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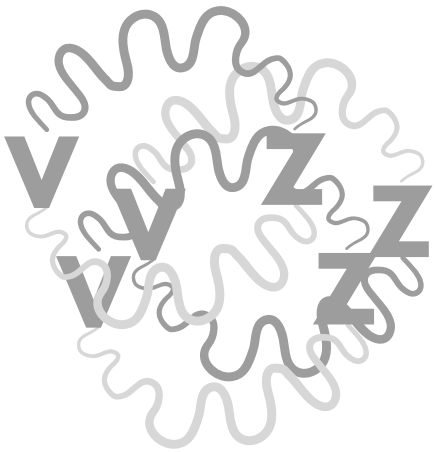
# ABSTRACTS BOOK

Santander 4 - 7 SEPT 2024

PAN-EUROPEAN VOICE CONFERENCE 15



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THE WORLD>>

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PAN-EUROPEAN
VOICE CONFERENCE 15

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# INDEX

**ABSTRACT 4**

## Chronic Refractory Cough: Short and Long-Term Evidence of Behavioral Treatments

Thomas Murry, Way Anne Watson, Ethan Simmons, Jessica Kim, Priya Krishna

**Objective:** The objectives of this presentation are to report the results of treatment of chronic refractory cough (CRC) over short and long terms using cough suppression therapy (CST) methods.

**Methods/Design:** From the medical records of 106 adult patients diagnosed with chronic refractory cough, two groups of patients were studied prior to and following CST. The patients in the short-term study underwent 4 sessions of CST over a six-week period. Those in the long-term study were seen at their follow up exams. All subjects underwent otolaryngologic and stroboscopic evaluation prior to, following treatment and after long term follow up.

**Results:** Both groups of patients had a significant reduction in cough following CST. (Pamp=0.001). A significant difference was also found in CSI scores from pre-therapy to long-term follow up in the long-term group (P=0.001). No significant difference was found in CSI scores from post-therapy to long-term follow up visits (P=0.93). No correlation was found between changes in cough and voice severity and between the number of comorbidities.

**Conclusions:** Findings of a significant short-term difference in cough severity with no significant long-term changes suggests that patients maintained improvement in cough over the long term despite various comorbidities. The current results suggest that cough suppression therapy represents a satisfactory approach to treating CRC and provides patients with an ongoing tool to maintain reduced cough severity. No significant correlations between number of comorbidities and mean CSI or VHI-10 scores were found over the long-term follow-up.

**Keywords:** Chronic cough, chronic refractory cough, cough suppression therapy

**ABSTRACT 5**

## Anatomic and Manometric Outcomes in Patients with And Without Chronic Cough

Thomas Murry, WayAnne Watson, Priya Krishna, Jessica Kim, Ben Bercerra

**Objective:** This study examines the relationship between chronic cough and vagal hypersensitivity by measuring baseline esophageal motility, focused on the upper esophageal sphincter (UES).

**Methods:** Patients who were undergoing workup for dysphagia completed a series of assessments including validated self-assessments, laryngeal videostroboscopy, and high-resolution esophageal ma-

nometry. Based on those results, they were assigned to a chronic cough or control group. Differences in demographics and medical comorbidities were obtained retrospectively.

**Results:** 62.5% of our cohort had chronic cough (30/48). There were no significant differences between the two groups with respect to sex, age, and race/ethnicity. Subjects in the chronic cough group had significantly higher rates of diabetes (OR = 8.20, p = 0.04) and hypertension (OR = 3.79, p = 0.03). Laryngeal videostroboscopy showed similar rates of vocal fold paresis in both groups, with higher rates of bilateral true vocal fold edema (60%, p = 0.16) and mild phase asymmetry (53%, p = 0.55) in the chronic cough group. Patients with chronic cough had UES relaxation duration (734 ms) longer than the non-cough patients (582 ms; p = 0.03), though both groups had similar upper esophageal mean basal pressure, mean residual pressure, relaxation time-to-nadir, and recovery time. Median intrabolus pressure and upper esophageal motility mean peak pressure were lower in the cough group, though not statistically significant.

**Conclusion:** UES manometric measurement differences between patients with a chronic cough suggest, in line with previous studies, that vagal dysfunction in chronic cough may manifest in baseline alterations of UES relaxation.

**Keywords:** chronic cough, esophageal motility, high-resolution manometry (HRM), upper esophageal motility, vagal hypersensitivity

## ABSTRACT 6

### Voice Health Challenges among Student Teachers: Investigating Prevalence and Contributing Factors

Lady Catherine Cantor-Cutiva, Carlos Manzano, Adriana Diaz, Alejandro Morales, Eric Hunter

**Background:** Previous research has identified diverse factors contributing to voice problems among student teachers, notably the lack of knowledge and training in voice care strategies during their educational preparation. This knowledge gap has led to a high prevalence of voice disorders among this population.

**Methods:** This cross-sectional, multicentric study aimed to assess the prevalence and associated factors of voice disorders, including vocal fatigue and hoarseness among student teachers. Prospective student teachers from Colombia, Mexico, Uruguay, and the United States participated in an online survey, providing self-perceived information on voice symptoms, demographics, teaching-training conditions, and training-related voice use.

**Results:** Out of 1,260 student teachers, approximately 50% reported experiencing hoarseness. Significantly, the prevalence of persistent hoarseness increased with the progression of academic training,

with the fifth-year cohort exhibiting a 6.1% prevalence compared to the 2.1% in the first-year cohort. Logistic regression analysis showed that the second and third-year cohorts faced the highest risk of hoarseness. Furthermore, student teachers engaged in current practicum activities presented a 47% higher likelihood of reporting hoarseness.

**Conclusion:** The findings highlight the prevalence of voice disorders within the teaching profession, particularly hoarseness among student teachers. The study emphasizes the influence of training level (academic cohort and practicum activities) on the development of voice symptoms in this population.

**Keywords:** prospective teachers, voice disorders, occupational health

## ABSTRACT 10

### Creating Gender-Inclusive Voice Lessons: Can We Do Better?

Emily Lowe

The research on trans and gender-expansive voices, particularly in adolescents, is limited despite a growing interest in the field. Recent studies highlight a decline in adolescents' mental health, emphasising the need for sensitivity in addressing this emerging area. This study advocates for placing adolescents' perspectives at the centre, directly involving them in decisions about their voice lessons. Analysis of existing research underscores the impact of surroundings and education on gender roles, urging educators to recognise and address biases in their practices. In the unregulated field of voice teaching, where no overarching body ensures safety and inclusivity (British Voice Association, 2018; Voice Study Centre, 2021), this study draws on my 11-year of experience as a voice teacher. It observes diverse viewpoints among educators and acknowledges that personal vulnerabilities can create barriers affecting both educators and pupils (Malins, 2016; Garrett and Spano, 2017). I aim to enhance understanding of how individuals are influenced by education and surroundings, with a focus on gender inclusivity and "Ambient Belonging"within voice lessons. By analysing relevant literature, the goal is to apply these findings to create inclusive and welcoming teaching spaces. I hope contributes to ongoing efforts to develop effective, inclusive teaching strategies for all voices, emphasising the importance of open dialogue and inclusivity over assumptions. An informed teaching strategy, rooted in individual values, should cater to all voices, regardless of gender, fostering a comfortable learning environment. The project concludes by offering recommendations for further research, contributing to the broader conversation on gender-inclusive voice education.

**Keywords:** Gender, adolescent, singing, ambient belonging

## ABSTRACT 11

### Philosophy of Mind and The Imagery Versus Science Debate: Redefining Imagination

Jenna Brown

Traditional imagery in voice pedagogy appears to be the antithesis of contemporary approaches to voice science. However, imagery continues to be a pivotal strategy in vocal teaching and choral conducting. Despite conflicts between stock metaphorical imagery and anatomical and physiological realities, metaphor and playful imagination can be affective in promoting optimal vocal function and crafting vocal artistry. This paper argues that imagery should not be disregarded in favour of utilising scientific approaches to voice pedagogy. Presenting findings from a theoretical investigation conducted by integrative literature review and philosophical analysis, this paper suggests that pedagogical analysis of the use of imagery, which considers the relationship between ontology, language, and practice, shows that the science versus imagery debate is predicated on a false dichotomy. Imaginative and scientific principles of voice production are not mutually exclusive. The belief that they cannot be synthesised in vocal and choral pedagogy appears to stem from a lack of clear communication and shared aims between scientists and teachers. Imagination-based teaching strategies can be synthesized with a rigorous understanding of voice science if pedagogical and research aims are aligned, and a unified language for learning is developed through collaboration between voice scientists, singing teachers, and performers. To achieve this, vocal practitioners must first redefine their understanding of the nature of imagination. Drawing on theories from Philosophy of Mind, specifically Lens Theory of Imagination, it is possible to bring traditional vocal metaphors into alignment with contemporary understandings of voice science. This has implications for the application of imagery in vocal and choral pedagogy, opening potential avenues for the synthesis of vocal artistry and science through the creation of a new imagery schema.

**Keywords:** Voice, Imagery, Science, Pedagogy, Philosophy

## ABSTRACT 14

### Dyskinesis of the Lateral Cricoarytenoid Muscle—A Frequently Missed Neurolaryngeal Injury

James Thomas

**Introduction:** Visual diagnosis of laryngeal neurologic impairments is perhaps the most accurate method for evaluating the neurologic status of the larynx, yet impairment of the lateral cricoarytenoid muscle is one of the most easily missed injuries. The actions of each intrinsic muscle can be isolated visually by the careful observer. Topical anesthesia, slow observation during respiration,

stroboscopy, video recording and post examination slow motion video-analysis of movement lead to an accurate neurolaryngeal diagnosis.

Principles of the neurolaryngology examination include:

1. Each muscle has only a single action.
2. That action can be isolated.
3. That action can be elicited and visualized.
4. The patient always attempts to compensate and the examiner's goal is to remove compensation in order to better visualize the neurologic impairment.
5. Degree of neural injury and patterns of regrowth determine timing of muscle actions.

**Materials and Methods:** Flexible endoscopic videos are recorded of patients with neurologic impairments of the larynx. Methods of observation include examination during breathing and during phonation. Video recordings are slowed down and analyzed comparing anticipated muscle action to actual muscle action. Changes in action after intervention with botulinum toxin or surgical re-innervation are compared.

**Results:** Paralysis, paresis and dyskinesis of the lateral cricoarytenoid muscle can be visualized.

**Conclusions:** Paralysis, paresis and dyskinesis (of which synkinesis is a subtype) can be visualized and explanations for missing the injury are proposed. A color booklet complements this lecture. It can be downloaded as a pdf file or for printing (https://www.voicedoctor.net/neuro). Electromyography is a valuable tool yet precise electromyography is a cumbersome examination, uncomfortable for the patient, difficult to interpret and careful endoscopic evaluation seems at least, if not more precise.

**Keywords:** laryngology, neurolaryngology, paralysis, videoendoscopy

## ABSTRACT 17

### A Computational Social Network Analysis of Vocal Stigma In Professional Voice Users

Nicole Li-Jessen, Aaron R. Glick, Colin Jones, Lisa Martignetti, Marc, D. Pell

**Objective:** Health stigma related to vocal disorders, i.e., vocal stigma, which is a ubiquitous barrier to professional voice users such as singers and actors. Individuals with a stigmatized medical condition are often reluctant to seek medical help. Social networks are considered as a structural determinant of health on their role in the spread of social behaviors and attitudes affecting health outcomes. Existing work on vocal stigma is largely observational or anecdotal by far. The goal of this study is to develop

computational tools that can help (1) quantify the experience of vocal stigma and help-seeking behaviors and (2) predict their modulations with peer influences in social networks.

**Methods:** The data source is from our previous online survey study on profiling the experience of vocal stigma (i.e., social- and self-stigma) and help-seeking behavior (i.e., Information, Motivation, Behavioral Skills – IMB). We computerized an agent-based social network model and parameterized it with the survey data. Each virtual agent updated their help-seeking behavior via social interaction, which in turn changes their IMB and stigma states. Network analysis was performed to evaluate the effect of social network structure on the flow of stigma and IMB among virtual agents.

**Results:** Overall, the increase in vocal stigma was more strongly correlated with external pressures (i.e., social stigma) than by internal beliefs (i.e., self-stigma). In small social networks, modulation of IMB could lead to reduction in vocal stigma among agents. However, in large social network, agents' vocal stigma resisted to large changes in IMB. Simulation data further showed that agents with extreme stigma and IMB values contributed to polarizing their networks faster in larger social groups. That is, large social networks may exacerbate the stigmatization process, i.e., negativity spreads faster than positivity.

**Conclusions:** Social computing is an effective approach to interrogate the complex stigmatization process and predict health-seeking and stigma-related behavior. Social interventions on close peer support is recommended for vocal stigma mitigation. This work provides, for the very first time, scientific evidence that can be used to guide public policy or social interventions of reducing health stigma against voice disorders.

