

## The Effect of Vocal Training Methods on Improving Turkish Accent Defects

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### Abstract

*Problem Statement:* Despite analyses of how vocal training methods can correct or improve Turkish-language accent defects, for most voice educators, the most important methods continue to be breathe management control and correct vocalization exercises. We therefore sought to demonstrate the relationship of song lyrics to breathe control, accent defects, and good diction.

*Propose of Study:* The aim of the study was to promote best practices in order to enhance students' speech in a university music department in Turkey. To that end, we administered vocal training in a group of 12 first-year student volunteers in the department. We recorded and evaluated differences in accent defects both prior to and subsequent to vocal training.

*Methods:* The sample included 12 first-year students in the Music Department of the Fine Arts Faculty at Erciyes University. We determined pre- and post-test results by using the same oral readings ("Minnelied," meaning 'Mutluluk Sarkisi' in Turkish). Prior to the study, the students read song lyrics chosen by voice education specialists and that were translated and adapted into Turkish. We performed testing with the *Vitalograph Alpha Model 6000 portable spirometer*, which we used to analyze the parameters of forced vital capacity, forced

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expiration volume during the first second, and vital capacity, as well as *PRAAT vocal analysis*. Afterward, the students read the text again, and we collected pre-and post-analysis data by using *PRAAT vocal analysis*. We analyzed accent defects in the words “insan,” “ormanda,” “gezerken,” “guzel,” “oter,” and “kopardigin” for intensity, intensity in air, amplitude, and pitch.

*Findings and Results:* Following voice training, FEV1 ( $p < .05$ ) increased significantly, whereas vital capacity and forced vital capacity did not change significantly. Vocal analysis revealed that the amplitude of the words “insan,” “ormanda,” “gezerken,” “guzel,” “oter,” and “kopardigin” ( $p < .05$ ) increased significantly. For the words “ormanda” and “gezerken,” intensity ( $p < .05$  and  $p < .001$ ) increased significantly, as did intensity in air ( $p < .05$ ) for “guzel,” “oter” and “kopardigin.”

*Conclusion and Recommendation:* Students’ voice lessons in the Music Department can benefit from vocal training methods that significantly improve accent defects and expressions, as well as assist in breath management. This methodology ultimately promoted the correct expression of Turkish words.

*Keywords:* PRAAT, individual voice education, prosody problems.

## Introduction

The aims of voice education are threefold: to assist with speech correction (i.e., articulation, phonation and breath usage), to provide instruction on self-expression, and to guide in singing professionally, or in Italian opera terminology, to master *bel canto*, or ‘beautiful singing’.

Especially designed to perfect language and lyrical articulation (Evren, 2013), voice education also includes correcting body posture and refining breathing techniques. For professional singing, singers need limpid diction (i.e., good articulation and phonation) and efficient breath control, with the proper use of abdominal muscles and the diaphragm. To optimize breath and voice control, singers need to perform intonation exercises that include vocalizations and vocal exercises with only vowels or consonants (Sabar, 2008), generally with piano accompaniment.

For singers, *intonation* refers to fluctuation in vowel vibration. In the Turkish language, fluctuation encompasses resonance, pitch contour, and intonation guidance. Unlike singing, reciting a melody involves natural vowel intonation that results in ascending and descending vowel differences (Vural, 2005). Intonation correlates directly with accent, articulation, and breath management. In some studies, audiologists generate findings that allow the measure of accent parameters only, since accent relates to duration, intensity, amplitude, and pitch. Technically, all of those parameters are measurable with *Praat vocal analysis* (Boersma, 2012; Kilic, 2011).

Correlating such results with phonology, Vural (2005) deduced that, in phonology, the vowel that vibrates most prominently in a sentence is accented. He moreover demonstrated that a voice accent appears as a periodic waveform, whereas non-accented vowels do not stimulate such waveforms, because accented syllables produce more breath and intensity. Arguably, then, the three primary elements of accent are vowel intensity, amplitude, and duration.

Music intonation involves *prosody*, which Arel (1997), defines as having two meanings, both from ancient Greek music. The first relates to musical instruments, whereas in the second, special accentuated syllables from spoken voice pitch variations together constitute music and lyrical relevance. Lyrics and music share few common parameters when realized orally or with instruments. In reading aloud, speakers need to supply prosodic variation, including word stress, emphasis, sentence intonation, and tempo, that is barely, if at all, apparent in any given text. Constructing those prosodic parameters in reading benefits from punctuation parameters and similar graphic devices, which constitutes an interesting but rather neglected question in language production research addressed so far by only a fringe group of researchers known as pausologists (O'Connell, 1988).

