

## CSD Faculty Research 2005-2006

**Altmann, L.J., & Kemper, S. (2006).** Effects of age, animacy and activation order on sentence production. *Language and Cognitive Process*. 21, 322-354.

The current study examines whether young and older adults have similar preferences for animate-subject and active sentences, and for using the order of activation of a verb's arguments to determine sentence structure. Ninety-six participants produced sentences in response to three-word stimuli that included a verb and two nouns differing in animacy. Dependent variables included accuracy, sentence structure produced, and production times for active vs. passive sentences. Neither group shows a strict preference for active sentences, but the two groups are differentially sensitive to animacy and the order of noun activation. Results suggest that sentence structure choice is a probabilistic, constraint-satisfaction process during which these factors interact.

**Altmann L.J., Saleem A, Kendall D., Heilman K.M., Rothi L.J. (2006).** Orthographic directionality and thematic role illustration in English and Arabic. *Brain and Language*. 97, 3, 306-316.

This study tested the hypotheses that people had a bias for drawing agents on the left of a picture when given a verb stimulus targeting an active or passive event (e.g., "kicked" or "is kicked") and that orthographic directionality would influence the way events were illustrated. Monolingual English speakers, who read and write left-to-right, and Arabic speakers, who read and write right-to-left, drew agents and patients in response to verb stimuli. We found no significant orthographic directionality effects and no preference for positioning agents on the left of pictures in either group or sentence type. Instead, participants drew agents on the right regardless of language or sentence type, and this was exaggerated in English speakers illustrating passive verbs. These findings support the existence of a preference for placing agents in the right hemispace that may result from asymmetrical hemispheric (i.e., left>right) activation induced by language processing. Our results are consistent with findings that people prefer pictures in which focus is on the right, a preference strongest in pictures with no implicit directionality of movement. This suggests that the methodology of the current study encouraged a static rather than dynamic interpretation of the verb in most participants.

**Mendes, A.P., Brown, W.S., Jr., Rothman, H.B., Sapienza C. (2004).** Effects of singing training on the speaking voice of voice majors. *Journal of Voice*. 18, 1, 83-89.

This longitudinal study gathered data with regard to the question: Does singing training have an effect on the speaking voice? Fourteen voice majors (12 females and two males; age range 17 to 20 years) were recorded once a semester for four consecutive semesters, while sustaining vowels and reading the "Rainbow Passage." Acoustic measures included speaking fundamental frequency (SFF) and sound pressure level (SLP). Perturbation measures included jitter, shimmer, and harmonic-to-noise ratio. Temporal measures included sentence, consonant, and diphthong durations. Results revealed that, as the number of semesters increased, the SFF increased while jitter and shimmer slightly decreased.

Repeated measure analysis, however, indicated that none of the acoustic, temporal, or perturbation differences was statistically significant. These results confirm earlier cross-sectional studies that compared singers with nonsingers, in that singing training mostly affects the singing voice and rarely the speaking voice.

Mendes, A.P., **Brown, W.S., Sapienza, C., Rothman, H.B.** (2006). Effects of vocal training on respiratory kinematics during singing tasks. *Folia Phoniatrica, Logopedica*. 58, 5, 263-377.

This longitudinal study determined the effects of vocal training (VT) on respiratory kinematics and muscle activity during singing tasks. Four voice students, 3 females and 1 male, were recorded during singing tasks once a semester for 3 consecutive semesters. Respiratory kinematic measures included lung volume, rib cage (RCE) and abdominal excursions (ABE). Surface electromyographic measures included burst duration (BD) and peak amplitude (PA) of the pectoralis major, rectus abdominis and external oblique muscles. Descriptive statistics revealed that RCE and ABE increased from the 1st to the 2nd semester, but decreased from the 2nd to the 3rd semester of VT. Overall, mean BD decreased from the 1st to the 2nd semester and increased from the 2nd to the 3rd semester. Mean PA increased from the 1st to the 2nd semester and decreased from the 2nd to the 3rd semester of VT. RCE and muscle force generation of the above muscles increased as the demand level and the length of the phonatory tasks increased. Interpretation of the results suggests that the respiratory system is highly responsive to VT, after only 3 semesters of training.