**Keywords:** computer simulation, vocal stigma, help-seeking, social network, vocal performers

## ABSTRACT 19

### Conflict and Resolution: Common Sense Oriented Solutions to the Historical Choral-Vocal Problem

Serdar Ilban, James Han

**Conflict and Resolution:** Common Sense Solutions to the Historical Choral-Vocal Problem. In the modern university curriculum, many voice students enjoy both solo and ensemble performance opportunities. Along with those opportunities, these students are also exposed to an often unspoken conflict between choir directors and private voice teachers on contrasting pedagogies of sound production.

The oral presentation will explore the historical nature of the choral-vocal conflict, discuss the key factors that contribute to the conflict, as well as offering tried and true, communication-based, common sense solutions.

Over the course of more than ten years, the co-authors Dr. Serdar Ilban (voice teacher and opera director), and Dr. James Han (choir director) surveyed students and colleagues from different universities

across the United States and collected data and opinion-based information from various resources. Their research led them to discover that regardless of the methods employed, they shared a very important common goal: student success! The authors will present their findings in a brief PowerPoint presentation, explaining the factors that contribute to the conflict from both the voice teacher's and choir director's point of view, and share their experiences as colleagues on how they manage to find common ground that works for the duo and their students. A brief Q&A will be included at the end of the session.

**Keywords:** Choral, Vocal

## ABSTRACT 20

### Influence of Partial Deafness Cochlear Implantation on Voice Acoustics in Children And Adults. Comparative Analysis

Karol Myszel, Agata Szkielkowska, Piotr Henryk

The purpose of our study was a comparative assessment of voice characteristics in children and adults with partial deafness (PD). Analysis of voice in 44 prelingual PD children at school age was first performed. The control group included 23 children with normal hearing. Then, 25 post lingual adult PD patients were examined. Control group included 55 healthy persons. The average length of hearing impairment was 9,4 years in children and 19,1 years in adults.

The study showed that partial deafness disturbs voice acoustics both in children and adults. Simultaneously in both groups statistical changes were seen in parameters describing fundamental frequency variation (vF0), amplitude (vAm, sAPQ) and noise (NHR). Differences between children and adults included fundamental frequency (F0) and soft phonation index (SPI), which in adult patients did not present statistically important changes versus control group. Statistical changes in PD adults were however observed in a bigger number of parameters, including increase of Jita and Jitt, APQ and sAPQ, Shim and ShdB, RAP, PPQ, sPPQ, DSH, NSH and DUV. Voice changes covering a bigger number of parameters in PD adults result from a longer hearing deprivation time at frequency ranges over 1kHz, compared to much shorter deprivation time in PD children.

In the group of PD children, values and directions of changes in acoustic parameters of voice present irregular and short term variances, which is related to the fact, that in age range of 7-12 years, development of voice acoustic structure is delayed compared to healthy children. The study group includes children on different development stages, which influenced and caused differences compared to adult patients.

In PD adults acoustic structure of voice presents more regular and long term changes and covers a bigger group of parameters. This is related to a longer time of hearing deprivation and its post lingual onset, as well as to the mechanism of auditory control of voice imprinted before PD appeared and deposited in auditory memory.

**Keywords:** partial deafness, voice acoustics, children, adults

## ABSTRACT 23

### Influences of Preventive Voice Training On The Vocal, Mental Health, And Voce-Related Self-Concept Of University Teachers And Academic Advisors: A Pilot Study

Christiane Lücking, Kathrin Classen

**Objectives:** University teachers and academic advisers show an increased susceptibility to occupational risk factors related to their voice and an increased prevalence of developing a voice disorder in the course of their employment. The aim of the study was to investigate whether the vocal self-concept and potential vocal and related mental health problems of university teachers and academic advisers can be improved by participating in preventive voice training.

**Methods:** An experimental, prospective, longitudinal study was conducted to examine whether voice training (1) improves physiological vocal function, vocal performance, vocal self-concept, and mental health of university teachers and academic advisers; (2) reduces unfavorable influencing factors at the university workplace; and (3) fewer voice problems are reported from the perspective of university teachers and academic advisers.

**Results:** Voice training has positive influences on the voice (function and quality), voice self-concept, and well-being of university staff.

**Conclusions:** Workplace prevention programs can help to reduce the high prevalence of voice disorders among university teachers and advisers and counteract the risk factors. They should therefore be firmly integrated into continuing education/university health management and everyday life to cope with certain work-related vocal stresses and to maintain psychological and vocal well-being throughout the university career. Gender and age-related aspects should be considered.

**Keywords:** Prevention, Occupational dysphonia, Voice disorder, University personnel, Voice training

## ABSTRACT 24

### Grieving a Previous Voice, A Psychotherapy Case Study Of A Performer With A Functional Voice Disorder

Stephen King

**Objective:** Functional Voice Disorders (FVD) are thought to affect 1.7% of the global population, and the treatment for FVD has long had a gold standard of multidisciplinary intervention. As a Psychotherapist specialising in voice disorders, I seek to provide the rationale for the potential importance of my profession in the multidisciplinary team. This case study aims to establish the importance of having

a voice specialist psychotherapist on a multidisciplinary team as well as the effect the psychotherapy intervention has on the progress of the performer's healing journey.

**Methods/Design:** According to my recent literature review, specialist psychological practitioners are often missing in multidisciplinary teams. This case study is presented based on the examination of notes from a 12-week psychotherapy journey in a multidisciplinary practice where the patient had a diagnosis of FVD. The presentation will explore the main themes of the work including; grief, adoration, shame and the psychological blueprint of being a performer. This presentation also aims to educate clinicians and educators about the importance of a voice specialist psychotherapist or psychologist being present in a team. This may be as well as, or instead of a Speech pathologist with Cognitive Behavioural Therapy (CBT) training.

**Results:** The result of the 12 weeks of psychotherapy culminated in the performer's voice working well enough to audition for a TV show and begin optimistic planning for A Theatre Festival, and the performer feeling positive about the future. Whilst psychotherapy cannot take credit for the physiological changes, the psychological changes may be attributed to the progress in the 12 sessions.

**Conclusions:** Psychotherapy may be an important addition to a multidisciplinary treatment plan and can help performers navigate their internal psychological landscape to better deal with functional voice disorders.

**Keywords:** Psychotherapy, functional, voice, disorders, multidisciplinary

## ABSTRACT 25

### Extrinsic Laryngeal Muscle Tension in Primary Muscle Tension Dysphonia with Shear Wave Elastography

Adrianna Shembel, Ted Mau, David Fetzer

**Objectives:** It has been assumed that patients with primary muscle tension dysphonia (pMTD) have more extrinsic laryngeal muscle (ELM) tension, but tools to study this phenomenon lack. Shear wave elastography (SWE) is a potential method to address these shortcomings. SWE ultrasound uses acoustic force impulse technology to estimate tissue stiffness—or intramuscular tension—by measuring the velocities of shear waves. SWE has previously been validated in and can be applied to any tissue that is elastic, like skeletal muscle. The objectives of this study were to apply SWE to the ELMs; compare SWE measures to standard clinical metrics; and determine group differences in pMTD and typical voice users before and after vocal load. This third objective was driven by the classic presentation of increased voice use or heavy vocal demands that often precipitate the onset and perpetuation of pMTD, and the high prevalence of pMTD in occupational voice users who rely on their voices for their profession.

**Methods/Design:** SWE measurements of the ELMs from ultrasound examinations of the anterior neck, supraglottic compression severities from laryngoscopic images, cepstral peak prominences (CPP) from voice recordings, and self-perceptual ratings of vocal effort and discomfort were obtained in voice users with (N=30) and without (N=35) pMTD, before and after a vocal load challenge.

**Results:** ELM tension significantly increased from rest-to-voiced conditions in both groups. However, the groups were similar in their ELM stiffness levels at SWE at baseline, during vocalization, and post-vocal load. Levels of vocal effort and discomfort and supraglottic compression was significantly higher and CPP significantly lower in the pMTD group. Vocal load had a significant effect on vocal effort and discomfort but not on laryngeal or acoustic patterns.

**Conclusion:** SWE can be used to quantify ELM tension with voicing. Although the pMTD group reported significantly higher levels of vocal effort and vocal tract discomfort and, on average, exhibited significantly more severe supraglottic compression and lower CPP values, there were no group differences on levels of ELM tension using SWE.

**Keywords:** Muscle tension dysphonia, extrinsic laryngeal muscles, shear wave elastography, acoustics, laryngoscopy, vocal load

## ABSTRACT 26

### Spatiotemporal Paralaryngeal Movement Patterns in Muscle Tension Dysphonia with Motion Capture Technology

Adrianna Shembel, Xiaohu Guo, Robert Morrison

**Objectives:** Paralaryngeal tension and hyperfunction is often implicated in muscle tension dysphonia (MTD). However, there is a lack of quantitative physiologic metrics to study these movement patterns and their relationships to vocal productions to inform diagnostics and monitor treatment progress. The objective of this study was to validate motion capture (MoCap) technology to study paralaryngeal movement patterns during voice and speech tasks.

**Methods/Design:** 16 marker stickers were placed on various anatomical paralaryngeal landmarks in 30 participants with (n=15) and without (n=15) MTD. Two Intel RealSense D435 stereo depth cameras were used to track movement patterns within the paralaryngeal system. Participants completed four voice and speech tasks: (1) sustained vowel /a/, (2) phrases (Rainbow Passage), (3) pitch glides, and (4) loud Hey you!. 16 sticker key points and 53 corresponding edges between each key point were identified within each video frame, aligned to audio recordings, and task sequences compared to Euclidean distances between corresponding edges. Movement variability was also compared for each key point edge on the spatiotemporal scale across each sequence.

**Results:** Participants with MTD did not differ significantly from controls in paralaryngeal movement displacement; however, they had significantly greater paralaryngeal spatiotemporal variability across

edges in speech tasks involving longer phasing (Rainbow Passage) (p's<0.001), especially in paralaryngeal regions closest to the larynx. These regions also had significant negative correlations to cepstral peak prominence (CPP) measures of acoustic vocal quality in the MTD group (r= -0.611, p=0.016), but not the control group (r= 0.249, p=0.391).

**Conclusion:** Physiologic measures using MoCap suggest patients with MTD may not have more quantitative paralaryngeal tension or hyperfunction, as demonstrated by similar edge displacements between groups. However, the significantly greater movement variability within the MTD group suggests there may be greater paralaryngeal system instability in patients with MTD. Results also suggest this vocal instability may contribute to increased aberrant vocal quality in these patients.

**Keywords:** Muscle Tension Dysphonia, Motion Capture, Muscle Tension, Vocal Hyperfunction, Vocal Instability

## ABSTRACT 30

### Clinical Application of High-Speed Videoendoscopy

Rita Patel

**Objective:** The current goal standard in laryngeal imaging is videostroboscopy. While videostroboscopy works in most instances, it is limited in evaluating short, transient, and severely aperiodic voice. High-speed videoendoscopy (HSV) overcomes these limitations and is able to provide cycle-to-cycle information about vibratory motion. The goal of this talk is to present the clinical application of HSV based on current evidence.

**Methods/Design:** Findings from a systematic review across studies will be presented.

**Results:** In this talk, participants will understand: (1) how HSV assessment of laryngeal function differs from videostroboscopy, (2) clinical indication of when to use HSV in voice clinic and vocal pedagogy, and (3) visual-perceptual analyses of HSV using the validated 'Voice-Vibratory and Laryngeal Imaging Form.' Ample examples of various videos will be used to illustrate the various concepts.

**Conclusions:** High-speed videoendoscopy should be augmented with stroboscopy in cases of moderate to severe dysphonia and transient vocal phenomena to aid clinical decision making in assessment and treatment of voice disorders across the lifespan.

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**Keywords:** High-Speed Videoendoscopy, Clinical application, Voice disorders

## ABSTRACT 37

### Acoustic Voice Quality Analyses with the New Freeware Voxplot On Sustained Phonation For Clinical Practice And Research

Ben Barsties v. Latoszek, Jörg Mayer, Christopher Watts, Bernhard Lehnert

**Objective:** The evaluation of voice quality can be assessed through standard clinical procedures, which include for example the acoustic methods of voice recordings. In clinical practice, it is often unclear which parameter is the most meaningful and valid for the evaluation of voice quality due to the large number of parameters. This study aimed to identify the most robust acoustic parameters for perceived hoarseness and breathiness when examining the sustained vowel [a:] using a novel clinical acoustic tool, the VOXplot freeware.

**Methods/Design:** A total of 218 voice samples from individuals with and without voice disorders underwent both perceptual and acoustic analyses. Thirteen individual acoustic parameters were employed to assess their validity in relation to perceptions of hoarseness and breathiness.