Speech therapy traditionally situates voice production in an educational context in which the voice is studied perceptually, acoustically, and physiologically. Perceptually, the voice consists of three basic components—pitch, volume, and timbre—that are vital to developing a good, functional voice, usually described as having a pleasant vocal quality, adequate pitch and volume, and flexibility. A good voice should vary in pitch and volume and adapt to various situations (Bele, 2008).

Given all of the above, we designed this study to demonstrate the use of vocal training methods to eliminate accent defects in Turkish. We administered vocal training to a group of students in a university music department in Kayseri, Turkey, using the *Vitalograph Alpha Model 6000 portable spirometer* to analyze the parameters VC, FVC, and FEV1, supported by *Praat vocal analysis*.

#### *Purpose of the Study*

The purpose of this study was to ascertain how programmed vocal training can developmentally affect accent defects in a student sample.

#### *Hypothesis*

Voice educators doesn't know the relationship with the breath exercises and accented the consonants. Generally voice educators have known the relationship with the speech quality and auditory processing. However some of the voice educators emphasis the correction of the song lyrics, some of the voice educators do not emphasis the correction of the song lyrics. And researchers have observed the direct relationship with the song lyrics and breath control, accent defects and correction of the intonation (auditory processing and speech quality) also. Eventually the research hypothesis is the direct relationship with the song lyrics and breath control, accent defects and correction of the intonation.

*The Question's Related with the Hypothesis*

In training, singers essentially need to learn breath usage and management, relaxation techniques for the jaw, tongue, and lip movements, and how to use consonants and vowels correctly by way of voice education and elocution lessons.

If vocalists have good diction, then they will also have efficient breath usage control to express consonants and vowels efficiently and be able to relax and adapt their jaw for tongue and lip movements.

If there is a direct correlation between prosody studies in voice education and oral intonation studies, then voice training can teach people to use adequate pitch levels, to speak with less intensity, and to avoid voice musculature during speech.

## Method

*Research Design*

Although voice educators emphasize breath usage control and vocalization in individual voice lessons, knowledge about the relationship among breath usage, control in consonant expression, and accent defects remains scarce. In general, voice educators recognize a direct relationship between oral reading studies and prosody studies, yet only a fraction have emphasized lyrics. In fact, researchers have observed that the most important topics for most voice educators are breath management control and correct vocalization. In response, we sought to show how lyrics relate to breathe control, accent defects, and good diction.

*Research Sample*

Twelve student volunteers in the Music Department of the Fine Arts Faculty at Erciyes University in Kayseri, Turkey, participated in the study. We determined pre- and post-test results by using the same oral readings ("Minnelied," meaning 'Mutluluk Sarkısı' in Turkish). Prior to the study, the students read song lyrics chosen by voice education specialists and that were translated and adapted into Turkish. We analyzed accent defects in the words "insan," "ormanda," "gezerken," "guzel," "oter," and "kopardığın" for intensity, intensity in air, amplitude, and pitch.

*Research Instrument and Procedure*

Researchers recorded participants' voices using a microphone in an isolated room in the Fine Arts Faculty with Goldwave sound editor (version 5.69) and analyzed them with Praat vocal analysis software both before and after vocal training instruction exercises performed regularly over a 2.5-month period in 1-h sessions with two participants each. We tested participants' respiratory volumes and capacities using a Vitalograph Alpha Model 6000 portable spirometer before and after the programmed vocal training exercises in terms of forced vital capacity (FVC), forced expiration volume during the first second (FEV1), and vital capacity (VC).

### Data Analyze

Researchers evaluated results using the Statistical Package for the Social Sciences version 18.0, normalization using Shapiro tests, and comparisons of pre- and post-test significance using Mann-Whitney *U*-tests. We set significance at  $p < .001$  and  $p < .05$ .

### Validity and Reliability

Before experiments commenced, phoniatrists clinically observed participants to identify any pathological problems regarding their vocal tracts. A phoniatrists familiar with the voice analysis program recommended measureable parameters.

## Results

After the voice training the *FEV1* (c) ( $p < 0.05$ ) increased significantly whereas the *VC* (a) and *FVC* (b) did not change thus revealing that *FVC* had ascended however the volume of the expiration was prolonged in the first seconds.