Thompson, C.K., Kearns, K.P., & **Edmonds, L.A.** (2006). An experimental analysis of acquisition, generalization, and maintenance of naming behaviour in a patient with anomia. *Aphasiology*. 20, 12, 1226-1244.

This paper examines the effects of a cueing hierarchy on naming in a patient with anomic aphasia. Using a single-subject multiple baseline design across behaviors, the patient was trained to produce single inanimate nouns while generalization was tested to semantically related nouns matched for frequency of occurrence. Results showed successful acquisition and maintenance of trained words, but no generalization to untrained words. These data indicate that generalization does not occur as a natural by-product of successful treatment and suggest, as pointed out by Baer, Wold, and Riskey (1968), that “generalization should be programmed rather than expected or lamented.”

**Edmonds, L.A., Kiran, S. (2006).** Effect of semantic naming treatment on crosslinguistic generalization in bilingual aphasia. *Journal of Speech Language and Hearing Research.* 49, 4, 729-748.

The effect of semantic naming treatment on crosslinguistic generalization was investigated in 3 participants with English-Spanish bilingual aphasia. **METHOD:** A single-subject experimental design was used. Participants received semantic treatment to improve naming of English or Spanish items, while generalization was tested to untrained semantically related items in the trained language and translations of the trained and untrained items in the untrained language. **RESULTS:** Results demonstrated a within- and across-languages effect on generalization related to premorbid language proficiencies. Participant 1 (P1; equal premorbid proficiency across languages) showed within-language generalization in the trained language (Spanish) as well as crosslinguistic generalization to the untrained language (English). Participant 2 (P2) and Participant (P3) were more proficient premorbidly in English. With treatment in English, P2 showed within-language generalization to semantically related items, but no crosslinguistic generalization. With treatment in Spanish, both P2 and P3 exhibited no within-language generalization, but crosslinguistic generalization to English (dominant language) occurred. Error analyses indicated an evolution of errors as a consequence of treatment. **CONCLUSIONS:** These results are preliminary because all participants were not treated in both languages. However, the results suggest that training the less dominant language may be more beneficial in facilitating crosslinguistic generalization than training the more proficient language in an unbalanced bilingual individual.

**Harnsberger J.D., Shrivastav R., Brown W.S. Jr., Rothman H., Hollien H. (2006).** Speaking rate and fundamental frequency as speech cues to perceived age. *Journal of Voice.* Sep 9 (Epub ahead of print)

This study aimed to specify a set of acoustic cues fundamental to vocal aging and to establish their perceptual relevance, using acoustic analysis and perceptual testing. Three experiments were conducted to identify the perceptual correlates of the aging voice. The first experiment analyzed important voice parameters that signal a person's age for 16 older males and 14 younger males. In the second and third experiments, these acoustic patterns were systematically shifted through resynthesis to see if perceived age would be significantly influenced. In the second experiment, the older and younger male voices were resynthesized by manipulating speaking rate and fundamental frequency to shift the perceived age of the groups toward each other. In the third experiment, older and middle-aged male voices were resynthesized in a similar manner. In both perceptual studies, an age estimation task with naive listeners was used. The results of the first experiment showed that, in older speakers, sentence, word, and diphthong durations were all significantly longer and mean fundamental frequency was significantly higher than for the younger group. In the second experiment, only the manipulation of speaking rate resulted in a significant shift in perceived age, and it did so only for the older subjects. In the third experiment, a significant shift in age estimates was observed for the middle-aged, but not the older, voices when speaking rate was manipulated. The results of both perception tests

suggest that speaking rate, but possibly not fundamental frequency, is a perceptually relevant cue to age in voice.

**Johnson, B., & Fey, M.E.** (2006). Interaction of lexical and grammatical aspect in toddlers' language. *Journal of Child Language*. 33, 2, 419-435.

This study examined the effect of lexical aspect on children's imitation accuracy of English tense-aspect morphology. Thirty-five typically developing children, ages 2;4 to 3;1, imitated sentence-pairs in which the same regular verb was used once in an activity (skip on the rug) and once in an accomplishment (skip out the door). Children imitated past-imperfective morphology equally well in accomplishments and activities, but they imitated past-perfective morphology with higher accuracy in accomplishments than activities. These findings suggest that children's early morphology development is influenced by lexical aspect conveyed at the sentence level, as predicted by the PROTOTYPE HYPOTHESIS.

