

# The Effect of Instructor Postural Changes on the Posture of an Individual Singer

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## Abstract

The purpose of this investigation was to examine the potential effect of instructor body positioning on individual singer (N=40) posture and vocal production. The instructor/researcher assumed different standing positions while standing participants sang exercises. The instructor assumed the following body conditions: (a) not in view, baseline; (b) exaggerated erect posture; (c) slumping forward; (d) leaning weight to one side; and (e) balanced, upright posture. Digital audio and video recordings of each condition were analyzed with attention to (a) singer posture changes and (b) pitch and amplitude changes as measured by spectral analysis software. Other acoustical data were analyzed qualitatively. Results were discussed in terms of vocal and choral pedagogy and implications for future research.

## Introduction

Vocal music instructors regularly give verbal instructions that cue their students' musical and technical behaviours. Concurrent with these verbal instructions, however, are countless nonverbal behaviour that also play a role in communication. In fact, some suggest that when verbal and nonverbal cues are in opposition with regard to liking and disliking, nonverbal behaviour may have a stronger influence on the communication (Mehrabian, 1971). The area of nonverbal communication has been the subject of many studies in neuroscience and the social sciences. The examination of these studies can inform musicians as to their possible application to a music classroom.

Fadiga, Fogassi, Pavesi, and Rizzolatti (1995) discovered a mirror system in human beings. "Mirror neurons," as they have been nicknamed, were first discovered in the macaque monkey. The neurons fire when performing an activity and also when watching an activity being performed by others. This phenomenon may help observers to interpret what another person is thinking. This finding has fueled discussion on human communication. In an evolutionary sense, the mirror system may help an observer to determine friendship or danger. Iacoboni (2008), among others, has speculated that the mirror system is "...the foundation of empathy (p. 5)."

The decoding of messages, however, may go beyond simply imagining what another person is thinking. Some suggest a connection between seeing and doing, a theory referred to as the "perception-behavior link." The theory of this link is that "...perceiving observable aspects of others (their expressions, postures, behaviors) activates the associated representations in memory, which in turn makes us more likely to do the same" (Chartrand, Maddux, & Lakin, 2005, p. 334). Humans, therefore, would unconsciously mimic the facial expressions, gestures, and postures of others. Iacoboni agrees, stating "indeed, mirroring behaviors...seem implicit, automatic, and pre-reflective (p. 270)."

Facial mimicry, in particular, has been widely studied. Dimberg (1990) reported that evidence from several studies from his laboratory indicated the tendency for humans to mimic the emotional facial expressions of others. These and subsequent studies took electromyographic (EMG) readings of participant zygomatic major (smiling) muscles and corrugator supercilii (brow furrowing) muscles while they viewed images of neutral, happy, and sad facial expressions. Results showed that participants tended to engage the same muscles being used by the person in the viewed images. In one study, these reactions occurred very quickly – within 300-400 ms (Dimberg & Thunberg, 1998). A subsequent study showed the facial stimuli to participants for only 30 ms before changing to a neutral facial expression (Dimberg, Thunberg, & Elmehed, 2000). Because of the short viewing duration, the participant did not know he or she had seen the facial expression image. Even without conscious awareness of having seen the image, participants still displayed significantly more muscular activity as they mimicked the stimulus expression.

Other studies reveal that human mimicry occurs in other areas of the body. Berger and Hadley (1975) used EMG to examine participant arm and mouth activity. They found that participant arm muscle activity increased when watching a video of an arm wrestling match, but not while watching a video of a person stuttering. Mouth muscle activity, however, increased only while watching the video of a person stuttering. Watkins, Strafella, and Paus (2003) determined that simply observing or hearing speech patterns caused excitability of participants' ( $N=8$ ) motor system related to speech production. These arm and facial muscular responses, however, were so slight that they were not visible to the naked eye.

In a study by Kilner, Paulignan, and Blakemore (2003), participants ( $N=8$ ) demonstrated difficulty in making an arm motion while observing another human making an incongruent motion. Participants made arm movements while observing congruent (mirror image) or incongruent movements from a robotic arm or another human. Results showed that there was significantly more variance in participant arm movement when observing incongruent movements from humans as compared to congruent movements. There were no such differences when observing a robotic arm. This finding would imply that human mimicry only applies to observation of living things.