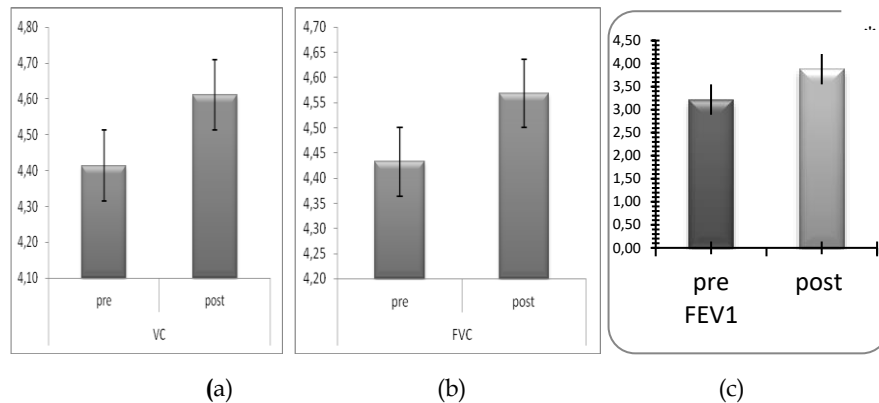


Figure 1. Respiratory volume and capacity changes before and after a programmed vocal training

(a): VC (Vital Capacity), (b): FVC: Forced Vital Capacity, (c): FEV1 (Forced Expiration Volume 1<sup>st</sup> sec) \*:  $p < 0.05$

When we compared the vocal analysis results after the conclusion the vocal training it was found that: *Amplitude* increased significantly for all 6 words, *Intensity* increased significantly for the "ormanda" and "gezerken" words. Intensity in air increased significantly for the "guzel", "oter", "kopardıgun" words and *duration* increased significantly only for the "guzel" word.

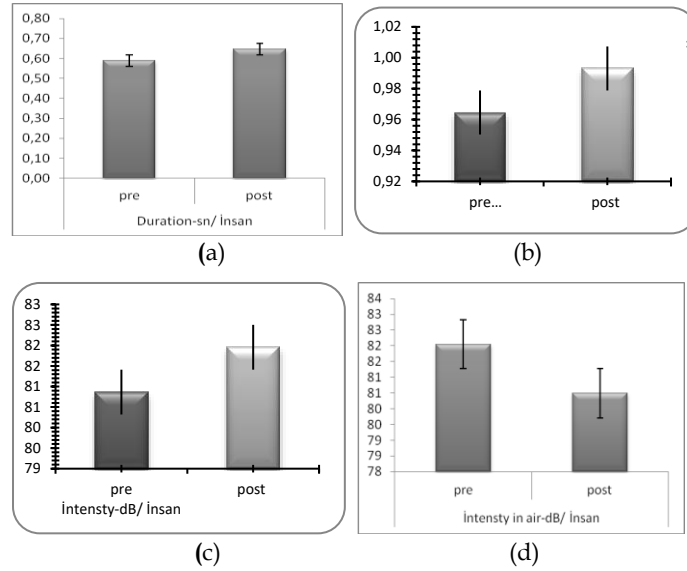


Figure 2. The duration (a), amplitude (b), intensity (c), intensity in air alterations after a programmed vocal training obtained from the “insan” word. \*:  $p < 0.05$

When we compared the vocal analysis results after the vocal training had been concluded, it was found that for the “insan” word only the amplitude ( $p < 0.05$ ) increased significantly whereas the duration, intensity and intensity in air had not changed.

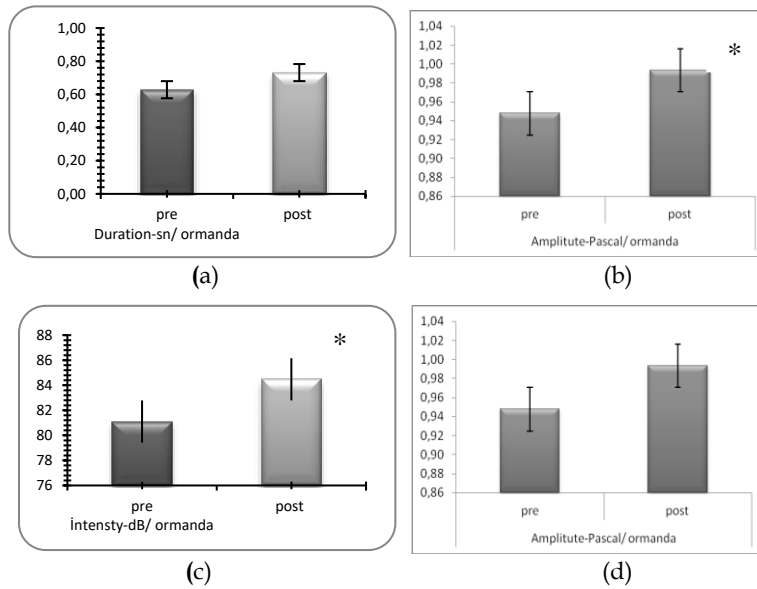


Figure 3. The duration (a), amplitude (b), intensity (c), intensity in air alterations after a programmed vocal training obtained from the “ormanda” word. \*:  $p < 0.001$

In relation to the words "ormanda", the intensity ( $p < 0.001$ ) and amplitude ( $p < 0.001$ ), increased significantly whereas the duration and intensity in air did not change.