DeThorne, L.S., **Johnson, B.W.**, Loeb, J. (2005). A closer look at MLU: What does it really measure? *Clinical Linguistics & Phonetics*. 19, 635-648.

Despite the common use of mean length of utterance (MLU) as a diagnostic measure, what it actually reflects in terms of linguistic knowledge is relatively unclear. This study explored the extent to which variance in MLU could be accounted for by a measure of expressive vocabulary and a measure of morphosyntax in a group of 44 typically-developing children, ages 28–37 months. Regression techniques were employed to predict MLU from number of different words (NDW) and a tense accuracy composite (TAC). Depending on whether the variable was acting alone or in concert with the other, TAC accounted for 23% or none of the variance in MLU, while NDW accounted for 51% or 28%. We offer three potential explanations for the observed association between MLU and NDW, none of which necessarily precludes the others.

**Kendall, D.L.**, Rodriguez A.D., Rosenbek, J.C., Conway, T., Gonzalez Rothi, L.J. (2006). Influence of intensive phonomotor rehabilitation on apraxia of speech. *Journal of Rehabilitation Research and Development*. 43, 409-418.

In this phase I rehabilitation study, we investigated the effects of an intensive phonomotor rehabilitation program on verbal production in a 73-year-old male, 11 years postonset a left-hemisphere stroke, who exhibited apraxia of speech and aphasia. In the context of a single-subject design, we studied whether treatment would improve phoneme production and generalize to repetition of multisyllabic words, words of increasing length, discourse, and measures of self-report. We predicted that a predominant motor impairment would respond to intensive phonomotor rehabilitation. While able to learn to produce individual sounds, the subject did not exhibit generalization to other aspects of motor production. Discourse production was judged perceptually slower in rate and less effortful, but also less natural. Finally, self-report indicated less apprehension toward speaking with unfamiliar people, increased telephone use, and increased ease of communication.

**Kendall, D.L.,** Nadeau, S.E., Conway, T., Fuller, R.H, Riestra, A., Gonzalez Rothi, L.J. (2006) Treatability of different components of aphasia-Insights from a case study. *Journal of Rehabilitation Research and Development.* 43, 323-326.

In this phase I clinical rehabilitation study, we investigated the effects of phonological rehabilitation for alexia and aphasia in an individual 54 years after a left-hemisphere ischemic infarction. In the context of a single-subject design, we studied whether treatment would improve phonological processing, reading, and generalization to untreated behaviors. While results showed a lack of generalization to real-word reading aloud, improvement was present in phonological processing, language function (Western Aphasia Battery Aphasia Quotient, Boston Naming Test, Reading Comprehension Battery for Aphasia), and auditory processing (Revised Token Test). Improvement in the lexical-semantic system was attributed to informal forced-use language treatment. We concluded that phonological therapies are unlikely to be successful unless a minimum initial level of phonological sequence knowledge exists; therapies that pressure subjects to use verbal communication can achieve clinically important gains in communicative ability that generalize to untreated behaviors. This study also demonstrates the importance of a careful analysis of the patient's language ability before a therapeutic strategy is chosen.

**Kricos, P.B.** (2006). Audiologic management of older adults with hearing loss and compromised cognitive/psychoacoustic auditory processing capabilities. *Trends in Amplification.* 10, 1, 1-28.

The number and proportion of older adults in the United States population is increasing, and more clinical audiologists will be called upon to deliver hearing care to the approximately 35% to 50% of them who experience hearing difficulties. In recent years, the characteristics and sources of receptive communication difficulties in older individuals have been investigated by hearing scientists, cognitive psychologists, and audiologists. It is becoming increasingly apparent that cognitive compromises and psychoacoustic auditory processing disorders associated with aging may contribute to communication difficulties in this population. This paper presents an overview of best practices, based on our current knowledge base, for clinical management of older individuals with limitations in cognitive or psychoacoustic auditory processing capabilities, or both, that accompany aging.

