 to 39 years.

Though a majority of participants ( $n=44$ , 70.96%) were not singing in a choir at the time of the study, most participants ( $n=43$ , 69.35%) reported previous choir singing experience: less than 1 year ( $n=5$ , 8.06%); 1-3 yrs ( $n=11$ , 17.74%); 4 to 7 years ( $n=15$ , 24.19%); 8 to 10 years ( $n=10$ , 16.12%); more than 10 years ( $n=3$ , 4.84%). Choir participation was defined as membership in a regularly scheduled choral ensemble (school, church/synagogue, community) at any age from elementary school through adulthood.

Participants reported years of private voice study as follows: no private voice study ( $n=19$ , 30.64%), less than 1 year ( $n=5$ , 8.06%), 1 to 3 years ( $n=11$ , 17.74%), 4 to 7 years ( $n=15$ , 24.19%), 8 to 10 years ( $n=10$ , 16.12%), and more than 10 years of private voice study ( $n=3$ , 4.83%). Ten participants (16.12%) had never sung in Latin before, while 20 participants (32.25%) described themselves as “sort of experienced” in singing Latin, 11 participants (17.74%) were “experienced,” and 21 participants (29.52%) were “very experienced.” Reported familiarity with the musical excerpt ranged from “never heard it before” ( $n=14$ , 22.58%) to “very familiar” with it ( $n=25$ , 40.32%).

### Sung musical excerpt

The sung musical excerpt employed for this study consisted of the opening phrase of the melody line of Mozart's motet "Ave Verum Corpus" (see Figure 1).

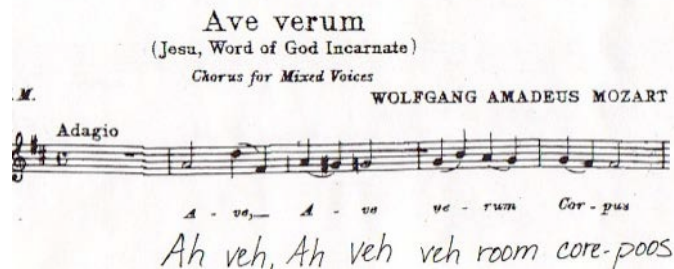


Figure 1. Sung musical excerpt.

We selected this particular motet because it was a composition likely to have been performed or heard at some point by participants with previous choral singing experience, it lent itself to a moderate tempo, and its opening melodic phrase contained two /u/ vowels in the words "verum" and "corpus." A phonetic Latin text was supplied for those participants with little or no previous experience with singing in Latin.

### Preliminary procedures

Participants completed a short questionnaire in order to obtain the demographic data described above. Upon completion of the questionnaire, the musical excerpt was played once on a keyboard (MM=80), as participants listened and followed either the Latin or phonetic Latin text. Participants were then asked to respond yes or no to the statement, "I can sing this melody in Latin right now." Those participants responding yes were asked to demonstrate by singing the melody a cappella after hearing a starting pitch provided by a pitch pipe.

Participants who responded no were afforded individual help in learning the task. At no time, however, did the researchers sing or speak the text. Rather, we either hummed or played the melody as needed until participants reported they could respond yes to the statement, "I can sing this melody in Latin right now," and were successfully able to demonstrate such.

### Stimulus videotape

Videotaped conducting was used as a control for potential variability in conductor behaviours and to ensure all participants were responding to the same stimuli. The conductor used a metronome (MM=80) and a mirror in preparing two conducting conditions: (a) use of conducting gestures with neutral facial affect (baseline condition) and (b) use of the same conducting gestures and facial affect with the addition of displayed conductor lip rounding on the /u/ vowels of "verum" and "corpus" (experimental condition).

Preparation of the stimulus tape entailed frequent visual examinations for consistency of conducting plane, gestures, and facial affect as measured by (a) freeze framed comparisons both within and between conditions and (b) reference to a grid of one centimetre squares positioned behind the conductor. A panel of three experienced choral conductors reviewed the final

stimulus tape with respect to consistency of facial affect and conducting gestures. Each evaluator attested the only change noticeable was the addition of lip rounding in the experimental condition.

### **Study protocol**

Participants were asked to sing the Mozart excerpt a cappella and from memory as they viewed the videotaped conductor in each of the two conducting conditions. The stimulus videotape was projected such that the conductor appeared life size, as determined by having him stand beside the projected image prior to the study. Prior to each condition, participants heard the starting pitch on a pitch pipe.

Participants were video recorded and audio recorded as they sang. Distance from recording devices was consistent for all participants.

Following the sung trials, participants completed a brief questionnaire, which asked (a) if they noticed any differences in conductor behaviour between the two trials, and (b) if so, to describe the differences noted.

### **Evaluation of participant videos**

A panel of six persons experienced as choral conductors and voice teachers reviewed all participant videos. Panelists' professional teaching and conducting experience ranged from 4 to 15 years.

Video trials were projected via SmartBoard technology, which allowed participants' faces to be viewed life size. Evaluators were instructed to look for the presence or absence of lip rounding on the /u/ vowel of "verum" and "corpus" in the second trial, using the first trial of each participant as a baseline. To note any differences in lip rounding observed between the two trials, evaluators marked a 7-item rating scale: A lot less, Moderately less, A little less, Same, A little more, Moderately more, A lot more. Mean ratings for each participant were used in reporting of results.

## **Results**

Results to date are reported in terms of the research questions posed for this investigation.

### **Research question one**

Our first research question inquired if participants' lip postures varied between baseline and experimental conditions. As indicated by Figures 2 and 3, all participants evidenced increased lip rounding on at least one of the sung /u/ vowels in the experimental condition. No participant evidenced less lip rounding on either /u/ vowel in the experimental condition.