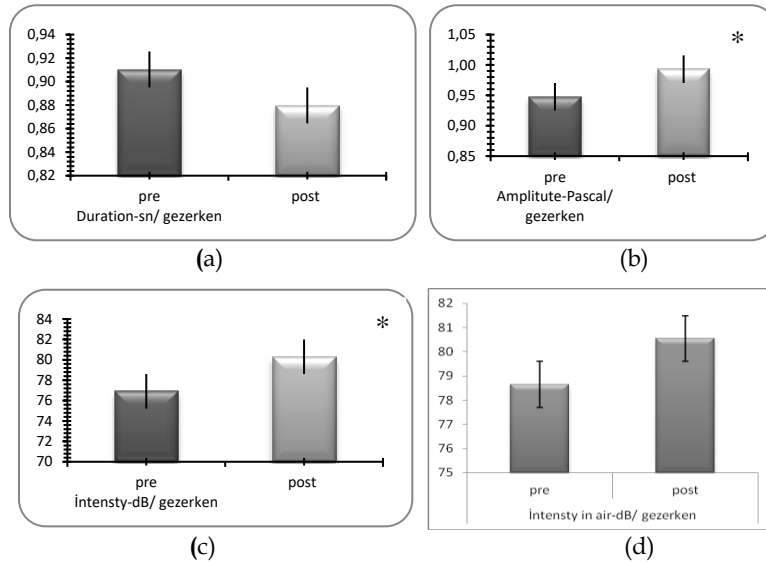


Figure 4. The duration (a), amplitude (b), intensity (c), intensity in air alterations after a programmed vocal training obtained from the "gezerken" word.\*:  $p < 0.001$

For the word "gezerken" the intensity ( $p < 0.001$ ) and amplitude ( $p < 0.001$ ), increased significantly whereas the duration and intensity in air did not change.

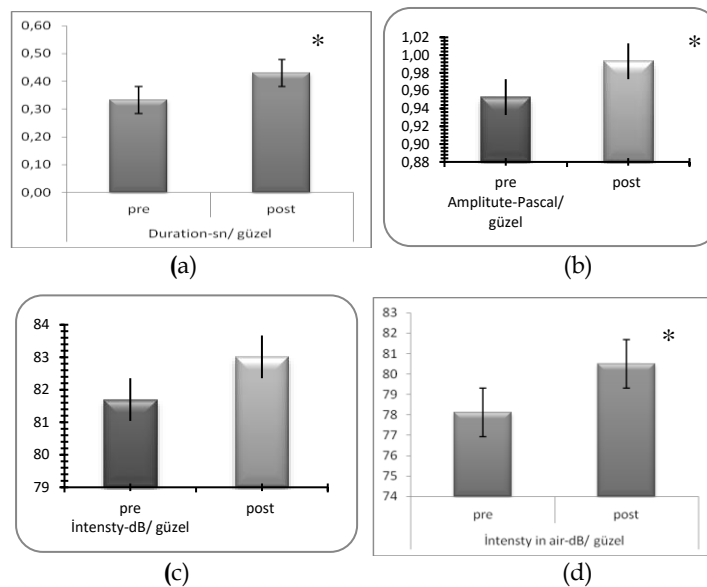


Figure 5. The duration (a), amplitude (b), intensity (c), intensity in air alterations after a programmed vocal training obtained from the "güzel" word.\*:  $p < 0.001$ , \*\*:  $p < 0.05$

Turning next to the word “*guzel*” the *duration* and *amplitude* ( $p < 0.001$ ), *intensity in air* ( $p < 0.05$ ) increased significantly whereas the *intensity* did not change.