Chiarello, C., **Lombardino, L.J.,** Kacinik, N.A., Otto, R., Leonard, C.M. (2006). Neuroanatomical and behavioral asymmetry in an adult compensated dyslexic. *Brain and Language.* 98, 2, 169-181.

Individual differences in cortical anatomy are readily observable, but their functional significance for behaviors such as reading is not well understood. Here, we report a case of an apparent compensated dyslexic who had attained high achievement in visuospatial mathematics. Data from a detailed background interview, psychometric testing, divided visual field tasks measuring basic word recognition (word naming, nonword naming, and lexical decision), and more controlled word retrieval (verb, category, and rhyme generation), and measurements of his atypical brain structure are described. The findings

suggested that enhanced "top-down" processing could provide the means to compensate for deficient "bottom-up" word decoding skills in this case. Relative to controls, this individual also evidenced unusually large asymmetries on several divided visual field lexical tasks, an extreme leftward asymmetry of the planum temporale, and a rare form of Sylvian fissure morphology (Steinmetz type 4, [Steinmetz, H., Ebeling, U., Huang, Y., & Kahn, T. (1990). Sulcus topography of the parietal opercular region: An anatomic and MR study. *Brain and Language*, 38, 515-533.]). We suggest that certain forms of brain organization may be associated with successful behavioral compensation for dyslexia, and that anatomical variations in the right hemisphere may be important contributors to individual differences in reading acquisition and achievement.

**Roth, H.L.** Eskin, T.A., **Kendall, D.L.**, Heilman, K.M. (2006). Progressive Oculo-Orofacial-Speech Apraxia (POOSA). *Neurocase*. 12, 4, 222-227.

A loss of speech can be related to disorders of the motor units (paresis), language deficits (aphasia), or speech programming deficits (apraxia of speech). Although apraxia of speech has been reported to be associated with degenerative diseases, we observed a patient with a unique constellation of signs that included apraxia of speech, oculo-oro-facial apraxia and a supranuclear ophthalmoplegia in the absence of extrapyramidal (Parkinsonian) signs. Post-mortem examination revealed a loss of neurons in the frontal and temporal regions, but there was also a marked loss of neurons and astrogliosis in the caudate, claustrum, globus pallidus, substantia nigra, and loss of axons in the anterior cerebral peduncles. This patient's clinical presentation and the pathological correlates suggest that he might have suffered with a distinct disorder we call progressive oculo-oro-facial-speech apraxia or POOSA

**King, W. M., Lombardino, L.L.,** Ahmed, S. (2005). Accuracy and speed of orthographic processing in persons with developmental dyslexia. *Perceptual and Motor Skills*, 101, 1, 95-107.

A group of 39 persons (20 male and 19 female, 11.0 to 32.5 yr.) with developmental dyslexia and 42 controls (21 male and 21 female, 11.2 to 32.3 years) were compared on computerized tests of sight word reading, nonword decoding, and spelling recognition. The subjects with developmental dyslexia performed significantly slower and less accurately than controls on all tasks. Further, the effect size of the group differences was larger for the older group. Within-group analyses showed a significant difference by age group on accuracy. Only the control group showed a significant age difference between groups on response time. Mean accuracy and response times for the reading-disabled subjects resembled shifted versions of the control group means. These results agree with previous reports that phonological deficits persist for reading-disabled adults and suggest a test of whether the discrepancy between reading-disabled and typically achieving readers may actually increase across age groups.

**Saleem, A.F., Sapienza, C.M.,** Okun, M.S. (2005). Respiratory muscle strength training: treatment and response duration in a patient with early idiopathic Parkinson's disease. *Neurorehabilitation*. 20, 4, 323-333.

The outcome of a 20 week expiratory muscle strength training program (EMST) is documented in a patient with early idiopathic Parkinson's disease. A pressure threshold device was utilized and training occurred in the home setting. The training was intensive with a physiologically challenging load specific to the expiratory muscles, adjusted weekly based on the participant's performance. Results indicated that strength, as indexed by the generation of maximum expiratory pressure (MEP), increased by 50% in the first 4 weeks of training, consistent with the average strength increase obtained in previous research. Strength increases continued beyond the traditional 4 weeks of training with a final improvement in MEP of 158% from baseline over the 20 weeks. When the EMST was discontinued for a period of 4 weeks, the participant's MEP decreased by 16% from the 20 week endpoint measurement. The strength training pattern of the expiratory muscles observed in this study was similar to the pattern previously reported for limb muscles.