Some studies have indicated that mimicry is related to length of time and positive rapport. Charny (1966), for example, coded the behaviour of patients in relation to their therapists into congruent, noncongruent, and mirroring postures. He found that patients often adopted the posture of their therapists during their sessions, particularly when patients were speaking of their relationships with others. He also found that upper body congruent events tended to increase and noncongruent events tended to decrease as sessions progressed. Using the same posture coding techniques, studies have shown that posture sharing occurs in college classrooms (LaFrance & Broadbent, 1976; LaFrance, 1979). In these studies, posture sharing increased over time and as students reported higher levels of rapport with the instructor.

In a series of three studies, Chartrand and Bargh (1999) studied behaviours of participants who were asked to complete a task with a previously unknown confederate. While completing the task, the confederate began to rub his face or to shake his foot. Results showed that participants tended to nonconsciously mimic the behaviour of the confederate. They named the phenomenon “the Chameleon Effect.” In the second study of the series, participants again completed a task with a confederate. This time, some participants were mimicked while others were not. In a follow-up questionnaire, the participants described the experiment and their interaction with the confederate. Results showed that participants who were mimicked tended to like the confederates more and felt generally better about the interaction than those

participants who were not. Lakin and Chartrand (2003) also demonstrated the tendency to mimic behaviours when seeking to create a relationship. In this case, participants were more likely to mimic a confederate when their first attempt to affiliate was unsuccessful.

If mimicry appears to occur nonconsciously, increases with positive rapport, and even helps to foster positive rapport, what effect might it have in a vocal music setting? Eichenberger (1994) has suggested that mimicry occurs between a choral conductor and individual choristers. Jennings underscores this assumed connection between conducting gesture and choral sound, stating “the kind of conducting you do will be reflected in the sound and the attitude of the singers (Cook-Koenig, 1995, p. 330).” Decker further asserts that when the conductor “is tense in his physical movement or he/she has poor body stance, it will be reflected in the singers (p. 291).” However, while theories and beliefs are plentiful in this area, scant research has investigated the phenomenon in music classrooms.

Nonetheless, existing research does indicate the possibility of this phenomenon. Fuelberth (2003a, 2004) studied singer perceptions of left hand crescendo gestures. In both of these studies, participants watched a video to evaluate which gestures they believed would cause the most tension in a chorister’s vocal production. They identified fist and stabbing gestures as potentially causing the most tension. In a subsequent study, using a panel of evaluators, some of the same gestures were judged to lead to singer vocal tension in performance (Fuelberth, 2003b).

Manternach (2009) studied mimicry in conductor preparatory gesture. In this case, singers watched multiple preparatory gestures from a pre-recorded conductor, which cued the participant to sing a familiar song. Results showed that upward head or shoulder movement by the conductor led to corresponding increases in singer head and shoulder movement. Daugherty and Brunkan (2009) found that singers tended to mimic conductor modeling of an [u] vowel. Moreover, many of these singers were not able to accurately report any differences in conductor mouth shape. To date, however, there are no studies examining the presence of mimicking behaviours in a private voice lesson setting.

The purpose of this study is to assess what effect, if any, instructor posture (slumped/leaning versus balanced) may have on individual singer posture ( $N=40$ ) when asked to sing the first phrase of a familiar song while attending to various vocal tasks. To that end, the following research questions have been developed: (a) to what extent, if any, do participant postural behaviours change as the postural behaviours of an instructor/researcher change? and (b) do participants who display similar postural changes as an instructor/researcher share any demographic characteristics?

## Method

### Participants

Participants ( $N=40$ ) for this study comprised a convenience sample ( $n=21$  female,  $n=19$  male) from a large Midwestern university and its surrounding communities. The age ranged from 19 to 76 years old, though most ( $n=27$ , 67.50%) were 19 to 29 years old. This range was representative of the large percentage of undergraduate and graduate participants from the university community.