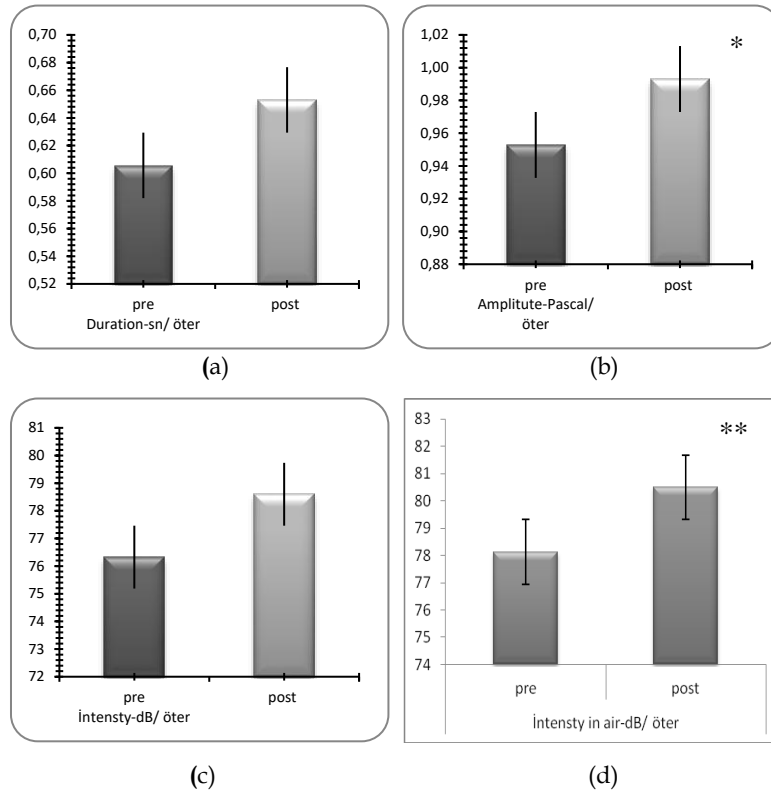


Figure 6. The duration (a), amplitude (b), intensity (c), intensity in air alterations after a programmed vocal training obtained from the “*oter*” word. \*:  $p < 0.001$ , \*\*:  $p < 0.05$

The “*oter*” word showed that the *amplitude* ( $p < 0.001$ ) and *intensity in air* ( $p < 0.05$ ) increased significantly whereas the *duration* and *intensity* did not change.



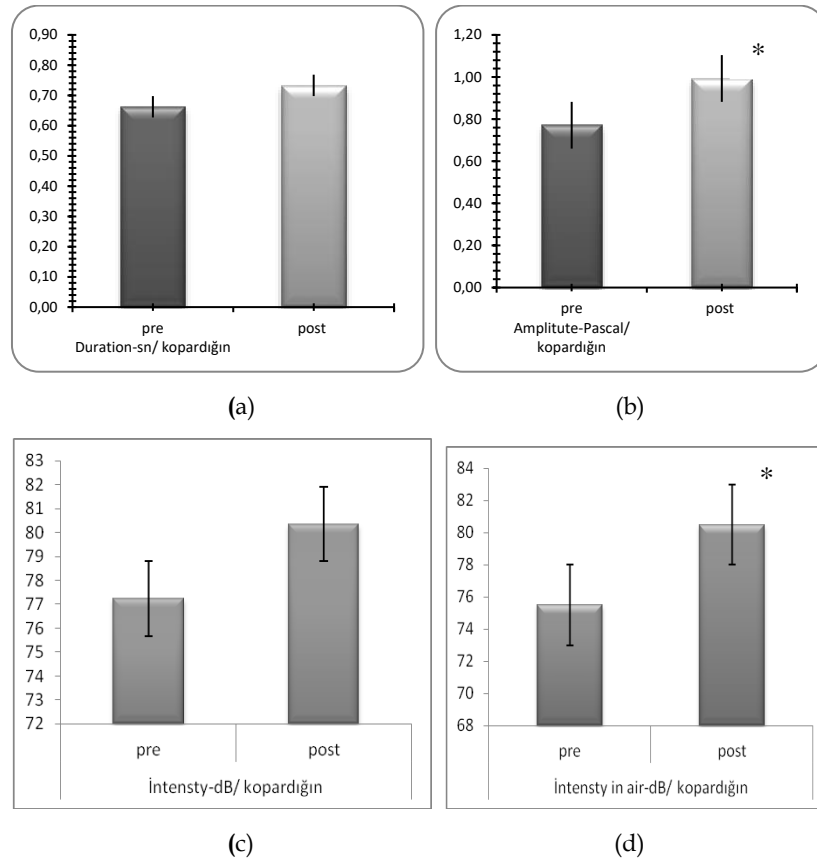


Figure 7. The duration (a), amplitude (b), intensity (c), intensity in air alterations after a programmed vocal training obtained from the “kopardığın” word.\*:  $p < 0.001$

The results relating to the “kopardığın” word indicated that the *amplitude* ( $p < 0.001$ ) and *intensity in air* ( $p < 0.001$ ) increased significantly whereas the *duration* and *intensity* did not change.

### Discussion and Conclusion

Generally, *prosody* refers to the melody and rhythm of speech. Dysfunctional *prosody*, or *dysprosody*, exhibits alterations in *speech intensity*, *the timing of utterance segments*, *rhythm cadency*, and *intonation of words* (Ross, Edmondson & Burton Seibert, 1986; Turkbay & Conguoglu, 2007). *Prosody* also involves a process used to alter the

meaning (i.e., linguistic prosody) or emotional force (i.e., affective prosody) of a sentence. The components of prosody are rhythm, pitch, tone, and stress, all articulated by modulating the acoustic correlates of prosody: frequency, duration, and amplitude (Colin, Fitzsimons, Asenbauer & Staunton, 1999).