**Results:** Four specific acoustic measures were distinctly linked to perceptions of hoarseness or breathiness. For hoarseness, the harmonics-to-noise ratio (HNR) and pitch perturbation quotient with a smoothing factor of five periods (PPQ5) were strongly correlated, while for breathiness, the smoothed

cepstral peak prominence (CPPS) and the glottal-to-noise excitation ratio (GNE) exhibited high validity. Significant differences were identified for each of these measurements compared to the other aspects of perceived voice quality.

**Conclusions:** The following study successfully confirmed that out of 13 acoustic parameters only 4 metrics are relevant for the valid determination of voice quality and facilitates the application and relevance for clinical practice. Two acoustic measures, namely HNR and PPQ5, were robustly associated with perceptions of hoarseness and effectively distinguished hoarseness from breathiness with confidence. Similarly, two other acoustic measures, CPPS and GNE, were strongly linked to perceptions of breathiness and accurately discriminated breathiness from hoarseness with confidence.

**Keywords:** Voice quality, hoarseness, breathiness, acoustic measures, voice diagnostic

## ABSTRACT 41

### Voice Moves the Mind: Soothing Sounds For a Wounded World

Nikki Martinez

**Objective:** Explore what part the voice plays in moving listeners to a better state of mind.

**Methods/Design:** In a post-pandemic world, we've experienced how voicework can bridge the gaps of loneliness and isolation, creating positive energy and helping listeners care for their mental health. The art of voice is especially useful when creating digital tools for deeper communication with our younger generations. As a former travel-TV host and Inflight magazine editor, now audio producer and voiceover artist, I work with mental health applications, narrating sleep stories (bedtime stories for adults), guided meditations, and motivational podcasts.

**Results:** Apps are a way to connect the user to real-life therapists, providing mental health support and calm. One app, for example, has over 64,000 listeners on the digital community channel, Discord. We collaborate with psychologists and professors from Johns Hopkins University, creating "safe spaces"with mini-courses on self-care and wellness, then further dialogue with therapists in real-life community meetups.

**Conclusions:** Today, there is a great need for easier access to mental health support. If music is a universal language, then we can use our voice to connect and reach across cultures and borders. Through collaboration, we can build bridges and pathways to more peace of mind. In examining this topic, we explore three aspects of the voice.

1. Voice as a vehicle for mental health awareness (i.e. podcasts and apps that take listeners on a journey to calm).

2. Voice as a guide to a better state of mind (i.e. guided meditation and visualizations now also being offered in Virtual Reality).

3. Voice as the pathway for listeners to find emotional support and long-term solutions.

As technology advances, as voice professionals, we must explore the role of the holistic voice. Our voices, pure energy, have the ability to flow in diverse ways—whether singing, speaking, or educating. To create and share a more meaningful, connected world.

**Keywords:** mental, wellness, mind, voice, technology

## ABSTRACT 44

### Singers' Fach: Articulatory and Acoustic Differences between Lyric and Dramatic Singing

Matthias Echternach, Fabian Burk, Jonas Kirsch, Louisa Traser, Peter Birkholz, Michael Burdumy, Bernhard Richter

**Introduction:** Within the field of voice classification, singers can be further categorized based on the breadth of their repertoire, a concept known as the "singers' Fach." However, the terms "lyric" and "dramatic" singing remain somewhat unclarified.

**Materials and Methods:** Nine professional singers, representing different Fach categories, participated in the study. They were asked to sing a diatonic scale using the vowel /a/, first interpreting it as lyric singing and then as dramatic singing. Real-time MRI imaging (25 frames per second) and audio signals via an optical microphone system were recorded. The analysis focused on several parameters, including sound pressure level (SPL), vibrato amplitude and frequency, resonance frequencies, and articulatory settings of the vocal tract.

**Results:** The analysis revealed three key differences between dramatic and lyric singing:

1. Sound Pressure Level (SPL): Dramatic singing exhibited higher SPL.

2. Vibrato: Dramatic singing had greater vibrato amplitude and frequency.

3. Resonance Frequencies: Dramatic singing corresponded to lower resonance frequencies.

However, it's important to note that individual variability played a significant role in these strategies.

**Conclusion:** The concept of singers' Fach may contribute to perceptual differences, even within the same singer, depending on the specific repertoire they are performing.

**Keywords:** singing, lyrical, dramatical, Fach, MRI

## ABSTRACT 45

### Biomechanics of Sound Production in High-Pitched Classical Singing

Matthias Echternach, Fabian Burk, Marie Köberlein, Michael Döllinger, Michael Burdumy, Bernhard Richter, Ingo Titze, Coen Elemans, Christian Herbst

Voice production of humans and most mammals is governed by the MyoElastic-AeroDynamic (MEAD) principle, where an air stream is modulated by self-sustained vocal fold oscillation to generate audible air pressure fluctuations. An alternative mechanism is found in ultrasonic vocalizations of rodents, which are established by an aeroacoustic (AA) phenomenon without vibration of laryngeal tissue. Previously, some authors argued that high-pitched human vocalization is also produced by the AA principle. Here, we investigate the so-called "whistle register"voice production in nine professional female operatic sopranos. Super-high-speed videolaryngoscopy revealed vocal fold collision in all participants, with closed quotients from 30% to 73%. Computational modeling show that the biomechanical requirements to produce such high-pitched voice would be an increased contraction of the cricothyroid muscle, vocal fold strain of about 50%, and high subglottal pressure. Our data suggest that high-pitched operatic soprano singing uses the MEAD mechanism. Consequently, the commonly used term "whistle register" does not reflect the physical principle of a whistle with regard to voice generation in high pitched classical singing.

**Keywords:** high sopranos, register, whistle

## ABSTRACT 46

### The Soul Voice Method as a Vocal Tool To Reduce Music Performance Anxiety In Adolescent Music Students: A Pilot Study

Sofia Serra, Karina Schelde, Nádia Moura, Viria Romagnoli, Anke Jong, Pedro Dias, Veríssimo Lurdes, Oliveira-Silva Patricia

Music Performance Anxiety (MPA) is a psychological phenomenon characterized by the experience of apprehension and nervousness in anticipation of or during musical performances, which can negatively impact the musician's ability to perform and potentially lead to a diminished quality of musical execution. MPA may affect musicians and music students at different ages and stages of development and continues to be significantly undervalued (Kenny, 2011). Within music students, aged between 12 and 15 years, MPA is estimated to affect up to 50% (StGeorge, 2005), many of which lack opportunities for developing self-awareness of their limitations or access therapies to acknowledge and overcome the detrimental effects of MPA, leading, in many cases, to dropout of music performance. Despite the large number of interventions developed to control MPA, this phenomenon persists (Herman & Clark, 2023). This presentation introduces a pilot study with a novel

intervention utilizing Voice Meditation as a method to address MPA, employing the vocal instrument itself to mitigate performance anxiety.

**Objective:** The aim of this pilot study was to experiment the use of vocal meditative method "Soul voice" to reduce MPA, and explore its usefulness with students aged between 12 and 14.

**Method:** A group of 10 music students with ages between 12 and 14, were characterized for their MPA and psychological vulnerability, using the following measures: socio-demographic and music-related variables questionnaire; Music Performance Anxiety Inventory for Adolescents (MPAI-A); State-Trait Anxiety Inventory for Children—Trait (STAI-C C-2); Youth Self-Report (YSR). Anxious adolescents were then invited to participate in a four-week pilot intervention using the Soul Voice Method. Sessions centered in the use of Voice through meditation, breathing management, body consciousness, peer support, sounding projection, vocal expansion, sound bath, among other vocal exercises from the method.

**Results and Conclusions:** It is estimated that the consciousness development of the young musicians using the soul voice method may be an innovative and potentially more efficient method to work with MPA. However, the sessions are expected to take place in the time leading between the submission and the conference. Results and conclusions will be structured based on the research goals outlined earlier.

**Keywords:** Music Performance Anxiety, Voice Therapy Approach, Soul Voice Method, Musician Adolescents", Vocal intervention

## ABSTRACT 50

### Inhalation as A Marker Of Emotion Expression In Singing

Tua Hakanpää

**Objective:** This study examines how the different stages of phonation affect the recognition of emotion in singing voices. Particular focus is on the inhalation preceding phonation. This information may be useful in improving the training of interpretation in singing.

**Methods:** Two female- and two male second year acting students (mean age 24 years) with a minimum of 2 years of singing lessons sang an 8-bar singing excerpt expressing the emotions of joy, tenderness, sadness, and anger plus a neutral state. There were four types of voice samples extracted for the listening test: 1) breathing sounds, 2) vowel sounds [a:], 3) consonant + vowel [a:] and 4) breathing sound + consonant + vowel [a:]. A listening test was conducted in which 80 voice samples were played to 28 listeners (One sample/singer/condition/emotion). The listeners completed a multiple-choice questionnaire on which emotion they perceived as being expressed.

**Results:** The percentage of correct recognitions out of all the answers in the listening test (N= 2240) was 47%. Recognition of expressions of joy and sadness increased with the amount of information

provided in the singing samples. Recognition of expressions of tenderness and anger decreased in sample type 3 (consonant + vowel) & 4 (breath + consonant + vowel). Recognition of expressions of emotion from breath-only was highest in sadness (44%) and lowest in tenderness (7%). Joy was recognized from the breath-only samples in 12% of the answers given in the listening test and anger in 33% of the cases.

**Conclusions:** It was possible to recognize emotion expression from singing samples containing only the sound of inhalation preceding phonation. Negatively valenced emotions were easier to recognize from breath-only samples than positively valenced emotions.

**Keywords:** emotion expression, singing, inhalation, emotion recognition

## ABSTRACT 52

### Voice and Vocal Fold Condition Following Short-Term General Anesthesia: A Prospective Study

Jan Wouter Brunings

**Background:** Dysphonia, with or without laryngeal changes, has been reported as a complication following prolonged intubation. In contrast, it is unknown if laryngeal changes also occur following short-term airway instrumentation. The objectives of this study were to determine the prevalence of laryngeal changes in patients undergoing short-term routine general anesthesia using an endotracheal tube (ETT) or supraglottic airway (SGA), and to identify predictors to these changes.

**Methods:** Standardized voice assessments were performed preoperatively, postoperatively, and at follow-up on adults undergoing general anesthesia for an elective procedure of less than three hours requiring an ETT or a SGA. The standardized voice assessment protocol comprised a rigid videolaryngostroboscopy, the Voice Handicap Index (VHI), and acoustic voice analysis. The effects of demographic and anesthetic characteristics and type of airway instrumentation on the videolaryngostroboscopic variables were studied using multilevel logistic regression. Multilevel linear regression was used to reveal preoperative versus postoperative changes in VHI and acoustic voice scores.

**Results:** Overall, the prevalence of postoperative laryngeal changes was low. Significant postoperative laryngeal changes were found for the variables right-sided vocal fold redness in the ETT group ($P = 0.048$) and right-sided vocal fold blood vessels in both groups (ETT versus SGA). However, after adjustment for all demographic and anesthetic characteristics in the regression model, the effect of the type of airway instrumentation (ETT versus SGA) on the variable right-sided vocal fold redness was no longer significant.

**Conclusions:** ETT and SGA short-term airway instrumentation are vocal fold function sparing techniques with negligible laryngeal changes.

**Keywords:** Anesthesia, Intubation, Intratracheal, Laryngeal mask, Vocal cords

**ABSTRACT 54**

## Introducing Of Voice Wellness Index Application for Dysphonia Assessment and Screening

Virgilijus Ulozas , Nora Ulozaitė-Stanienė, Kipras Pribuišis, Tadas Petrauskas, Tomas Blažauskas, Rytis Maskeliūnas

Objective. In the context of the multidimensionality of voice, there is a growing interest in studies investigating the integration of multidimensional information obtained in the voice clinic. This study aimed to develop a universal-platform-based Voice Wellness Index (VWI) application combining the Acoustic Voice Quality Index (AVQI) and Glottal Function Index (GFI) data and to evaluate its reliability in quantitative voice assessment and normal versus pathological voice differentiation.

**Methods:** A study group consisted of 135 adult individuals, including 49 with normal voices and 86 patients with pathological voices. The "Voice Wellness Index"application installed in five iOS and Android smartphones was employed for VWI estimation. The VWI measures calculated from voice recordings obtained from a reference studio microphone were compared with VWI results obtained using smartphones. The diagnostic accuracy of WVI differentiating normal and pathological voice was evaluated by applying the receiver-operating characteristics (ROC) statistics i.e. area under the curve (AUC), sensitivity, and specificity.

**Results:** The VWI scores of individual smartphones displayed an excellent inter-smartphone agreement and reliability achieving Cronbach's alpha of 0.972 and ICC of 0.972 (0.964 to 0.979). Almost perfect direct linear correlations (r=0.993–0.998) were observed between the VWI results obtained with a studio microphone and different smartphones. Depending on the individual smartphone device used, the cutoff scores of VWI related to differentiating between normal and pathological voice groups were calculated as 5.6–6.0 with the best balance between sensitivity (94.10–95.15%) and specificity (93.68–95.72%). The diagnostic accuracy was excellent in all cases, with an AUC of 0.970–0.974.