Though prior choral experience was not a prerequisite for participation, 77.50% of participants ( $n=31$ ) reported at least six years of involvement in school, community, or church choirs. Only one participant had not previously sung in a choir. Voice lesson experience was

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more widely varied, with the highest number of participants ( $n=13$ , 32.50%) reporting no voice lesson experience. Six or more years ( $n=9$ , 22.50%), two or three years ( $n=8$ , 20.00%), four or five years ( $n=4$ , 10.00%), and one year ( $n=4$ , 10.00%) were also reported. Two participants did not specify their voice lesson experience.

### Preliminary transactions

After signing a consent form, participants were told that they would be fitted for an Ambulatory Phonation Monitor (APM, Kay Pentax, Model 3200), which was a newly acquired piece of lab equipment. They were told that the study was partly to help the researcher to become more familiar with the equipment and accompanying software. A small accelerometer was affixed to the sternal notch on the front of the participant's neck using a mild adhesive. While doing so, the participant reviewed the first phrase of "America" (My country 'tis of thee, sweet land of liberty, of thee I sing) to insure that it could be sung from memory.

When the accelerometer was securely in place, the APM unit was calibrated using current manufacturer guidelines. The instructor/researcher explained that proper calibration would allow for amplitude monitoring during phonation. The unit was placed in a small waist pack worn by the participant. Though amplitude data were not used in this study, the APM was used to provide a cover for participant postural monitoring.

### Research room

Participants were subsequently taken to a music room that was configured for private voice instruction (Figure 1).

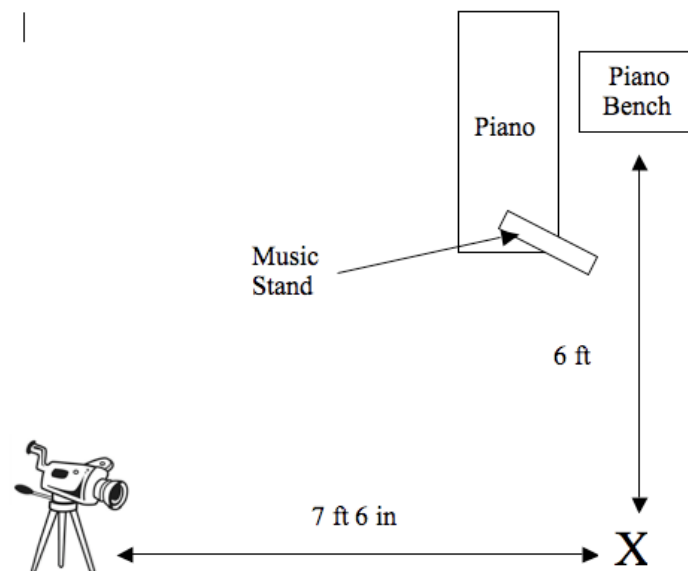


Figure 1. The research room, configured for private voice instruction.

They stood on a floor marking adjacent to the wall. This marker was 6 ft from a piano bench that was seated in front of a piano. A camera (RCA Small Wonder, Model EZ201) stood 7 ft 6 in to the side of the participant, where it filmed the profile of the participant while he or she performed the required tasks.

**Sung conditions**

The instructor/researcher played the first six pitches and initial chord progression of “America” (played in E Major) on the piano. The instructor/researcher then walked out of view of the participant to monitor the camera recording equipment. Using a metronome to establish tempo (mm=92), the instructor/researcher gave a count-off in tempo (“one, two, three, one, ready, go”) to cue the participant to begin. The metronome was turned off prior to the participant singing the first note.

The instructor/researcher then moved back to the piano, 6 ft in front of the participant. He gave the pitches and chord progression again before assuming a (a) seated upright and balanced posture, (b) seated slumped and leaning posture, (c) standing upright and balanced posture, or (d) standing slumped and leaning posture (Figure 2).



Figure 2. The four instructor postural conditions.

This procedure was repeated until the participant had sung the phrase during all four instructor/researcher postural conditions. The conditions were presented in varied sequence in order to control for order effect (Table 1).

Order	1 <sup>st</sup> Condition	2 <sup>nd</sup> Condition	3 <sup>rd</sup> Condition	4 <sup>th</sup> Condition
1	Stand - Balanced	Stand - Slumped	Sit - Balanced	Sit - Slumped
2	Stand - Slumped	Stand - Balanced	Sit - Slumped	Sit - Balanced
3	Sit - Balanced	Sit - Slumped	Stand - Balanced	Stand - Slumped
4	Sit - Slumped	Sit - Balanced	Stand - Slumped	Stand - Balanced

Table 1. Four permutations of instructor/researcher postures.