The study of vocal skill development provides teachers with strategies to enhance auditory processing and speech quality. Auditory processing enables individuals to perceive and produce distinct phonemes, inflections, and pitches and to sense the duration of sounds in language and music, all of which functions contribute to literacy (O'Herron, 2007). Indeed, research has revealed a link between musical perception and reading ability (Barwick, Valintine, Robert, & Wilding, 1989). Oral fluency includes prosody and the ability to put words together into natural speech rhythms in terms of intonation, inflection, and flow, while auditory perception relates to learning both music and language. Prosody also entails descending and ascending temporal measurement according to the musical vocal composition (Albuz, 1997). More broadly, *prosody* encompasses a range of features in speech and language, including pitch, volume, tempo, and rhythm (Cruttenden, 1997), which suggests that prosody moreover relates to duration, pitch, and vowel intensity.

The sound of spoken language involves the rise and fall of pitch as well as flow of time in speech, which in music are known as melody and rhythm, respectively (Pearl, 2004). Unlike in the English language, which is non-tonal, in some languages intonation changes meaning or expression, if not both. In fact, more than half of the world's population speaks tonal languages, including Mandarin and Thai, in which speaking with short intonation contours affects the meaning of words (Ross, 1986). In Turkish, also a tonal language, word placement is also important for pronouncing accents and is a component of intonation. In Turkish sentences, accentuated words tend to appear next to the verb, and melodic words and suprasegmental or prosodic features are subject to accent, intonation, caesura, and full stops. A word or sentence's intensity peak exhibits special features in Turkish, in which initial syllables have some intensity, middle ones far more intensity, and final ones the most intensity. However, accent placement changes vary depending on a particular word's function. For example, accent placement changes and is emphasized on the first syllable in adverbs and exclamations (Banguoglu, 1990).

Intonated words and sentences with fluctuating vocal pitches can reflect different meanings in Turkish. Sometimes, only one word or a sentence with an alternative intonation can express far more meaning and emotion (Banguoglu, 1990). As such, intonation and accent correlate in Turkish and are even inseparable. In both of two types of speaking—namely, tonal speaking and non-tonal speaking—this difference is relates directly with accent. Non-intonation does not involve a scope to improve accent efficiency. However, in the tonal language of Turkish, it is possible to change intonation by way of voice education. In traditional speech therapy, vocal production is situated in a special educational context, in which the voice can be studied perceptually, acoustically, and physiologically. Perceptually, the voice consists of three basic components—pitch, volume or intensity, and timber (Bele, 2008)—and the term *prosody*, or the melody and rhythm of speech, commonly refers

to a range of features in speech and language, including pitch, volume, tempo, and rhythm (Cruttenden, 1997).

Our study demonstrates that Turkish is a tonal language whose speakers can improve intonation by way of vocal education. However, our study suffered from the brevity of participants' vocal exercises and breathe management assignments. If the training program had been prolonged, then the accent defects might have improved even more significantly. Furthermore, participants' performances were limited in reading the text with intonation together with the musical melody. As a result, they focused more heavily on musical melody intonation (Aycan, 2012), as did a group of students selected randomly from Erciyes University's third-year classes in Turkish teaching. In our study, *Ataturk's Oration for Turkish Youth was the oral text chosen by speaking education instructors from the university's Faculty of Turkish Education. We chose one passage ("Birinci vazifen Türk İstiklalini, Türk cumhuriyetini ilebet muhafaza ve müdafaa etmektir. Mevcudiyetinin ve İstikbalinin yegane temeli budur")* and seven words from it – "Turk," "vazifen," "mevcudiyetinin," "istiklalini," "istikbalinin," "muhafaza," and "mudafaa" – all of which contain the vowel i, e, a, u, and ü, which we analyzed using PRAAT.

At post-test, the prosodic parameters of duration, intensity, and amplitude had significantly improved. However, the sample had little musical ability and had never played any musical instruments. Compared to the group with musical ability, the non-musical sample benefited from the techniques employed.

In sum, first-year students in the Music Department participated in programmed vocal training so that we could investigate potential improvements in their respiratory capacities and accent problems. The programmed training lasting 2.5 months significantly changed their respiratory capacities (e.g., FEV1), which shows that they began to be able to control their breath while speaking or reading. Furthermore, their vocal quality improved in terms of intensity, intensity in air, amplitude, and duration. With the aim to promote best practices in order to enhance students' speech, our study marks the first on programmed vocal training that has shown an improvement in participants' accent problems, evidenced by respiratory and vocal analysis.

We conclude that the vocal training methods applied can significantly improve students' accent defects, accent expressions, and breath management and can ultimately promote the correct expression of Turkish words.