**Conclusion:** The "Voice Wellness Index" application represents an accurate and reliable tool for voice quality measurement and normal versus pathological voice screening. It has considerable potential to be used by healthcare professionals and patients.

**Keywords:** Voice screening app, AVQI, GFI, VWI

**ABSTRACT 55**

## Holistic Approach in Treatment of High Professional Singers

Joseph Schlömicher-Thier

The physician in attendance must devise an effective treatment concept that will enable the patient to make full use of his/her voice within the shortest possible time. To find a right decision for a conservative therapy or for a potential phonosurgery procedure, the physician takes a high degree of responsibility. Any unduly prolonged "vocal rest for safety reasons"induces unnecessary cancellations, involving the risk of sizable financial loss for the singer and even future contracts. Inadequate vocal rest and overloading the voice with an untreated organic disease can likewise constitute a great danger. Finding the adequate treatment plan in such cases requires considerable sensitivity and sometimes as well necessitates assertiveness and authority. The Author is the consultant doctor of the Salzburg Festival since more the 25 years and will underline these presentation with challenging cases of high professional singers.

**Keywords:** singers, physician, effective treatment, effective decision

## ABSTRACT 56

### Living High: Manual Treatment of the Speaking Voice In Singers

Kim Gutowski

The lecture will explore the complex interplay between the intense use of the singing voice, particularly in the high ranges, and its subsequent impact on the speaking voice. It is well known that singing, especially at high pitches, requires a significant amount of muscular effort in addition to precise laryngeal adjustments. This presentation will explore the mechanisms by which these vocal demands may manifest symptomatically in the speaking voice and identify specific patterns of muscular tension that may occur. A major focus of the lecture is the use of manual therapy techniques to relieve these tensions and facilitate relaxation of the (para-)laryngeal muscles. The presentation carefully outlines how these manual interventions can influence the position of the larynx and subsequently affect voice quality and pitch. Through the use of video footage, the presentation provides a compelling visual comparison of the effects of the treatment, showing changes in voice before and after intervention.

**Keywords:** speaking voice, singers, muscle tension, manual therapy

## ABSTRACT 57

### Effects of the Proprioceptive-Elastic Method in Promoting Vocal Health and Preventing Vocal Disorders Among Adolescents: Experimental Study Within A Scout Group

Barbara Ramella, Beatrice Maurutto, Marco Fantini

**Background:** This dissertation investigates the effects of an innovative strategy for the prevention of vocal disorders among adolescents. Through the application of the Proprioceptive-Elastic (PROEL) Method, a program was devised specifically targeting the prevention of vocal disorders among adolescents aged 10 to 16 years. This prevention program comprises four sessions aimed at increasing awareness of risk factors, advocating for local hydration, improving muscle flexibility, and exploring vocal resonance through the implementation of the PROEL method. The aim of the study is to demonstrate an improved stability of vocal quality in the subjects involved in the experimentation.

**Materials and Methods:** In the context of this research, a sample of 19 individuals, aged between 11 and 14 years, was randomly divided into an experimental group, which participated in the prevention program, and a control group. Participants in the study underwent perceptual evaluations using the GRBAS scale, electroacoustic assessments measuring pitch range, Shimmer, Jitter, CPPS, AVQI, and self-assessment utilizing the CVHI-10 questionnaire at three intervals: initial, intermediate, and final.

**Results:** The data analysis revealed an increase in the stability of the Pitch Range in the experimental group, highlighting its ability to maintain a consistent vocal range despite vocal exertions, in contrast to the control group that showed a decrease. Simultaneously, the perceptual evaluation demonstrated a decrease and stability of values over time in the experimental group, unlike the control group characterized by a more inconsistent trend. Within the experimental group, a statistically significant variation (p value= 0,037) in vocal acoustic quality was observed, confirmed by the increase in average CPPS (Cepstral Peak Prominence Smoothed) values.

**Conclusions:** These findings emphasize the positive impact of the prevention program, confirming the effectiveness of the PROEL Method-based program in preserving the vocal health of adolescents without significant vocal pathologies by stabilizing their vocal conditions. The adopted approach, proven to be particularly suitable for the needs of adolescents and engaging in the proposed activities, demonstrates that the preventive pathway is an effective strategy for ensuring a healthy and stable voice over time."

**Keywords:** Vocal disorders, Adolescents, Prevention program, PROEL Method, Vocal stability

## ABSTRACT 59

### Contemporary Commercial Music (Ccm) Vocal Pedagogy: Identifying A Foundational Framework

Marisa Lee Naismith

Fundamentally, the evolution, accessibility, and diversification of contemporary commercial music (CCM) styles over the last century have been a consequence of changes in technology, a major shift in music consumption, and the impact of the globalization of popular music culture. Western popular

music has rapidly expanded to become the most dominant form of music internationally. This increase in consumption of CCM styles has created a growing demand for vocal instruction across a broad range of CCM styles in both private studios and tertiary education institutions.

While the overwhelming growth in CCM production over the past 100 years acknowledges the legitimacy of these music styles, the pedagogy has not evolved sufficiently to compensate for the diversity and scope of CCM styles and associated vocal characteristics. This paper addresses the challenges of teaching singers across CCM styles and informs the development of a tailored CCM pedagogical framework that can be adapted to compensate for this ever-evolving territory of music styles.

Forming part of a larger research study, this paper reports specifically on the perspectives of nine prominent CCM pedagogues against five key themes identified from the literature of voice science and vocal pedagogy as foundational elements of technique, i.e., alignment, breath management, breath flow and support, resonance, and articulation. The results of this investigation have particular implications for teachers and music institutions working within a dynamic CCM voice teaching industry. Recommendations are presented as to how we can continue to be responsive to the individual needs of students while meeting current market demands.

## ABSTRACT 60

### The Effect of Speaking Rate on Breathing and Voice Behaviour in Counting

Anna Katrine Waage, Jenny Iwarsson

**Objective:** The objective of the present study was to investigate the effect of fast speaking on pause duration, breath group duration, and fundamental frequency (FO) in rote speech (counting).

**Method:** 28 healthy women (age 18-39) who had no experience of voice training, repeated a counting task in both a habitual and fast speaking rate. Pause duration, breath group duration and mean fundamental frequency was measured from audio recordings. Differences in the study variables between habitual and fast speaking rates were analyzed and tested for statistical significance.

**Results:** In fast speaking rate, mean pause duration was shorter and mean breath group duration longer as compared with habitual speaking rate, both with statistical significance at the group level. Surprisingly, mean fundamental frequency was significantly lower in the fast-speaking rate condition.

**Conclusion:** The results overall supported previous research and the hypothesis that pause duration becomes shorter and breath group duration longer with a fast-speaking rate. This may have clinical relevance for voice therapy and supports the importance of speaking rate for the understanding and treatment of some hyperfunctional voice disorders. Notably, however, our findings indicate that counting as a speech task induces a specific pattern which may not be comparable to other speech tasks, nor representative of spontaneous speech in every-day-life.

**Keywords:** speech rate, speaking rate, articulation rate, speaking tempo, pause, breath group, hyperfunction, voice therapy

## ABSTRACT 61

### Latest Developments on The Vocal Tract Organ

David Howard

**Objective:** This paper reports the current state of development of the Vocal Tract Organ (VTO); a new musical instrument for musical performance and intonation research.

**Method/Design:** The VTO exists in two distinct formats and all versions are written in Pure Data (Pd). The first format is a keyboard instrument that has stops as are found on a church organ. It creates its larynx output sounds via special small output aperture loudspeakers onto which are placed 3-D printed oral vowel tracts. It exists in two formats; one has all concert pitch stops, each using its own loudspeaker with a vowel tract and the other has one harmonic and a gain control per stop. Both are played via a MIDI keyboard and stop tabs. The second format is a solo instrument with one slider for fundamental frequency and a 3-D printed oral vowel tract.

This paper will detail the inner workings of the harmonic version currently in development.

**Results:** The newest VTO is a one keyboard instrument with 16 organ tab stops and a swell (volume) pedal. It plays like a chamber organ but the naming and the sounds of its stops are unique. Each stop controls one harmonic of the played note(s) and each stop has an associated volume controle to enable the gain of every selected harmonic to be set independently. The approximate equivalent of a pipe organ 'tremulant' (pitch undulation) stop is available on the VTO using a MIDI vibrato wheel and in addition, pitch bend can be deployed from the MIDI keyboard.

**Conclusion:** The Vocal Tract Organ is a novel musical instrument for performance and research and a new version is reported that is currently under development. It will be used for performance as well as tuning experiments relevant to choral singing where control of vowel sound has been important.

**Keywords:** Intonation, vocal tract

## ABSTRACT 63

### Integrating Psychosocial Interventions in Muscle Tension Dysphonia (Mtd) Management: A Multidisciplinary Approach

Stephen King, Jenevora Williams

**Objective:** To explore the psychosocial aspects and treatment strategies for Muscle Tension Dysphonia (MTD), with a focus on integrating psychotherapeutic interventions alongside traditional voice therapy.

**Methods/Design:** A qualitative study (Misono et al., 2019) and a systematic review (Gray et al., 2021) were analyzed to understand the lived experiences of individuals with MTD and to evaluate the effectiveness of various interventions. The qualitative study identified themes related to trauma, triggers, emotional responses, and coping strategies, while the systematic review assessed the quality and efficacy of voice and psychotherapeutic treatments for MTD.

**Results:** Participants in the qualitative study often did not recognize the link between emotions and voice symptoms, instead expressing hope-based sentiments. However, triggers for voice dysfunction episodes included both external stimuli and internal emotional reactions, revealing a lack of awareness among participants. The systematic review highlighted the low quality of existing studies on MTD treatments but suggested the feasibility of implementing cognitive-behavioral therapy (CBT) alongside voice therapy to address functional voice disorders effectively.

**Conclusions:** The findings suggest a need for interdisciplinary approaches to MTD treatment, incorporating both physiological and psychosocial interventions. While traditional voice therapies like circumlaryngeal massage were mentioned, prescribed medications like proton pump inhibitors showed limited efficacy. The review advocates for CBT as a viable adjunct to voice therapy, emphasizing the importance of addressing both physical and emotional aspects of MTD. This underscores the necessity of holistic care for individuals with MTD, integrating psychological interventions to manage underlying emotional stressors alongside traditional voice treatments."

## ABSTRACT 66

### Exploring Autonomic Dysfunction In Functional Dysphonia: A Pilot Study

Iris Meerschman, Evelien D'haeseleer, Marie-Anne Vanderhasselt, Nelson Roy, Sofie Claeys, Kristl Vonck, Gwen Van Nuffelen, Gauthier Desuter, Riet Vergauwe,Kristiane Ven Lierde

**Background:** Although psychological factors have been implicated in patients with functional dysphonia (FD), conventional voice therapy (CVT) typically targets the aberrant voice symptoms exclusively. Yet, CVT is not always successful, and in view of the significant adverse quality of life impact combined with the financial burden on the healthcare system, research is needed to elucidate the underlying psychophysiology of FD and improve treatment outcomes.

**Objectives:** The first objective of this pilot study is to investigate the occurrence and frequency of symptoms and/or disorders related to autonomic nervous system (ANS) dysfunction in patients with FD. The second objective is to investigate the effects of a therapy based on ANS regulation, i.e. heart rate variability (HRV) biofeedback, in this population.

**Methods:** Autonomic (dys)function will be investigated using both physiological measures (e.g. HRV) and psychological patient-reported outcome measures (e.g. Depression Anxiety and Stress Scale). Patients will receive 1 month of HRV biofeedback training with 20min of daily practice. Both the autonomic assessment and the voice assessment will be performed pre- and posttherapy.

**Results:** Data collection for this pilot study is currently ongoing and the first results will be available by the time of the conference. In a later stage of the project, autonomic dysfunction in FD will be compared with gender- and age-matched vocally healthy controls, using a case-control study. Second, the effects of the ANS regulation therapy in FD will be compared with CVT alone or in combination with ANS regulation therapy, using a randomized controlled trial."

**ABSTRACT 67**

## Immediate Effects Of Straw Phonation In Air Or Water On The Laryngeal Function And Configuration Of Female Speech-Language Pathology Students Visualized With Strobovideolaryngoscopy: A Randomized Controlled Trial

Iris Meerschman, Evelien D'haeseleer, Imke Kissel, Casper De Vriese, Peter Tomassen, Frederick Dochy, Kaat Pieters, Sofie Claeys, Robert Sataloff, Kristiane Van Lierde

**Objective:** The objective of this study was to investigate and compare the immediate effects of straw phonation (SP) in air, SP in 2cm water, and SP in 5cm water (with stirring straws), on the laryngeal function and configuration of a homogeneous group of vocally healthy female speech-language pathology students, visualized with flexible strobovideolaryngoscopy (SVL).