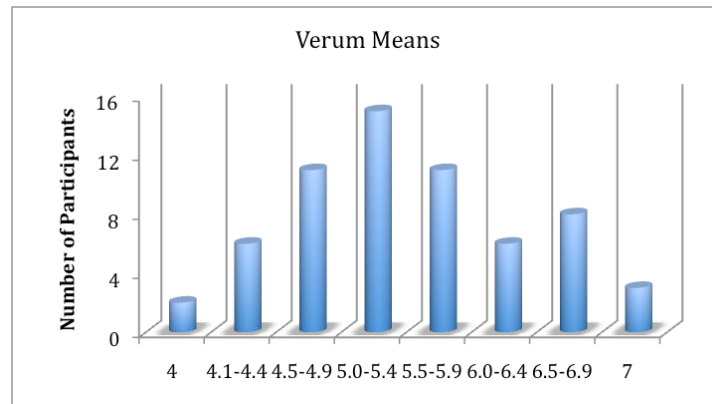


Figure 2. Mean panel ratings for the lip rounding on the /u/ vowel of “verum” in the experimental condition. 4=Same, 5=A little more, 6=Moderately more, 7=A lot more.

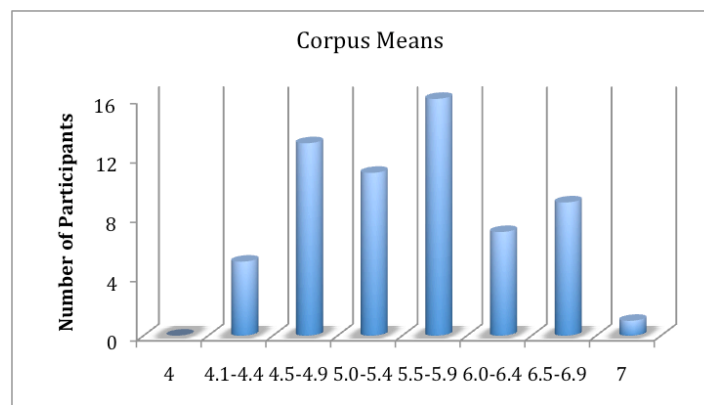


Figure 3. Mean panel ratings for the lip rounding on the /u/ vowel of “corpus” in the experimental condition. 4=Same, 5=A little more, 6=Moderately more, 7=A lot more.

### Research question two

Research question two asked if results would vary when disaggregated according to age, sex, choral singing experience, previous familiarity with the motet, prior experience with singing in Latin, or chronology of the /u/ vowels. Results to date indicated mean ratings for the /u/ of “corpus” tended higher than mean ratings for the /u/ of “verum,” that female means overall were higher than overall male means, and that mean ratings for participants with 3 or more years of private voice lessons were higher than for those participants with 0-3 years of private voice lessons. Preliminary results did not vary significantly according to age, sex, choral singing experience, familiarity with the motet, or prior experience with singing in Latin.

### Research question three

The third research question asked if participants would accurately notice that the only difference between the two conducting conditions was conductor lip rounding on the /u/ vowels in the experimental condition. Among participants, most ( $n=54$ , 87.10%) noticed some type of difference, while eight participants (12.90%) reported no difference. Eighteen participants (29.03%) specifically and accurately identified the difference between the two conditions.

## Discussion

The main finding of this pilot investigation is that conductor lip rounding appears to result in observed increase of singer lip rounding on at least one of the Latin /u/ vowels by all participants in this study, regardless of age, choral singing experience, and other demographic factors. Such finding, of course, is limited to the participants in this particular study and likewise circumscribed by the particular methodology and procedures employed.

In this respect, we view these results cautiously, primarily because of the dependent measurement employed for this pilot study. The experienced judges stated they were comfortable with evaluating participants' lip rounding by means of viewing and hearing videotapes of paired, sung trials. However, in some cases, particularly those instances where changes in lip posture appeared to be slight, the judges remarked it was sometimes difficult to recall with precision the baseline /u/ vowels despite the short duration of each sung trial (12 s).

This potential factor may be compounded by (a) the time interval between the end of one trial and the beginning of the next trial (12-14 s), and (b) the simultaneous presentation of both visual and audio data. Therefore, future studies might consider either presenting videotaped excerpts of only the two /u/ vowels, for example, baseline verum /u/ followed immediately by experimental condition verum /u/, or using still pictures of participants approximately midway through each /u/ vowel. Such procedures would also permit consideration of a counterbalanced order of condition presentations, in distinction from the consistent baseline-experimental condition presentations employed for this pilot study.

In addition, several tacks for future investigations of singer lip postures come readily to mind. Subsequent research, for instance, may benefit from the addition of more participants, particularly "naïve" participants less experienced in choral singing with a conductor. Acoustical analyses of the sung /u/ vowels might supplement visual and psycho-acoustical ratings. Studies might be done with small groups of singers rather than singers studied one at a time. Use of another language, for example, English, might also be instructive. In addition to visual and acoustic measurements, future investigations might employ electromyography (EMG) instrumentation.

In terms of the conductor stimulus, future studies may employ a simultaneous combination of variables, for example, lip rounding plus raised eyebrows. The potential variable of conductor sex, for example, a female conductor rather than a male conductor or a combination of both sexes, is also worthy of consideration.

The contextual theory of "what they see is what you get" argues that conductor postures, including conductor lip rounding, afford efficient, non-verbal means of evoking desirable singer behaviour by contending that singers mimic a variety of conductor behaviour. As such, this theory may point to a phenomenon that cannot ultimately or fully be understood by reductionist, scientific methods alone. Yet use of those methods, even in a simple experiment such as the present pilot study, can contribute to ongoing conversation and dialogue in this arena by assessing the credibility of the theory at particular junctures in particular contexts.

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