Ten participants viewed each of the four postural permutations.

In addition, an effort was made to present the instructor/researcher as a teacher rather than a lab technician. Thus, the instructor/researcher gave instructions during the four changing postural phrases. Before the first condition, participants were instructed to wait for the count off that would cue the entrance to the phrase. Prior to the next three repetitions of the phrase, the instructor/researcher directed the participants to (a) observe the purity and shape of the vowel on the word "of" during the passage "of thee I sing," (b) observe the purity and shape of the vowel on the word "thee" during the passage "of thee I sing," and (c) observe the purity and shape of the vowel on the word "sing" during the passage "of thee I sing." The instructor/researcher gave these instructions in the same sequence for each participant. Vowel observations were selected in order to give a focus that would not significantly affect singer posture prior to the initial breath of the sung phrase.

### Questionnaires

Following the experimental portion of the study, participants completed two questionnaires. The first primarily gathered demographic information. The second questionnaire was the Interpersonal Reactivity Index (IRI). This study was developed by Davis (1980, 1983) in order to measure different types of empathy. The 28-question survey assessed (a) emotional concern, (b) personal distress, (c) fantasy scale, and (d) perspective taking empathy. In their study of "the Chameleon Effect," Chartrand and Bargh (1999) discovered that participants who were more likely to mimic the behaviours of a confederate tended to display higher perspective taking scores than other participants. Perspective taking empathy, therefore, which measures the ability to understand something from another person's point of view, was of interest in this study.

### Measurement procedure

The videos for each participant were examined in order to assess possible participant postural changes between the varied instructor/researcher postural conditions. In order to do so, the moment immediately prior to inhalation was isolated for each sung example. This point was chosen in order to isolate a consistent moment for each condition. In addition, it marked the end of the count-off procedure, after which the instructor/researcher did not maintain eye contact with the participant.

The isolated photos were then examined by a panel of four choral graduate students, all of whom had choral teaching experience and extensive choral singing experience. The panel made two postural assessments, one comparing the standing postural conditions (standing balanced versus standing slumped/leaning) and one comparing the seated conditions (seated balanced versus seated slumped/leaning). They used a 7-point Likert-type scale to determine if the first posture shown was more slumped, the same, or more erect than the second posture. Figure 3 shows the side view of the participant as it was seen by the panel of judges.



Figure 3. The side view of a participant as viewed by the panel of judges.

The conditions were shown in varied order and the panellists did not know which instructor/researcher postural condition was being employed when assessing the participant images.

## Results

### Panel postural ratings

Of the four panel ratings acquired for each of the two comparisons (seated balanced versus seated slumped/leaning and standing balanced versus standing slumped/leaning) the high and low scores were dropped. The remaining two scores were then averaged in order to calculate a comparison average. Any score falling above a rating of four (no change in posture) was considered a ranking of “more upright/erect.” Any score falling below a rating of four was considered a ranking of “more slumped.” Participant postural changes were then compared to the changes in instructor/researcher posture.

Of the 78 total observation points (one singer was removed due to lack of memorization of the sung phrase), singer posture changes corresponded with instructor posture changes 27 times (34.62%). Of those 27 measurements, 15 (55.56%) occurred during standing conditions and 12 (44.44%) occurred during seated conditions. Singer posture changes that were opposite instructor posture changes occurred 27 times (34.62%). Singers were rated to have the same posture in 24 (30.77%) comparisons, even though the instructor/researcher had changed his posture in the comparison. Therefore, in 51 of the 78 observation points (65.38%), singer posture changes did not correspond to instructor/researcher posture changes.

### Demographic similarities

Six participants had posture changes that corresponded to the instructor/researcher during both comparisons. These participants were equally ( $n=3$ ) male and female ( $n=3$ ). One

participant was 18 to 19 years old and two were in their 20s. The remaining three were in their 40s, 50s, and above 60 years old, respectively. One participant had never taken voice lessons, one had taken a year, one had taken three years, two had taken five years, and one had taken eight years. All six of the participants had six or more years of choral singing experience. The perspective taking scores of the participants were an average of 21.17 out of a possible 28 points. The mean score rated slightly higher than that of the remainder of the sample (20.30).