**Methods:** A randomized controlled trial was used. Fifty-two female speech-language pathology students (mean age: 18.7 years, SD: 0.6) were assigned randomly to one of three experimental groups or a control group: (1) SP in air (2) SP in 2cm water (3) SP in 5cm water, or (4) [u] phonation with similar soft onset and slightly pursed lips as in SP but without a straw (control group). The participants underwent flexible SVL during habitual [u] phonation, followed by the specific semi-occluded vocal tract (SOVT) exercise of their group assignment. All video samples were evaluated randomly and blindly by two experienced investigators using the Voice-Vibratory Assessment with Laryngeal Imaging (VALI) rating form, first independently and then by consensus.

**Results:** Compared to habitual phonation, the vibrational amplitude decreased during SP in 5cm water and SP in 2cm water, being more prominent in the first, more flow-resistant exercise. The anteroposterior (AP) supraglottic compression similarly increased during SP in air, SP in 2cm and SP in 5cm water. Further, a rise in mediolateral compression and a decrease in phase symmetry and regularity were found during SP in 2cm water. A similar decrease in regularity was observed during SP in 5cm water.

**Conclusions:** Both SP in air and SP in water cause positive immediate laryngeal effects for voice training opportunities. More AP supraglottic activity found during each exercise might indicate epilarynx narrowing, an economic phenomenon associated with SOVT. Immersing the straw in water additionally diminished the vibrational amplitude, lowering vocal fold impact stress and risk for phonotrauma during the exercise. The decreased regularity of the vibrational cycles during SP in water might be due to the varying back pressure created by the water bubbling. The impact of SP in water on ML supraglottic compression needs further investigation."

## ABSTRACT 68

### How Change of Endoscopy Techniques Can Lead To Change Of Diagnosis

Susanne Fleischer

Office-based laryngoscopy is a common routine procedure. Nowadays, the new technical equipment such as high definition cameras, flexible tip-chip endoscopes and better optics allows for very precise examination. Nevertheless, without professional handling of the equipment one cannot take full advantage of the potential of the newest technology. In this presentation we want to demonstrate how improved endoscopic techniques can lead to a change of diagnoses by dealing with 3 different problems.

1. The vocal folds are only 1,5 – 2,0 cm long and lesions smaller than 1 mm may matter. Because resolution is improved the closer the lens gets to the target it is important to decrease the distance of the lens to the vocal folds. In small endoscopes with tiny lenses, millimetres can make a big difference. We will describe an easily performed clinical handling maneuver in flexible endoscopy, the so-called dipping maneuver, that allows to move the tip of the endoscope very close inside the larynx and to achieve maximum magnification of the vocal folds during indirect laryngoscopy.

2. Not all structures of the vocal folds are fully visible during endoscopy from above. For this problem it is helpful to change the direction of view by rotating the flexible endoscope. In rigid endoscopy different positions of the endoscope and / or the head of the patient can make different regions of the larynx better visible.

3. Some changes on the edge of the vocal folds might not be visible because they are adherent to the surface of the vocal folds. For this problem, during inspiratory phonation or forced rapid inspiration the medial part of the vocal fold is suctioned into the glottis and its full size gets visible.

In conclusion, these maneuvers allow to move the tip of the endoscope very close inside the larynx and to change the direction of view thus gaining an extraordinary magnification and quite astonishing

'insights' also on otherwise hidden structures within office-based endoscopy. Images of laryngeal findings, all obtained with these special maneuvers, are demonstrated and paralleled with instructional figures how to perform these three procedures."

## ABSTRACT 72

### Influence of Glottal Tuning Parameters On The Vocal Folds' Oscillations Within A Synthetic Larynx Model

Stefan Kniesburges, Bogac Tur, Marie Köberlein

**Objective:** The fundamental frequency, register, quality and perception of the human voice is the result of a complex interaction between the laryngeal muscles controlling the glottal tuning parameters as the prestress, length and adduction of the vocal folds, and the exhalation airflow. This interplay of tuning parameters is extremely difficult to analyze based on living subject studies as the laryngeal muscles cannot be controlled self-consciously. To analyze the influencing parameters separately, an experimental larynx model was developed with embedded fibers that allows the independent control of the fibers' tension within the vocal folds, the adduction and the flowrate through the model.

**Methods:** The larynx model is composed of a cylinder representing the thyroid cartilage with two three-layer vocal fold models with fibers included. It is made of silicone with different stiffness values mimicking the different tissue properties. The vocal folds' adduction and prestress were controlled by mechanical traversing tables. Additionally, a straight vocal tract model was placed on top of the larynx model. The experimental setup includes a subglottal pressure sensor, a highspeed camera and a microphone. During the measurements, the vocal folds were continuously adducted for each combination of prestress and flowrate until stable oscillations occurred.

**Results:** For each combination of flowrate and prestress, the vocal folds started to vibrate at two distinct fundamental frequency (F0) levels F0L1 and F0L2 depending on the increasing adduction position of the vocal folds. Thereby, F0L1 ranged from 160-200 Hz and F0L2 from 250-350 Hz. Furthermore, F0 predominantly increased with increasing prestress in the vocal folds for both F0-levels. The sound pressure level was found to be higher in F0L1 (63-75 dB) compared to F0L2 (69-82 dB).

**Conclusions:** The larynx model allows the separate control of the glottal tuning parameters which is not possible in-vivo. The first F0-level shows similar physiological mechanisms during voice onset. The second F0 level is also in the physiological range and potentially exhibits similar phenomena in human phonation. However, a direct attribution to physiological processes during phonation is hard to identify due to the separate control of the glottal tuning parameters in contrast to in-vivo.

**ABSTRACT 73**

## Collaborative Endeavors Aimed At Promoting The Voice Resilience And Vocal Health Of Azerbaijani Mugham Singers

Alexandria Sultan von Bruseldorff, Ramil Hashimli

Vocal-instrumental mugham, revered as part of UNESCO's intangible heritage list, is an ancient Azerbaijani tradition of modal music transmitted orally in a master-to-apprentice format for centuries. Mugham singers, known as khanende, require exceptional vocal prowess, encompassing power, range, and agility. Nevertheless, the exacting nature of these performances takes a toll on their voices, given the absence of formal instruction in modern vocal pedagogy and vocal hygiene practices. In response to this need, a collaborative effort was initiated to address the specific vocal challenges faced by Azerbaijani traditional mugham singers. This initiative operates within the newly established Voice Scientific Research Laboratory at the Azerbaijan National Conservatory, in partnership with the Voice Center, and a voice laboratory supported by the Science Development Foundation under the President of the Republic of Azerbaijan.

**Objective:** The primary goal is to reveal common functional problems in the voice of khanende and to enhance their vocal health and capabilities.

**Method and Instrumentation:** In this study, two groups of professional young mugham singers, tenors, aged 21 to 40, were selected. The first group, underwent acoustic analysis at the conservatory laboratory to assess vocal function utilizing analysis software such as Sopran, Voce Vista, and Praat. The first group also received instruction on proper breathing techniques and vocal health management. Additionally, thorough examinations of vocal fold condition and functioning were conducted via fiberoptic laryngoscopy at the doctor's office. The second group continued their regular performance activities without formal evaluation during the study but underwent vocal health assessment afterward.

**Results:** In the study's results, it was observed that the first group exhibited significantly better vocal condition with minimal vocal problems. Conversely, the second group, lacking knowledge and consequently overusing their voice, continued experiencing vocal problems such as hoarseness, impaired singing, nodules, and other issues throughout the study period.

**Conclusion:** In mugham singing, the collaborative synergy between pedagogical researchers and medical professionals emerges as a proactive platform, fostering preventive measures against functional vocal pathologies. This alliance facilitates continuous education and research on vocal health ensuring regular check-ups and early intervention, thereby mitigating potential vocal issues.

**ABSTRACT 75**

## The Effect of Physiologic Adjustments In Estill Voice Training® Exercises On Voice Outcome Measures

Kimberly Steinhauer, Zhaoyan Zhang, Cari Tellis, Nicholas Barone

The goal of this study is to evaluate the feasibility of using acoustic and aerodynamic measures to infer physiological adjustments in the larynx and vocal tract. Acoustic, aerodynamic, and electroglottographic data were collected from Estill Voice trained subjects producing different combinations of adjustments in the true vocal fold, false vocal fold, thyroid cartilage, cricoid cartilage, and aryepiglottic sphincter. The physiologic adjustments were perceptually validated by expert listeners. Results showed statistically significant effects of physiologic adjustments on the voice outcome measures. In general, adjustments in the true vocal folds and aryepiglottic sphincter have more notable effects on voice outcome measures, whereas the effects of other adjustments are subtler. This suggests that acoustic and aerodynamic measures may be used as feedback to monitor physiological adjustments in voice training and therapy, for example in the treatment of hypo- and hyper-functional voice disorders.

**ABSTRACT 82**

## Why Do We Teach Vocal Agility The Way We Do? A Comparative Analysis of Vocal Agility Teaching Strategies And Applications To Indian Classical Music

Samyukta Ranganathan

This study explores practical methods for teaching vocal agility, specifically key stylistic ornamentations in Indian Classical Music (ICM) (Radhakrishnan et al., 2011). Vocal agility refers to the swift and precise execution of melodic phrases and vocal flourishes. Traditional ICM teaching approaches often rely on imitation and daily practice without necessarily addressing underlying physiological principles or individual vocal limitations. Furthermore, hyperfunction and strain are common complaints for ICM singers (Arunachalam, 2014), negatively impacting vocal agility. This may contribute to students plateauing in skill development without specific techniques to address limitations in ICM classrooms. Thus, this study addresses a notable gap in the pedagogy of vocal agility within ICM. It revealed effective teaching strategies to improve skill acquisition and efficiency that culminated in a vocal agility training schematic.

Previous research and the literature search highlighted a lack of homogeneous peer-reviewed literature on the pedagogy of vocal agility. Thus, qualitative document analysis (Bowen, 2009) of YouTube videos teaching vocal agility was employed, which compared methodologies across genres. Key

themes identified in the document analysis informed a realist literature review (Rycroft-Malone et al., 2012), spanning research on laryngeal musculature, motor-learning theory, and ornamentation across musical genres, integrating insights from sports physiology literature.

The analysis exemplified several techniques to enhance vocal agility skill acquisition that informed the development of the training schematic. Daily practice recommendations emphasised spaced sessions (Nix, 2017) balanced with overload training (Sandage & Hoch, 2018). Cross-training various vocal articulations such as staccato, aspirates (McDonnell et al., 2010; Cleveland, 2001), glottal articulation (Sherman & Brown, 1995), vibrato (Nix, 2014; Sundberg, 1994), and yodelling (Echternach & Richter, 2010) was shown to promote vocal flexibility and develop unencumbered and inherently balanced intrinsic laryngeal muscles (Titze, 2014). Vowel choices, particularly closed vowels, facilitate efficient cord closure and promote effective acoustic setups, suggesting potential benefits for agility training when integrated with SOVTEs (Nix et al., 2008; Titze, 2018).

These findings underscore the importance of tailored, deliberate practice and understanding principles underpinning vocal agility for effective training. Thus, the training protocol developed in this study provides practical guidance for teaching vocal agility efficiently while preserving ICM's stylistic authenticity."

## ABSTRACT 83

### Intrinsic Pitch Of Vowels In A Cappella Choral Singing

David Howard

**Objective:** This paper reports on production and perception fundamental frequency variations for individual singers singing different vowels against three-part vocal tract organ chords on a fixed vowel. This experiment follows up on a recently reported production experiment on vowel intrinsic pitch in the Journal of Voice (http://tinyurl.com/ye29b4px); in particular, it extends that work by making use of well-controlled reference chords from a Vocal Tract Organ rather than 3-part sung chords.

**Method:** The purpose here is to explore the prevalence or otherwise of vowel intrinsic pitch production and perception effects in a cappella choral quartet singing. Intrinsic pitch is the effect where listeners perceive a change in pitch when a vowel is varied but the fundamental frequency remains constant.

The production experimental design encompasses the use of the Vocal Tract Organ to play a series of slow moving three-part chords on a fixed vowel whilst a fourth singer sings a series of vowels against each chord. The fundamental frequency for each vowel sing is analysed and compared with that of the written note to establish whether there is any compensation being made for the intrinsic pitch of the vowels being sung.

The perception experimental design is a tuning experiment in which singers pitch match a set of vowels electronically generated reference three-part chords produced on the same vowel.

**Results:** The interinsic pitch of vowels has been shown to modify the perceived tuning of sung notes. This experiment explores this effect in the context of well defined reference chords as opposed to a cappella sung chords which are subject to natural variations such as vibrato.

**Conclusion:** Vowel intrinsic pitch is an important effect in the context of a cappella choral singing when parts sing different vowels. Whilst this is not commonplace in regards to compositions in the repertoire, there are certainly pieces of music that do require the singing of different vowels in various parts and tuning for intrinsic pitch becomes salient. Knowledge of what singers do in practice in relation to this is important.