In conclusion, The Music Department 1<sup>st</sup> year class students took part in programmed voice training and improvements for their respiratory capacities and accent problems as an investigative study. A programmed vocal training exercise for 2.5 months significantly changed their respiratory capacities eg FEV1 reflecting that they started to be able to control their breath while speaking or reading. Furthermore, their voice qualifications also improved by testing: *intensity, intensity in air, amplitude and duration*. The aim of the study was to promote best practice to enhance the Music Department student's speech. This study is believed to be the first known study on programmed vocal training showing the improvement of the accent

problems evidenced by using respiratory and vocal analysis on the Music Department's students.

It was concluded from this study that when students have voice lessons in the Fine Arts Faculty Music Department, such vocal training methods significantly improve accent defects and such methodology proved to be helpful in improving accent expressions as well as assisting breath management. This methodology ultimately lead to the correct expression of Turkish words.

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## Türkçe'de Vurgu Kusurlarının Düzeltilmesinde Ses Eğitimi Yöntemlerinin Etkisi

### Atıf:

Aycan, K., Evren, F. G. (2016). The effect of vocal training methods to improve Turkish accent defects through individual voice student lessons. *Eurasian Journal of Educational Research*, 66, 299-314

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### Özet

**Problem Durumu:** Bu çalışma ses eğitimi yöntemleriyle Türkçe vurgu kusurlarındaki düzeltilmeleri veya iyileşmeleri değerlendirmek üzere kurgulanmıştır. Araştırmacılar bu amaç çerçevesinde en önemli problemin sadece nefes kontrolü çalışmaları ve ses egzersizlerinin birçok ses eğitimcisi tarafından önemsenmesi olduğunu gözlemlemişlerdir. Bu sebeple bu çalışmada müzik bestelerinin sözleri ile nefes kontrolü çalışmaları, vurgu kusurları ve doğru konuşma eğitimi arasındaki doğrudan ilişki gösterilmeye çalışılmıştır. Müzik bölümü öğrencileri eğer doğru konuşma alışkanlıkları kazanırlarsa ünsüzleri vurgulayarak nefeslerini etkili bir şekilde kontrol edebilirler ve ardından ünlüleri konuşarak dil ve dudaklarının esnek hareketleriyle çenelerini kullanırlar. Bunun yanında prozodi çalışmaları ile ses eğitimi ve tonlayarak metin okuma çalışmaları yapmak arasında direk bir ilişki vardır. Ses egzersizleri bu sebeple doğru perde üzerinde ses üretmek, bağırmadan konuşmak ve sesle ilgili kaslara konuşurken yük bindirmekten kaçınmak için yapılmaktadır. Bununla birlikte ses eğitimcileri bu durumu sağlamak için bireysel ses eğitimi çalışmalarında sadece nefes çalışmaları ve ünlü harfler üzerinde egzersizler yaptırılmaktadırlar. Ancak ses eğitimcileri nefes egzersizleri ile ünsüzlerin vurgulanması arasındaki ilişkiyi bilmemektedirler. Genel olarak ses eğitimcileri metin okuma çalışmaları ile prozodi çalışmaları (ses-söz uyumu) arasında doğrudan bir ilişki olduğunu bilmektedirler. Fakat bazı ses eğitimcisi şarkıların sözlerini konuşmaya önem verirken bazıları vermemektedir. Araştırmacılar bu sıkıntıyı gözlemlemiş şarkı sözlerinin doğru konuşulması ile nefes kontrolü, vurgu kusurları ve doğru tonlama arasındaki ilişkiyi göstermeye çalışmışlardır.

**Araştırmanın Amacı:** Bu çalışmanın yapılaş amacı ses eğitimi yöntemlerinin vurgu kusurlarına etkisinin nasıl olduğunu ortaya çıkartmak; çalışma grubunun müziksel işitme ve konuşma becerilerini geliştirecek en iyi teknikleri elde etmektir. Bu amaçla ses eğitimi çalışmaları Erciyes Üniversitesi, Güzel Sanatlar Fakültesi, Müzik Bölümü gönüllü 1.sınıf öğrencileriyle (n=12) uygulanmıştır. Öncelikle vurgu kusurları ses eğitimiyle iyileştirilmiş, ardından kaydedilmiş ve değerlendirilmiştir.

*Araştırmanın Yöntemi:* Kayıtlar 'Vitalograph Alpha, Model 6000' taşınabilir *spirometre* cihazı ve "PRAAT ses analiz programı" ile alınmıştır. Çalışmaya katılan öğrencilerle uygulanan ses eğitimi analiz etmek için ses eğitimi uzmanları tarafından seçilmiş Türkçeye çevrilip, uyarlanmış bir *lied* çalışılmıştır. Çalışmanın öncesi ve sonrasında çalışmaya katılan öğrenciler bu *lied*'in sözlerini düz metin haliyle okumuşlardır. Vurgu kusurları bu *lied*'den seçilmiş "insan", "ormanda", "gezerken", "güzel", "öter" ve "kopardığın" kelimelerinde şiddet, soluk şiddeti, genlik ve perde değerleri üzerinden PRAAT programı ile analiz edilmiştir.