### **Discussion and Conclusion**

#### **Primary finding**

The primary finding of this study is that there were no perceived effects of instructor posture changes on the posture changes of individual singers. Participant posture changes were opposite the instructor/researcher postural changes the same number of times that they were alike. In addition, there did not seem to be a common thread between the six participants whose postural changes corresponded to the instructor/researcher postural changes. There appeared to be a random distribution of sex, age, and voice experience. The one area that was consistent was that all six of the participants reported at least six years of choral experience. However, because 77.50% of the overall sample fell into this category, the finding could easily have been a chance occurrence.

The mean perspective taking score of the six participants was slightly higher than that of the sample. However, the six participant scores appeared to be randomly distributed. In fact, of the six participants, an equal number scored below the group average of 20.30 as scored above it. One of the six participants received the highest possible score (28 points), which could account for the slightly higher mean.

#### **Future Considerations**

Despite the lack of significant mimicry in this study, previous studies have clearly demonstrated a tendency for humans to mimic others. Therefore, this study could help to identify some exceptions or possible inhibitors in human mimicry with respect to a music instructional setting.

This experiment was naturalistic insofar as it involved live interaction between the instructor/researcher and the participant. It remained, however, a relatively short interaction (approximately five minutes). The duration allowed for a “user-friendly” experiment, in which little time was required of the participants. However, the length of the procedures could have led to less of a tendency to mimic. In previous studies of mimicry, for example, participants tend to mimic more over time (Charny, 1966; LaFrance, 1979). Future studies may want to extend the time period of the study in order to test this phenomenon in a voice lesson setting. Both experimental length and naturalism could be achieved by conducting a similar experiment over several lessons in a private voice studio. Researchers could then code instructor and singer behaviour over time.

Another result of a live instructor/researcher was that consistency of the various postural conditions could not be guaranteed between participants. Thus, a limited number of comparisons were made. Future studies could employ a video of the instructor/researcher in order to provide control for this variable. However, pre-recorded instructors may not create the same human interaction and possibility for rapport that live instructors would. This choice



could compromise the naturalistic environment, and may inhibit a tendency to mimic. *En lieu* of a pre-recorded stimulus tape, the instructor could implement a reliability procedure that could assess instructor/researcher postural consistency throughout the experimental process, thus allowing for more data comparisons.

There is also evidence in previous research that certain factors function as mimicry inhibitors. In particular, van Baaren, Maddux, Chartrand, De Bouter, & Van Knippenberg (2003) conducted an experiment in which participants were primed for “self construal,” or self-focus. Participants were less likely to mimic face rubbing or foot shaking of confederates when they were primed for self-focus. Because of the conditions of this study (for example, APM connection, location of instructor/researcher), participants may have been self-conscious during their singing. This self-focus was perhaps especially true for those singers who were not previously acquainted with the instructor/researcher. Such a focus may have led to less mimicry. While the comfort level of the singer was heavily considered in this study, it may still have been a factor. Future research must consider singer comfort as a factor.

Finally, 97.50% ( $n=39$ ) of the participants in this study had previous choral experience. As a result, they entered the study with established techniques and habits. It is possible that these techniques and habits simply overrode any tendency to mimic. If true, this finding may be good news for music instructors. It is possible that the technical habits encouraged by an instructor may take precedence over his or her posture in a voice lesson setting. Future studies can control for previous technical experience by adding a portion of inexperienced participants to the sample.

The growing body of research in social sciences consistently suggests that humans mimic others in certain social situations. As a result, music instructors may be unintentionally giving unwanted nonverbal signals to individual singers. This study did not reveal any mimicry. However, more study must be done in order to provide evidence-based data to determine when mimicry might be more or less likely to occur in a music setting.