**ABSTRACT 86**

## Speech Therapy Clients With Voice, Throat And Respiratory Complaints: Self-Reported Autonomic Reactivity, Anxiety And Depression And Effects Of Safe And Sound Protocol

Heleen Grooten-Bresser, Keri Heilman

Some evidence points to the existence of oto-rhino-laryngeal symptoms that may have a pathophysiology related to brain-body state regulation. We use predictions from the Polyvagal Theory to investigate whether clients with such symptoms have increased autonomic reactivity, anxiety, and depression. Study 1 included 54 symptomatic clients, and a comparison group of 26 individuals without symptoms. Outcome measures were anxiety and depression (Hospital Anxiety and Depression Scale, HADS), autonomic reactivity (Body Perception Questionnaire Short Form, BPQ-SF), and extent of voice handicap (The Voice Handicap Index, VHI) for the clients. The client group scored higher than the control group in supra-diaphragmatic reactivity, but there were no group differences in other measures. Based on the findings of Study 1, a feasibility study (Study 2) evaluated the effects of the Safe and Sound Protocol (SSP), a Polyvagal-informed protocol, on the same outcome measures. Study 2 included 33 clients with self-reported voice and throat complaints. Outcome measures assessed pre- and post-SSP were anxiety and depression (HADS) and autonomic reactivity (BPQ-SF). Results demonstrated a significant decrease in anxiety, depression, and autonomic reactivity post-SSP. In conclusion, a better understanding of the mechanisms that underlie voice symptomatology related to regulation may provide guidance for using neurophysiologically based interventions, such as SSP, that target autonomic state regulation.

**ABSTRACT 90**

## Comparing Text and Spoken Variation in Schiller's "The Hostage" Across Six Decades

Julia Merrill, Kai Koch

**Objective:** A performance of The Hostage by Friedrich Schiller poses many performative challenges: In addition to the alternation between the narrator, Damon/Moeros, and Dionys, an irregular meter and a considerable amount of punctuation challenge the speaker. This article examines the relationship between the text and the speaker's performance to determine to what extent the formal freedoms of the ballad have performative consequences. The research questions can be formulated as follows: Do the mean pitch and the tempo change over time, and is this also visible in the speaking parts of Damon and Dionys? Does the dramatic element of the speaking parts change over time? How are the possibilities of the text used for accentuation?

**Methods:** Thirty-eight recordings from 1953-2009 were analyzed acoustically and statistically regarding the average speaking pitch and tempo (syllables per second), as well as the accent structure of three selected verses.

**Results:** The acoustic analyses show that the speaking parts are more pronounced in recordings before 2003 than afterward and that the speaking tempo increases from the 1980s to the 2000s. The differences in the speaking parts are particularly evident in the fact that the role of Damon in recordings before 2003 is realized with a higher pitch than the role of Dionys or the part of the narrator, i.e., the roles are less pronounced in more recent recordings. There is also less variance in the narrator's mid-range speaking voice than in the performances of Damon or Dionys. Scope for interpretation is therefore used more in the roles than in the narrator. Concerning the accentuation structure, a large variation in pitch on certain syllables was detected. Despite a fairly stable meter, there is a clear variance in the speaker's style, with most speakers orienting themselves to the meter. In addition to the emphasis on the essential word "truth" and the subsequent structuring pause, there are various ways of presenting this important final statement on the part of Dionys.

**Conclusion:** This research determines changes over time and individual interpretations of spoken performances' aesthetics."

**ABSTRACT 93**

## Group Singing Workshops for People With Inducible Laryngeal Obstruction: A Feasibility Study

Emily Cooper

The research project aimed to observe the feasibility of group singing-related technique workshops for people with Inducible Laryngeal Obstruction (ILO) and to increase confidence in using voice and controlling upper airway through breathing and singing.

ILO is a condition affecting the function of vocal cords. On inspiration they spasm and close together, causing stridor, choking sensation, frequent coughing.

The inspiration for this project came from a collaboration between a speech and language therapist and a voice teacher who wanted to help people with ILO through singing and breathing techniques. This research was made possible by the University of Sheffield and Arts in Health at Sheffield Teaching Hospitals.

5 participants with ILO were recruited from Sheffield Teaching Hospitals, the research project partners. Workshops were held in February 2022 when COVID was still prevalent so workshops were online. Workshops included welcome and check-in questionnaires, posture checks, breathing exercises, humming, vowel sounds, singing exercises, and completing reflection questionnaires and socialising time.

A mixed-methods approach included observation, interviews with workshop leaders, questionnaires at beginning and end of workshops to 'check-in' and 'reflect', and a reflective questionnaire following workshops.

Quantitative data was analysed statistically and qualitative, thematically.

**Quantitative:** Analysis of likert scales on weekly questionnaires: Pearson Correlation revealed a significant increase in confidence ratings as weeks progressed.

**Qualitative:** Themes:

Confidence—Increased vocalisations, interactions, engagements observed.

Social—"Great to be able to meet others with similar issues", "Group singing and working together is fun".

Online—Workshop leaders were concerned being online would hinder ability to participate and reap benefits. However, being online increased accessibility for ILO and other physical conditions.

Workshops were seen as positive for participants with ILO. Limitations are the small sample size and self report measures used. Implications for this research are similar workshops could be used alongside speech and language therapy to potentially reduce time needed in therapy. Considerations for future workshops are a hybrid workshop delivery (online/face to face) to increase accessibility, limiting duration of workshops, and regular breaks to minimise physical and vocal fatigue."

**ABSTRACT 94**

## The Effect of Elongating Plosive Closures On The Recognition Of Plosives When Singing In Reverberant Acoustics

Allan Vurma, Einar Meister, Lya Meister, Jaan Ross, Marju Raju, Veeda Kala, Dede tuuri

**Aim:** This study aims to discover whether elongating plosive closures would improve the recognition of the plosives in sung vowel—plosive—vowel junctions, as in this case the resultant masking of the plosive burst by the decaying reverberation tail of the vowel preceding it would be weaker.

**Method:** Two perception tests with 34 and 33 participants were conducted. To create the stimuli, a classically trained mezzo-soprano and tenor were asked to sing /a/—/k, p, or t/—/a/ junctions at pitch G4 and F5 (mezzo-soprano) and G3 (tenor). The closure phase of the plosives was adjusted with Praat to last either 60 ms, 150 ms, or 260 ms.

In the first test, additional stimuli were used, in which reverberation (1) as in a Big Room, (2) as in a Church, and/or (3) Brown Noise were added to the stimuli using the Praat plugin Vocal Toolkit. The stimuli were played to the participants through HD560S headphones at about 65 dBA in an individually generated randomised order using the Praat listening experiment script. The participants had to indicate which plosive they heard.

In the second test, the participants sat in a concert hall (480 seats, T60 = 1.5 s), and the stimuli were played from a Genelec 8341A loudspeaker located on the stage.

**Results:** In the test with the artificial reverberation, a longer closure improved the recognition of plosives by up to 53 percentage points (in the case of the tenor singing /k/ in Big Room acoustics, chi-square = 137, $p < 0.0001$). In the test conducted in an actual concert hall, elongating the gap improved the recognition by up to 27 percentage points. The recognition was better for listeners who sat in the rows closer to the stage and for younger listeners. Producing the plosive bursts more intensively also improved the recognition. However, elongating the plosive gap did not enhance the recognition of the stimuli with added Brown Noise.

**Conclusion:** Lengthening the closure phase of the plosives can improve text intelligibility when singing in reverberant acoustics.

**ABSTRACT 95**

## Bridging The Gap: Voice Work Between Vocal Fold Surgery And 'Back To Stage' – A Timeline

Jale Papila

Professional singers depend on the unrestricted performance of their voice in their profession. If the voice no longer functions as usual on stage in the long term and surgery is unavoidable due to an otherwise untreatable organic change of the vocal folds, it is helpful to have a special voice rehabilitation in the phase between surgery and returning to the stage. This program, which is always adapted to the individual needs of those affected, initially concerns the speaking voice and later the singing voice. The aim of this voice work is to regenerate the singer's entire vocal range, develop a resilient voice, regulate compensatory tension mechanisms and regain a basic trust in the reliability of the voice.

A typical focus of this work is the transfer of the newly learnt tools to the vocal repertoire in order to return to a natural, self-evident stage performance.

In this presentation, the audience will be given an overview of the field of post-operative voice care, based on the experience of the MEDICAL VOICE CENTER in Hamburg with professional singers. The chronological process and the various phases of voice rehabilitation will be explained using a timeline. This is supplemented by case examples and patient videos from everyday practice.

## ABSTRACT 97

### Voice Quality and Narrative Specificity in Audio Descriptions

Viveka Lyberg-Åhlander, Roger Johansson, Jana Holsanova

**Background:** Audio description (AD) is an indispensable tool for making visual media accessible to audiences with visual impairments.

**Objective:** This study investigates the roles of voice quality and narrative specificity in improving imageability and comprehension for both sighted and non-sighted individuals.

**Method:** Twenty non-sighted participants, encompassing both congenitally blind individuals and those who became blind early in life, were compared to 20 sighted controls, matched based on verbal working memory abilities.

Participants were exposed to 50 concise event descriptions, articulating spatiotemporal dynamics with variable degrees of narrative specificity, and presented with both typical and dysphonic voice, recorded by the same female speaker. Following each description, subjective assessments were made regarding the subjects' ability to visualize the content, grasp the overall message, and their levels of listening effort and enjoyment.

**Results:** The findings reveal that the dysphonic voice presents a challenge to the non-sighted listeners who reported a significantly increased listening effort and diminished enjoyment when descriptions are presented in dysphonic voice quality. Also, elevated narrative specificity significantly boosts the capacity of non-sighted participants to mentally picture events, particularly those depicting motion changes and visuospatial relationships.

**Conclusion:** This research sheds light on the critical influence of vocal quality and narrative detail in AD and also offers insights for both practitioners and developers of automated AD technologies and to clinicians treating non-sighted individuals. By understanding the need of prioritizing considerate voice selection and, narrative precision, we can substantially enhance the accessibility and enjoyment of visual media for individuals with visual impairments.

**Keywords:** voice quality, audio description, non-sighted individuals

## ABSTRACT 98

### Acoustic Voice Assessment Reliability in Simulated Recording Environments

Ahmed Yousef, Eric Hunter

**Objective:** Background noise and reverberation time of a room are important factors for effective communication and speech intelligibility. The influence of these two factors is even more significant when considering voice assessment. Recording voice samples with unacceptable noise and reverberation levels can impact the outcome voice analysis and hence the evaluation of vocal health. This study investigates the environmental impact of different simulated levels of noise and reverberation on acoustic measures, commonly used for objective voice evaluation.

**Methods:** Voice recordings were selected from the publicly available Perceptual Voice Qualitied Database. Using signal processing techniques, the collected samples were modified to add in common recording and environmental effects (e.g. peak clipping, digital compressor/expander, simulated reverberation, noise). For example, reverberation was added via convolution to simulate multiple room sizes. All samples (the original and the modified recordings) were analyzed using a custom MATLAB algorithm combined with Pratt software resulting in common voice acoustic metrics which included traditional contemporary metrics that are temporal-based and spectral based. Statistical analyses were performed to investigate the consistency and discrepancies in the extracted acoustic measurements in response to the range of recording and environmental effects.

**Results and Conclusions:** By systematically manipulating recordings to simulate various degrees of common effects on an audio recording due to recording technique or environmental impacts, we were able to test the impact of such effects on estimated voice acoustic metrics. Results indicated which metrics were most sensitive to the various manipulations. For example, smoothed Cepstral Peak Prominence and jitter were not impacted by certain types of additive noise or a range of reverberation times. Knowing the sensitivity of the various metrics to such affects allows for the expanded use of recordings from a range of sources, as well as the selective use of metrics in the best case recording scenarios. Further, these results lead toward assisting clinical use of acoustic metrics in a range of recording environment and spaces concerns.

**ABSTRACT 99**

## Unlocking the Power of Voice for Diagnosing Different Diseases and Conditions: Systematic Literature Review

Ahmed Yousef, Lady Catherine Cantor-Cutiva, Eric Hunter

**Objective:** The complex nature of human voice production, involving a precise coordination between several physiological systems, makes it susceptible to a range of disorders. Therefore, we aimed to assess the use and efficacy of acoustic voice analysis in detecting different disorders that affect voice production based on a systematic literature review.

**Methods:** Indexed papers published in seven databases (including Web of Science, EBSCO, Pubmed, Science Direct, Scopus, Scielo, and BVS) were identified and screened. Papers written in three languages – including English, Portuguese, and Spanish – were considered. A comprehensive search string was designed according to the PICO framework: population (normal adults and patients with conditions that affect voice such as Parkinson disease, Amyotrophic lateral sclerosis, COVID-19, Dementia, and Alzheimer), intervention (any kind of intervention), comparison (intra- or inter-comparison between patients and normal controls), and outcome (acoustic measurements). A quality assessment was then performed, and low-quality papers were excluded. Relevant data were extracted from the considered studies to define the type of voice disorders identified using voice acoustic metrics, type of acoustic metrics used, and type of speech material.