*Araştırmanın Bulguları:* Ses eğitimi sonrasında taşınabilir *spirometre* cihazından elde edilen FEV1 ( $p<0.05$ ) değeri istatistiksel açıdan anlamlı bir şekilde artmış olmasına rağmen VC ve FVC değerleri anlamlı bir değişiklik göstermemiştir. Ses analizleri sonucunda ses eğitimi sonrasında Türkçeye çevrilip, uyarlanmış *lied*'den seçilmiş "insan", "ormanda", "gezerken", "güzel", "öter" ve "kopardığın" kelimelerinde genlik ( $p<0.05$ ), "Ormanda" ve "gezerken" kelimelerinde şiddet ( $p<0.05$  ve  $p<0.001$ ) anlamlı bir şekilde artış görülmüştür. Ayrıca "güzel", "öter" ve "kopardığın" kelimelerinde soluk şiddeti ( $p<0.05$ ) istatistiksel açıdan anlamlı bir şekilde artmıştır.

*Araştırmanın Sonuç ve Önerileri:* Aycan (2012) yaptığı benzer bir çalışmada rastgele seçilen Erciyes Üniversitesi, Eğitim Fakültesi, 3. Sınıf Türkçe Öğretmenliği öğrencileri katılmıştır. Bu çalışmada konuşma eğitimi dersi uzmanları tarafından "Atatürk'ün Gençliğe Hitabesi" nden bir paragraf: "Birinci vazifen Türk İstiklalini, Türk cumhuriyetini ilelebet muhafaza ve müdafaa etmektir. Mevcudiyetinin ve İstikbalinin yegâne temeli budur" seçilmiş ve "i, e, a, u, u" ünlülerini içeren 5 kelime: "Türk, vazifen, mevcudiyetinin, istiklalini, istikbalinin, muhafaza, müdafaa" seçilip PRAAT programıyla analiz etmiştir. Çalışma sonucunda ses eğitimi uzmanları tarafından seçilmiş unlu ve ünsüzlerden oluşan ses egzersizleri ve okuma parçalarındaki tonlama çalışmaları *prozodik* parametreler (*sure, şiddet ve genlik*) istatistiksel açıdan anlamlı çıkmıştır. Bununla birlikte çalışma grubundaki öğrenciler önceden hiçbir müzik enstrümanı çalmamış ve yeterli müzik kabiliyeti gösterememiştir. Bu çalışmadaki müzik kabiliyeti olmayan grupla hâlihazırda çalışılan müzik yeteneği olan gruptaki öğrencilerin durumları *prozodik parametreler* üzerinden karşılaştırıldığında uygulanan tekniklerin müzik kabiliyeti olmayan grupta daha başarılı olduğu görülmektedir. *Prozodi* üzerine yapılan çalışmalar ve tartışmalar Türkçe'nin bir ton dili olduğunu, ses eğitiminin tonlamayı değiştirebileceğini ya da iyileştirebileceğini göstermektedir. Bununla birlikte bu çalışma öğrencilerin ses egzersizleri ve soluk çalışmalarını yeterince çalışmamalarından olumsuz yönde etkilenmiştir. Eğer bu ses eğitimi çalışmaları daha uzun süre yapılırsa vurgu kusurlarının daha da anlamlı şekilde düzeleceği beklenmektedir. Bunun yanında çalışmaya katılan öğrencilerin algıları tonlayarak metin okuma konusunda sınırlıdır. Başka bir deyişle öğrenciler sadece müzikal açıdan tonlamayı önemsemektedirler. 2.5 aylık surede solunum kapasiteleri (örneğin FEV1 değerinde) istatistiksel açıdan anlamlı bir şekilde değişmiştir. Dolayısıyla çalışmaya katılan öğrenciler konuşup, şarkı söylerken soluklarını kontrol edebilmeye başlamışlardır. Ayrıca çalışmaya katılan öğrencilerin ses kaliteleri: "sesin şiddeti, soluk şiddeti, genliği ve suresi" değişmiştir. Sonuç olarak bu yöntem Türkçe kelimelerin doğru ifade edilmesinde yol gösterici olmuştur. Müzik Bölümü

öğrencilerinin vurgu kusurlarını ne düzeyde iyileştirdiğini ve bunu ses ve soluk kullanımı analizleriyle de göstermesi sebebiyle de öncül bir çalışma olacağına inanılmaktadır.

*Anahtar Sözcükler:* PRAAT, bireysel ses eğitimi, prozodik problemler.