Baker, S., Davenport, P., **Sapienza, C.** (2005). Examination of strength training and detraining effects in expiratory muscles. *Journal of Speech Language and Hearing Research*. 48, 6, 1325-1333.

The purpose of this study was to determine strength gains following expiratory muscle strength training (EMST) and to determine detraining effects when the training stimulus is removed. **METHOD:** Thirty-two healthy participants were enrolled in an EMST program. Sixteen participants trained for 4 weeks (Group 1) and 16 participants trained for 8 weeks (Group 2). All 32 participants were detrained for 8 weeks. Maximum expiratory pressure (MEP) was used to document change in expiratory muscle strength throughout the study. **RESULTS:** Group 1 had a 41% increase and Group 2 had a 51% increase in MEP following the training. Mean MEP, for both groups, was significantly greater than baseline at the end of the training period ( $p = .0001$ ), at the 4th week of detraining ( $p = .0001$ ), and at the 8th week of detraining ( $p = .0001$ ). The results also indicated that there was no significant difference in mean MEP between the groups at baseline, end of training, or throughout the detraining period ( $p = .960$ ). **DISCUSSION:** The results suggest that expiratory muscle strength gains following a 4- and 8-week EMST program do not differ significantly. Additionally, detraining rates do not appear to be dependent on length of training time.

Silverman, E.P., **Sapienza, C.M.**, Saleem, A., Carmichael, C., Davenport, P.W., Hoffman-Ruddy, B., Okun, M.S. (2005). Tutorial on maximum inspiratory and expiratory mouth pressures in individuals with idiopathic Parkinson disease (IPD) and the preliminary results of an expiratory muscle strength training program. *Neurorehabilitation*. 21, 71-79.

Respiratory symptoms are recognized as sequelae of motor dysfunction in idiopathic Parkinson's disease (IPD) and these symptoms have the potential to cause problems with swallow, cough, voice and speech. Specifically, maneuvers that require rapid activation and coordination of upper airway and chest wall musculature become progressively impaired as motor dysfunction progresses during the natural course of the disease. This study reports on the maximum inspiratory and expiratory pressures produced by 28 participants (average age 64) diagnosed with moderate to severe IPD (average stage 2.5 with a range of 2.0-3.0). All

measures were collected during the "medication on" state. Outcomes of a specific respiratory muscle strength training technique for improving maximum expiratory pressure are reported for three of the patients in this study. Techniques that focus on strengthening the respiratory muscles in patients with IPD (other than with low load breathing exercises), have not been previously reported. The results of this pilot study demonstrate that respiratory muscle weakness may be an important factor in the respiratory complications in IPD and that respiratory muscle strength training has the potential to improve expiratory muscle strength for this population. This improvement has the potential to positively impact high forced respiratory activities, such as forced breathing maneuvers, swallow, cough and speech functions that require greater magnitude and duration of expiration.

Wheeler K.M., Collins S.P., **Sapienza C.M.** (2006). The relationship between VHI scores and specific acoustic measures of mildly disordered voice production. *Journal of Voice*. 20, 2, 308-317.

This study was designed to examine the relationship between the Voice Handicap Index (VHI) and acoustic measures of voice samples common in clinical practice. Fifty participants, 38 women and 12 men, ranging in age from 19 to 80 years, with a mean age of 49 years, served as participants. Of these 50 participants, 17 participants could be included in the acoustic analysis of voice based on measures of error calculated with the TF32 software. All participants completed the VHI and provided voice samples including three trials of the sustained vowel /A/ at a comfortable loudness level as well as a connected speech sample consisting of the Zoo Passage. Acoustic measures were made with TF32 and Cool Edit software and included fundamental frequency, jitter %, shimmer %, signal-to-noise ratio, mean root-mean-square intensity, fundamental frequency standard deviation, aperiodic periods, and breath groups. Results indicate that these measures were not predictive of overall VHI score, and no cohesive or predictable pattern was identified when comparing individual measures with overall VHI or with each subscale item. Likely contributions to this lack of correlation and subsequent clinical implications are discussed, as well as the direction for further research.