**Results and Conclusions:** The present review highlighted the increasing interest (represented in the number of studies across years) in using acoustic voice analysis as a promising biomarker for predicting, diagnosing, and monitoring voice disorders. On top of these conditions, Parkinson disease was heavily investigated in literature compared to other conditions. The results demonstrated the acoustic measurements frequently used in the diagnosis of Parkinson disease, Amyotrophic lateral sclerosis, COVID-19, and other conditions. Additionally, the outcome of the meta-analysis pinpointed the acoustic measurements that acted as reliable biomarkers for detecting different conditions. The review also discusses the research gaps, limitations, underrepresented disorders, and overlooked biomarkers in the previous studies as well as the future directions. Valuable insights are also provided into enhancing the diagnosis and screening of numerous disorders utilizing voice as a promising biomarker.

**ABSTRACT 101**

## Glottal Voice Distortions: Nasolaryngoscopic and Spectral Analysis of Anatomophysiologic Changes in Singing Voice

Ariel Coelho, Rubens Guths, Maria Rita Rolim

The distorted voices, commonly called vocal drives in Brazil and in some other South American countries, are vocal ornaments belonging to the aesthetics of popular singing and desired by singers of different styles. The advances in vocal sciences have allowed the demystification of this type of technique in the last four decades, classifying them as glottal, supraglottic or mixed distortions/drives. The interdisciplinary approach in the evaluation of singers who use glottal distortions is fundamental for a broad understanding of the particularities of each case. The present study has as main objective to describe the anatomophysiological and spectral findings of the glottal distortions, identified in the practice of many singers. A sample of three singers in a sung emission with and without vocal distortions was collected. PreSonus Audio-Box Studio One kit was used to record the voice during the nasolaryngoscopic evaluation. The singers underwent vocal warm-up and functional evaluation of the larynx based on two studies on contemporary singers. The singers performed the Snarl Voice and Phaser distortions and both showed particular anatomophysiological behaviors. The larynx was low in the first distortion and the level of the clean voice in the second, with the posterior opening of the glottis in both distortions being observed, with opening of the middle third of the glottis for the first as well. Formants vary according to the vocal tract settings used for the distortions. The glottic distortions present a complex anatomophysiological behavior in their composition, with fundamental participation of the transverse interarytenoid muscle and lateral cricoarytenoids, as well as the the participation of the vocal fold in the frequency break. F3 varied according to the longitudinal length and F4 with the diameter, both being related to the three-dimensional adjustments of the vocal tract.

**Keywords:** Speech Therapy; Contemporary Singing; Formants; Vocal Distortions

## ABSTRACT 102

### Managing Childhood Dysphonia through Behaviour, Emotions and Relational Skills: From Assesment to Integrated Treatment

Giuliana Pisanu, Annamaria Cimmino, Fiammetta Fanari, Lucia Lazzarini, Chiara Maria Lucchesi, Tommasina Pontillo, Egle Sciuto

**Objective:** Pediatric voice disorders are highly prevalent during growth, with an estimated incidence between 6% and 23%. The most common vocal disorder in childhood is vocal cord nodules, followed by congenital disorders. Studies suggest a connection between the development of benign vocal cord lesions and behavioral or emotional problems in children. Therefore, it is important to use an integrated approach based on direct and indirect vocal therapy while considering the child's personality and family communication system. Currently, however, there are few studies, data, and standardized procedures regarding this topic.

**Methods:** This study collected data on the etiology and incidence of pediatric voice disorders, prevention, vocal hygiene, assessment methods, parental counseling, and direct/indirect therapy. Subsequently, the importance of an integrated approach for accurate diagnosis and effective

treatment has emerged. The speech therapy assessment includes physiological, pathological, familial, and relational history, paired with perceptual, electroacoustic, and aerodynamic analyses and self-evaluating questionnaires. Parents undergo a counselling phase, in which conversational rules, strategies for effective parent-child communication, and methods for reducing vocal stress behaviours are covered. Childcare involves an indirect approach, vocal hygiene rules, turn-taking games, listening, verbalization, emotional awareness, and direct practice with functional vocal exercises. Practitioners tested this program on children with vocal cord nodules for uniformity and standardization.

**Results:** Pre-and post-therapy data analysis showed voice improvement with the integrated approach involving parents. Besides perceptual and acoustic enhancements, parents refer changes in communication, relational aspects, and improved emotional awareness in the family context, which promotes the normalization and stabilization of vocal skills acquired by the child during the direct treatment phase. These results are preliminary due to a small sample size, and formal statistical analyses are pending.

**Conclusions:** The proposed speech therapy approach provides a comprehensive view of childhood dysphonia therapy, emphasizing both the child and the family system. An integrated approach is essential for positive effects on the child's voice disorder, reflecting the child's communicative context. Parents are crucial for supporting indirect/direct vocal therapy. Further research with a larger sample size and a control group is needed to confirm and generalize these preliminary results, making this integrated treatment more widely applicable.

## ABSTRACT 103

### Comparison of Vwi, Avqi, Abi, and Dsi Measures in Differentiating Between Normal and Dysphonic Voices

Nora Ulozaite–Staniene, Virgilijus Uloza

**Objective:** In order to address the limiting validity of a single acoustic parameter in comparison to the multidimensionality of voice signals, several multiparametric acoustic voice indices (MAVIs) have been created during the past few decades. These indices capture and fuse multiple acoustic voice parameters while taking into consideration both sustained phonation and connected speech and provide a single score that measures voice quality.

The study aimed to investigate and compare the accuracy and robustness of the multiparametric acoustic voice indices (MAVIs), namely the Dysphonia Severity Index (DSI), Acoustic Voice Quality Index (AVQI), Acoustic Breathiness Index (ABI), and Voice Wellness Index (VWI) measures in differentiating normal and dysphonic voices.

**Methods:** The study group consisted of 129 adult individuals including 49 with normal voices and 80 patients with pathological voices. The diagnostic accuracy of the investigated MAVI in differentiating between normal and pathological voices was assessed using receiver operating characteristics (ROC).

**Results:** Moderate to strong positive linear correlations were observed between different MAVIs. The ROC statistical analysis revealed that all used measurements manifested in a high level of accuracy (area under the curve (AUC) of 0.80 and greater) and an acceptable level of sensitivity and specificity in discriminating between normal and pathological voices. However, with AUC 0.99, the VWI demonstrated the highest diagnostic accuracy. The highest Youden index equaled 0.93, revealing that a VWI cut-off of 4.45 corresponds with highly acceptable sensitivity (97.50%) and specificity (95.92%).

**Conclusion:** The VWI was found to be beneficial in describing differences in voice quality status and discriminating between normal and dysphonic voices based on clinical diagnosis, i.e., dysphonia type, implying the VWI's reliable voice screening potential.

**Keywords:** acoustic voice analysis; screening; DSI; AVQI; ABI; VW

## ABSTRACT 106

### Heard But Not Seen – Opera Choristers' Thoughts on Occupational Environment and Vocal Health, an Exploratory Qualitative Study

Pontus Wiegert, Viveka Lyberg Åhlander, Roland Rydell

**Objective:** The main purpose for an opera singer is to produce a sound that carries over an orchestra in a way that is sustainable for many hours, several days a week. In many ways the demands on muscular control and endurance is comparable to that of professional athletes. In other voice dependent professions, like teachers, occupational environment is known to play a big part in maintaining vocal health. We postulated that this would be true for the opera singer as well and hence, the objective of this study was to explore opera singers' thoughts on their occupational environment from a vocal health perspective.

**Method:** 12 focus group interviews with a total of 47 opera choristers at the three main opera houses in Sweden were conducted. The singers were grouped according to sex and age (≤ 45 and ≥ 46 years). Discussions revolved around the research question "what occupational environment factors affect the professional vocal health of Swedish opera choristers—and what can management do to improve their situation" and was aided by and interview guide. Thematic analysis of the collected data was performed using Systematic Text Condensation according to Malterud.

**Results:** Five main themes were identified: (1) varying vocal demand, (2) adequate recovery, (3) instrument care, (4) psychosocial work environment and (5) management measures. Themes 1-4 described

what occupational environment factors were identified whereas theme 5 discussed how management could improve their work environment and thereby promote vocal health. In addition to the five main themes a collective underlying core prerequisite emerged which constituted the need for management to increase their understanding of the opera chorister profession – both vocally and psychologically.

**Conclusion:** This exploratory study suggests that the occupational environment of the opera chorister entails inherent vocal as well as psychosocial challenges. According to the singers several improvements could be made to facilitate better vocal health. To our knowledge this is the first study of its kind. Further research is needed to understand how the findings may be implemented in the work place.

**Keywords:** Opera, occupational environment, vocal health

## ABSTRACT 109

### Non-Selective Laryngeal Reinnervation with Ansa Cervicalis Muscle Pedicle for Unilateral Vocal Fold Paresis – Experiences And Long-Term Outcome

Fabian Burk, Gerhard Förster, Kathleen Klinge, Andreas H. Müller

**Background/Objective:** Non-selective reinnervation (NSR) is becoming increasingly established in the treatment of unilateral vocal fold paresis (UVFP). The following is an in-progress report on the experience gained with the Ansa cervicalis nerve-muscle pedicle method at a German laryngology center over the last years reflecting various long-term outcome parameters.

**Methods:** Since 03/2017, 22 patients (12 f, 10 m) with UVFP have been treated using NSR with Ansa nerve-muscle pedicle. In 15 cases, the paretic vocal fold was simultaneously augmented with hyaluronic acid to bridge the reinnervation time. The median duration of paresis was one year. The VHI-12, perceptual voice assessment, maximum phonation time, maximum phonation loudness (dB(A)@30cm) and the Dysphonia Severity Index were assessed as outcome parameters at T0 (baseline), T1 (3-6 months), T2 (9-12 months) and T4 (18-24 months). In addition, EMG diagnostics were performed pre- and postoperatively.

**Results:** Across all cases, substantial improvements were recorded in all parameters between T0 and T4. There were also further improvements in the course between T3 and T4. 81% of the patients showed a long-term stable voice improvement, regardless of the duration of paresis.

**Conclusions:** NSR with nerve-muscle pedicle appears to be a reliable and stable method over time for improving voice quality and voice-related quality of life in UVFP with potential for continued improvement in the long term. Various aspects of the technique and the kinetics of the outcome parameters are discussed and reviewed in the context of the spectrum of treatment methods.

**Keywords:** UVFP, Reinnervation, Recurrent nerve, Voice rehabilitation

**ABSTRACT 111**

## Injection Laryngoplasty of Unilateral Vocal Fold Paralysis Evaluated With Pause- And Speech Measurements

Jenny Iwarsson, Liv Øster Müller Bendtsen, Nanna Kolborg, Solveig Gunvor Pedersen, Andreas Schjellerup Jørkov

**Objective:** The purpose of this study was to examine pause and speech measurements crucial for intelligibility and communication, in patients with unilateral vocal fold paralysis, before and after injection laryngoplasty. The measurements were selected to investigate and explain the treatment effect on connected speech in these patients.

**Method:** Voice recordings of 24 patients with unilateral vocal fold paralysis from before and after injection laryngoplasty in local anesthesia were analyzed retrospectively with the computer program Praat. Measurements examined were number of pauses, average pause duration, pause ratio (expressing the amount of pausing during a reading aloud task), number of breath groups, average duration of breath groups, articulation rate, speaking rate, maximum phonation time and voice handicap index.

**Results:** Injection laryngoplasty had a significant improving effect on the number of pauses, pause ratio, number of breath groups, average duration of breath groups, articulation rate, speaking rate, maximum phonation time and voice handicap index. Maximum phonation time before treatment correlated with several pause- and speech measurements.

**Conclusion:** The results showed that injection laryngoplasty had a clear effect on several pause and speech measurements crucial for intelligibility and communication. In addition, the study showed that these pause and speech measurements correlated with maximum phonation time, but not with voice handicap index.

**Keywords:** Injection laryngoplasty, Unilateral recurrent laryngeal nerve palsy, Pauses, Speaking rate, Maximum Phonation Time

**ABSTRACT 112**

## Menopausal Singers' Group: A Teaching Experiment with Exercises and Support for Climacteric Singers

Kaisa Kelloniemi

**Menopausal Singers' Group:** A Teaching Experiment with Exercises and Support for Climacteric Singers In my development project in 2023-2024, I am conducting a study on non-professional classical singers and menopause. My thesis will consist of a short literature review of international research

of hormonal effects on the voice during menopause and a group tuition experiment of menopausal and post-menopausal women singers.