## References

- Berger, S. M. & Hadley, S. W. (1975). Some effects of a model's performance on an observer's electromyographic activity. *American Journal of Psychology*, 88, 263-276.
- Chartrand, T. L. & Bargh, J. A. (1999). The chameleon effect: The perception-behavior link and social interaction. *Journal of Personality and Social Psychology*, 76, 893-910.
- Chartrand, T. L., Maddux, W. W., & Lakin, J. L. (2005). Beyond the perception-behavior link: The ubiquitous utility and motivational moderators of nonconscious mimicry. In R. R. Hassin, J. S. Uleman, & J. A. Bargh (Eds.), *The new unconscious* (pp. 334-361). New York, NY: Oxford.
- Charny, E. J. (1964). Psychosomatic manifestations of rapport in psychotherapy. *Psychosomatic medicine*, 28, 305-315.
- Cook-Koenig, C. (1995). Vocal fatigue in choral singing: Causes and suggestions for prevention voiced by prominent choral directors (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (AAT 9526487).
- Daugherty, J. F. & Brunkan, M. C. (2009, July). *The effect of conductor lip rounding on individual singers' lip postures during sung Latin /u/ vowels: Preliminary findings*. Presented at the International Phenomenon of Singing Symposium, St. John's, NL, Canada.
- Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44, 113-126.

- Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. *JSAS Catalog of Selected Documents in Psychology*, 10, 85.
- Di Pellegrino, G., Fadiga, L., Fogassi, L., Gallese, V., & Rizzolatti, G. (1992). Understanding motor events: a neurophysiological study [Abstract]. *Experimental Brain Research*, 91, 176-180.
- Dimberg, U. (1990). Facial electromyography and emotional reactions. *Psychophysiology*, 27, 481-494.
- Dimberg, U. & Thunberg, M. (1998). Rapid facial reactions to emotional facial expressions. *Scandinavian Journal of Psychology*, 39, 39-45.
- Dimberg, U., Thunberg, M., & Elmehed, K. (2000). Unconscious facial reactions to emotional facial expressions. *Psychological Science*, 11, 86-89.
- Eichenberger, R. B. (Producer), & Dunn, M. (Director). (1994). *What they see is what you get* [Motion Picture]. North Carolina: Hinshaw.
- Fadiga, L., Fogassi, L., Pavesi, G., & Rizzolatti, G. (1995). Motor facilitation during action observation: A magnetic stimulation study. *Journal of Neurophysiology*, 73, 2608-2611.
- Fuelberth, R. J. V. (2004). The effect of various left hand conducting gestures on perceptions of anticipated vocal tension in singers. *International Journal of Research in Choral Singing*, 2, 27-38.
- Fuelberth, R. J. V. (2003a). The effect of conducting gesture on singers' perceptions of inappropriate vocal tension. *International Journal of Research in Choral Singing*, 1, 13-21.
- Fuelberth, R. J. V. (2003b). The effect of left hand conducting gesture on inappropriate vocal tension in individual singers. *Bulletin of the Council for Research in Music Education*, 157, 62-70.
- Iacoboni, M. (2008). *Mirroring people*. New York, NY: Farrar, Straus, and Giroux.
- Kilner, J. M., Paulignan, Y., & Blakemore, S. J. (2003). An interference effect of observed biological movement on action. *Current Biology*, 13, 522-525.
- LaFrance, M. (1979). Nonverbal synchrony and rapport: Analysis by the cross-lag panel technique. *Social Psychology Quarterly*, 42, 66-70.
- LaFrance, M. & Broadbent, M. (1976). Group rapport: Posture sharing as a nonverbal indicator. *Group and Organization Studies*, 1, 328-333.
- Lakin, J. L. & Chartrand, T. L. (2003). Using nonconscious behavioral mimicry to create affiliation and rapport. *Psychological Science*, 14, 334-339.
- Manternach, J. N. (2009). The effect of conductor head and shoulder movement and preparatory gesture direction on upper body movement of individual singers (Master's thesis). Retrieved from ProQuest Dissertations and Theses database. (AAT 1465037).
- Mehrabian, A. (1971). *Silent messages*. Belmont, California: Wadsworth.
- Van Baaren, R. B., Maddux, W. W., Chartrand, T. L., De Bouter, C., & Van Knippenberg, A. (2003). It takes two to mimic: Behavioral consequences of self-construals. *Journal of Personality and Social Psychology*, 84, 1093-1102.
- Watkins, K. E., Strafella, A. P., & Paus, T. (2003). Seeing and hearing speech excites the motor system involved in speech production. *Neuropsychologia*, 41, 989-994.