**Shrivastav, M.N.**, Humes, L.E., Kewley-Port, D. (2006). Individual differences in auditory discrimination of spectral shape and speech-identification performance among elderly listeners. *Journal of the Acoustical Society of America*. 119, 1131-1142.

Speech-understanding difficulties observed in elderly hearing-impaired listeners are predominantly errors in the recognition of consonants, particularly within consonants that share the same manner of articulation. Spectral shape is an important acoustic cue that serves to distinguish such consonants. The present study examined whether individual differences in speech understanding among elderly hearing-impaired listeners could be explained by individual differences in spectral-shape discrimination ability. This study included a group of 20 elderly hearing-impaired listeners, as well as a group of young normal-hearing adults for comparison purposes. All subjects were tested on speech-identification tasks, with natural and computer-synthesized speech stimuli, and on a series of spectral-shape discrimination tasks. As expected, the young normal-hearing adults

performed better than the elderly listeners on many of the identification tasks and on all but two discrimination tasks. Regression analyses of the data from the elderly listeners revealed moderate predictive relationships between some of the spectral-shape discrimination thresholds and speech-identification performance. The results indicated that when all stimuli were at least minimally audible, some of the individual differences in the identification of natural and synthetic speech tokens by elderly hearing-impaired listeners were associated with corresponding differences in their spectral-shape discrimination abilities for similar sounds.

**Shrivastav, R.** (2006). Multidimensional scaling of breathy voice quality: Individual differences in perception. *Journal of Voice*. 20, 2, 211-222.

Experiments on disordered voice quality using multidimensional scaling (MDS) have resulted in solutions with low R-square and have failed to show consistent dimensions across different listeners. These findings have been suggested to indicate large individual differences in the perception of voice quality. However, these inconsistencies may arise from several factors, including random stimulus selection, instructions that encourage listeners to respond to global difference in pairs of voices and noisy perceptual data. The present experiment used MDS techniques to study individual differences in perception of breathiness. The voices used in the experiment were selected to have a relatively wide variation in breathiness but only minimal variation in roughness, strain and fundamental frequency. Additionally, listeners were instructed specifically to rate similarities in breathiness rather than judging global differences in voices, and several judgments from each listener were averaged to minimize noise in the data. It was hypothesized that these modifications would result in an MDS solution which accounted for greater variance in perceptual data than previously shown. Results show that averaging multiple responses from each listener increased the R-square from 45% to approximately 75%. The poor R-square and large individual differences in voice quality perception observed in past research may have partly resulted from the experimental procedures used in previous studies. The findings suggest that individual differences in the perception of voice quality are not as large as previously thought, and a model of voice quality perception for an "average" listener may be a good representation for the general population.

**Shrivastav, R., & Sapienza, C.** (2006). Some difference limens for the perception of breathiness. *Journal of the Acoustical Society of America*. 120, 416-423.

Perception of breathy voice quality appears to be cued by changes in the vowel spectrum. These changes appear to be related to changes in the intensity of aspiration noise and spectral slope of the harmonic energy (Shrivastav & Sapienza, 2003, *J. Acoust. Soc. Am.*, 114 (4), 2217-2224). Ten young-adult listeners with normal hearing were tested using an adaptive listening task to determine the smallest change in signal-to-noise ratio that resulted in a change in breathiness. Six vowels, three female and three male, were generated using a Klatt-synthesizer and served as stimuli. Results showed that listeners needed as much as 20 dB increase in aspiration noise to perceive a change in breathiness against a relatively normal voice. In contrast, listeners needed approximately an 11 dB increase in aspiration noise to discriminate breathiness against a severely breathy voice. The difference limens for

breathiness were observed to vary across the six talkers. Voices having aspiration noise that was predominantly in the high frequencies had smaller difference limens. No significant differences for male and female voice were observed.

**Shrivastav, R., Sapienza, C.M., Nandurm, V.** (2005). Application of psychometric theory to the measurement of voice quality using rating scales. *Journal of Speech Language and Hearing Research*. 48, 2, 323-335.

Rating scales are commonly used to study voice quality. However, recent research has demonstrated that perceptual measures of voice quality obtained using rating scales suffer from poor interjudge agreement and reliability, especially in the mid-range of the scale. These findings, along with those obtained using multidimensional scaling (MDS), have been interpreted to show that listeners perceive voice quality in an idiosyncratic manner. Based on psychometric theory, the present research explored an alternative explanation for the poor interlistener agreement observed in previous research. This approach suggests that poor agreement between listeners may result, in part, from measurement errors related to a variety of factors rather than true differences in the perception of voice quality. In this study, 10 listeners rated breathiness for 27 vowel stimuli using a 5-point rating scale. Each stimulus was presented to the listeners 10 times in random order. Interlistener agreement and reliability were calculated from these ratings. Agreement and reliability were observed to improve when multiple ratings of each stimulus from each listener were averaged and when standardized scores were used instead of absolute ratings. The probability of exact agreement was found to be approximately .9 when using averaged ratings and standardized scores. In contrast, the probability of exact agreement was only .4 when a single rating from each listener was used to measure agreement. These findings support the hypothesis that poor agreement reported in past research partly arises from errors in measurement rather than individual differences in the perception of voice quality.

**Wingate, J.M., Brown, W.S., Shrivastav, R., Davenport, P., Sapienza, C.M.** (2006). Treatment outcomes for professional voice users. *Journal of Voice*. March 30 [Epub ahead of print].

Professional voice users comprise 25% to 35% of the U.S. working population. Their voice problems may interfere with job performance and impact costs for both employers and employees. The purpose of this study was to examine treatment outcomes of two specific rehabilitation programs for a group of professional voice users. Eighteen professional voice users participated in this study; half had complaints of throat pain or vocal fatigue (Dysphonia Group), and half were found to have benign vocal fold lesions (Lesion Group). One group received 5 weeks of expiratory muscle strength training followed by six sessions of traditional voice therapy. Treatment order was reversed for the second group. The study was designed as a repeated measures study with independent variables of treatment order, laryngeal diagnosis (lesion vs non-lesion), gender, and time. Dependent variables included maximum expiratory pressure (MEP), Voice Handicap Index (VHI) score, Vocal Rating Scale (VRS) score, Voice Effort Scale score, phonetogram measures, subglottal pressures, and acoustic and perceptual measures. Results showed significant improvements in MEP,

VHI scores, and VRS scores, subglottal pressure for loud intensity, phonetogram area, and dynamic range. No significant difference was found between laryngeal diagnosis groups. A significant difference was not observed for treatment order. It was concluded that the combined treatment was responsible for the improvements observed. The results indicate that a combined modality treatment may be successful in the remediation of vocal problems for professional voice users.

**Wingate, J.M.,** Ruddy, B.H., Lundy, D.S., Lehman, J., Casiano, R., Collins, S.P., Woodson, G.E., **Sapienza, C.** (2005). Voice handicap index results for older patients with adductor spasmodic dysphonia. *Journal of Voice*. 19, 1, 124-131.

Adductor spasmodic dysphonia (ADSD) adversely affects a speaker's ability to effectively communicate. For many individuals suffering with ADSD, botulinum toxin (Botox) is the chosen treatment to remediate the symptoms. Although Botox's effects on symptom remediation have been examined before, patient perception of improvement post-Botox has been examined less frequently. Further, no studies have addressed the symptomatic changes in older adults that occur after Botox treatment. The Voice Handicap Index (VHI) was used as the instrument to assess older patient's (>65 years) perception of how ADSD impacts certain areas of their life pre- and post-Botox injection. The outcome of the VHI was related to a clinical judgment of voice severity. Participants also completed the Social Readjustment Rating Scale (SRRS) to examine overall stress level, and the outcome of the SRRS was correlated to postinjection VHI scores. Results indicated no significant correlation between VHI scores and voice severity or SRRS ratings. The current study suggests further study of voice outcomes with older adults with ADSD is needed.