My aim is to deliver information on this subject for Finnish singers and singing teachers and to discover, what kind of support women going through menopause would like to receive to overcome difficulties with their singing voice. I also hope to be able to gather a basis of overall information on how the hormonal changes during menopause affects the singing voice.

My project involves 14 women aged 45-65, divided into 3 groups. I will run a total of 9-10 sessions with them, during which we test certain excercises that have originally been used in speech therapy (straw and other SOVT excercises, Smith Accent Method, Resonant Therapy excercises) to discover, if they have a significant impact on the menopausal voice. During and after the menopause the muscles of the larynx and the breathing system also lose their strength, and my hypothesis is that these speech therapy excercises would serve as physiotherapy for the musculatory system of singing. We also practise posture, relaxation and discussion to find out if these improve the singers' situation, which may also cause a variety of stress-related problems.

The process has started with a non-structural survey with an e-questionnaire to find out what kind of experiences the participants have had with singing during menopause and what kind of information they would like to receive to understand the phenomenon. After the meetings I will conduct focus group interviews to find out how the excercises have worked on each individual.

By the end of summer 2024 I expect to obtain evidence on whether the excercises we use actually do have an impact on my participants' voices and attitude to their changing voices or not, and if one of them is significantly more efficient than the others.

**Keywords:** singing voice, symptoms of menopause, speech therapy exercises, peer support, group tuition

## ABSTRACT 114

### Decoding Persuasion: A Scientific Exploration of Modern Rhetoric

Jarek Sacharski

**Attention, vocal architects and linguistic engineers:** prepare to dissect the neurological blueprints of modern rhetoric in this dynamic presentation.

Intrigued? This interactive exploration delves into the scientific underpinnings of the most compelling speakers, revealing the tactics that orchestrate audience engagement. We'll deconstruct the illusion of subtlety, unveiling the strategic manipulation that fuels captivating communication. We will move the audience!

Ready to analyse the symphonic interplay between verbal delivery, paraverbal elements like pitch and pace, and nonverbal cues? This holy trinity forms the scientific foundation of persuasion. Witness firsthand how effective communication transcends mere words, eliciting specific neural responses that resonate with the audience.

Curious about the meta-approach? It's a demonstration of the engaging techniques you'll encounter. Join this journey as we unlock the scientific evidence behind modern rhetoric, equipping you to not only analyse but also master the art of captivating communication.

I this short, not-so serious lecture, I will attempt to demonstrate practical application of rhetorical devices to create a series of communication effects on the audience.

**Keywords:** public speaking, rhetoric, effective communication, rhetorical devices

## ABSTRACT 115

### Methods Used By Singers of Western Classical Style to Enhance the Intelligibility of Sung Text

Veeda Kala Kala, Marju Raju

Western classical singing is a longstanding cultural tradition that combines both melody and text to convey meaning. However, it can often be challenging for listeners to comprehend the lyrics, for example at an opera performance. There are numerous publications on Western classical singing and its technique, but comparatively little is known about how singers and singing teachers work with text in practice. In this grounded theory research, an attempt is made to find out when and how classical singers work with text and by whom and what are they influenced thereby. Semi-structured personal interviews were conducted with Western style classical singers (N=30) working in Europe (n=25) and North America (n=5) including several voice types. The findings show that there is a list of different approaches among the singers regarding working with the text and improving the text intelligibility. The findings also illuminate many challenges singers face in their work with text/libretto, for example working with many different languages as well as the dialects within those languages. The outcome of this research provides insights into the intelligibility of sung text in Western style classical singing from practical perspective and therefore, it can serve as a valuable contribution to the research in this field.

**Keywords:** classical singing, text intelligibility, singers, singing pedagogy, grounded theory

**ABSTRACT 116**

## Egg Signal Representation Generation from Acoustical Signal Using Machine Learning

Huanchen Cai Cai, Sten Ternström

**Objective:** To explore the possibility of predicting electroglottographic (EGG) signals from acoustic signals, potentially enabling non-invasive monitoring of vocal fold vibration characteristics; and also bridging the gap between direct EGG measurements, which require specialized equipment and contact with the throat, and the more accessible acoustic signal analysis.

**Method/Design:** Using a Neural Network and signal processing design, the method begins with the acquisition of high-quality acoustic and EGG recordings for training, from participants producing sustained vowels and speech segments. The EGG signal is first pre-processed to remove background noise and enhance signal clarity. It is then transformed cycle-by-cycle to its low-order Fourier descriptors for dimensionality reduction. These descriptors are then used as target features to train the network for the given input acoustic waveform.

**Results:** The proposed method generated EGG Fourier descriptors from acoustic signals with a high degree of accuracy. In validation tests comparing the descriptors to actual EGG measurements obtained from the same vocalizations, the method demonstrated an average correlation coefficient above 0.85, indicating strong agreement between the generated descriptors and direct EGG measurements. Performances on individual vowels and speeches were tested.

**Conclusions:** The study introduces a promising new approach for generating EGG signals readily available acoustic signals. Reconstructing EGG pulse shapes from acoustic signals could be used as a reference when specialized EGG equipment is not practical. Future work will focus on refining the method's accuracy and exploring its application in clinical and telehealth environments.

**Keywords:** Machine learning, electroglottographic, acoustic, fourier descriptor

**ABSTRACT 117**

## Speaking Voice of the Finnish Tv-News Readers Before And After Social Media

Teija Waaramaa, Anne-Maria Laukkanen

Changes of speech in media reflect general changes in language and speech culture. In this study, we investigated the Finnish TV-news reading, considered as normative speech, during the last three decades (time periods 1990-1995 and 2015-2023), i.e. before and after the start of social media. The research material consists of speech samples from Finnish-speaking (n = 41) and Swedish-speaking

(n = 35) newsreaders (34 men, 42 women) obtained from the Finnish Broadcasting Company Yle's archive. The samples were analyzed for their acoustic characteristics using the Praat software, and they were also evaluated in a listening test. According to the results, the mean fundamental frequency (f0) of men's voices has increased, the change being statistically significant in Swedish-speaking men ($p < 0.05$). In the female samples, a statistically significant acoustic change was a gentler spectral slope in the newer samples. Also, in Swedish-speaking men, the slope of the spectrum was significantly gentler in the newer samples. This change of the spectrum may be related to changes in the recording technique. In the listening test, the voice color of Finnish-speaking men was judged to be darker in the newer samples than in the older ones. The speech tempo of Finnish-speaking men and both Finnish and Swedish-speaking women was estimated to be slower in the newer samples. This may increase understandability of speech. In the Finnish-speaking women, the intonation range was estimated to have increased. The results of the increase in the mean F0 of the speaking voice resemble the results previously obtained from young Finnish speakers (Laukkanen & Waaramaa, 2020 and 2022). In both time periods, the overall voice quality was assessed as good and prosodic variation as higher than in ordinary speakers. Media culture has experienced a historical change along with the Internet and many new platforms which allow all different manners and styles of speaking. The present study shows that these changes have not destabilized the Finnish news genre, and that normative expression still has its place in the TV-news. News journalists' good voice quality implement the role of trustworthy media as a form of credible communication.

**Keywords:** voice quality, normative speech, tv-news readers, media speech

## ABSTRACT 119

### Influence of the Menstrual Cycle on Voice Performance in Subjects with Voice Disorders – A Multiple Single-Case Study

Annika Sophie Erning, Peter Dicks, Bruno Fimm

**Objective:** This pilot study investigates the impact of menstrual cycle-related hormonal fluctuations on the voices of women with muscle tension dysphonia (MTD). Previous research has explored the influence of the menstrual cycle on vocal performance in women without voice disorders. Vocal performance, such as producing loud and high-pitched sounds, is believed to peak during the ovulatory phase and decline during the premenstrual phase. Hence, there is a gap in understanding these effects in women with dysphonia. Three female subjects with MTD participated in the study.

**Methods:** Using the computer-assisted program lingWAVES, vocal performance parameters were analysed, including voice range profile, speaking voice during reading, and maximum phonation duration. Additionally, a questionnaire assessed self-perception during both ovulatory and premenstrual phases. Due to repeated measures, statistical tests, the exact Wilcoxon sign-rank test and the point biserial correlation analysis, could be performed to analyse significant differences and correlations between menstrual cycle phases and vocal parameters.

**Results:** Results revealed a significant reduction in the lowest frequency and intensity in the voice range profile from ovulatory to premenstrual phases. Two subjects also exhibited decreases in the highest frequency and intensity. However, no significant differences were found in maximum phonation duration, pitch, and self-perception. Correlations were found between the cycle phase and frequencies in the voice range profile, as well as the lowest intensity in all participants. Additionally, in two subjects, the highest intensity correlated with the cycle phase.

**Conclusion:** In conclusion, this pilot study provides initial evidence of cycle-related voice changes in German-speaking women with MTD. Impairments in loudness and pitch production were evident during the premenstrual phase, with the voice range profile identified as a suitable tool for mapping these changes. Further studies with larger sample sizes are necessary to validate and build upon these findings.

**Keywords:** menstrual cycle, muscle tension dysphonia, voice performance, voice changes

## ABSTRACT 120

### Short-Term Effects of Semi-Occluded Vocal Tract Therapy on The Phonation Of Children With Vocal Fold Nodules

Anke Adriaansen, Iris Meerschman, Kristiane Van Lierde, Sofie Claeys, Imke Kissel, Tine Papeleu, Evelien D'haeseleer

**Objective:** The aim of this study was to determine and compare the short-term effects of two intensive semi-occluded vocal tract programs, 'straw phonation' and 'resonant voice therapy', on the phonation of children with vocal fold nodules.

**Methods:** A pretest-posttest randomized sham-controlled study design was used. Thirty children aged 6 to 12 years were assigned to the straw phonation group (n = 11), resonant voice therapy group (n = 11), or control group receiving sham treatment (n = 8). Participants received 11 hours of voice therapy over four consecutive days. A multidimensional voice assessment consisting of both objective (Dysphonia Severity Index and Acoustic Voice Quality Index) and subjective (Pediatric Voice Handicap Index and Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V)) measures was performed pre- and posttherapy. Voice therapy effectiveness was evaluated using group-level analyses (linear mixed models) and individual-level analyses to investigate what proportion of participants changed to a clinically relevant degree.

**Results:** Group-level analyses showed no significant time-by-group interactions, indicating no differences in evolution over time between the three groups. Within-group effects of time revealed a significant and equal improvement in Dysphonia Severity Index in the straw phonation and resonant voice therapy group, and a significant improvement in CAPE-V overall severity in the straw phonation group. For Dysphonia Severity Index, individual-level analyses showed that 36% and 45% of participants improved to a clinically relevant degree in the straw phonation and resonant voice therapy group, respectively. For Acoustic Voice Quality Index, 38% improved to a clinically relevant degree in the straw phonation group.

**Conclusions:** Results suggest that short-term intensive semi-occluded vocal tract programs may have a positive effect on vocal quality and vocal capacities of children with vocal fold nodules. There seems to be a preference for straw phonation over resonant voice therapy.

**Keywords:** Voice therapy, children, vocal fold nodules, semi-occluded vocal tract

## ABSTRACT 121

### Effect of Face Protector Device on Acoustic Parameters of Voice

Sara Parretta, Michele Pellegrino

**Objectives:** SARS-CoV-2 pandemic required the use of Personal Protective Equipment (PPE) in medical and social contexts to reduce exposure and prevent pathogen transmission. This study aims to analyse various changes in voice and speech parameters with and without PPE.

**Methods:** Voice recordings were obtained using different types of PPE and were analysed using PRAAT software (version 6.1.42). Statistical analysis was conducted using ANOVA in Jamovi software. A post-hoc test was performed to compare PPE-related results.

**Results:** Statistically significant differences were found in CPPS, HNR, Slope of LTAS, Tilt of trendline through LTAS, shimmer parameters, HNR mean and standard deviation (SD) of vowels, vowels and consonants formants. HNR values increased while shimmer parameters and formant values reduced using PPE (PPE combined>FFP> surgical masks>no PPE).

**Conclusions:** Our data show improvement in vocal and speech quality when using masks. PPE modifies speech articulation and many parameters of voice and speech quality, especially in case of combined PPE. The most relevant changes were found with combination of face shield and FFP2 masks. This may be due to unconscious improvements in speech articulation and increased demand on vocal folds to achieve better speech intelligibility.

**Keywords:** Voice, speech, quality, Personal Protective Equipment, Sars-Cov2

## ABSTRACT 122

### Voice and Communication Training In Transgender Women: Good Clinical Practices and a Proposal For An Assessment And Treatment Protocol With A Case Study

Fiammetta Fanari, Dario Strangis, Diego Cossu, Jacopo Colombini, Marina Marauda

**Objective:** Transgender and gender non-conforming individuals are increasingly seeking care services to align their voice and communication style with their gender identity. Vocal training, whether individual, group, or mixed, in-person or via tele-rehabilitation, offers numerous benefits to transgender women, enhancing their communicative abilities and meeting their needs effectively. It is essential for speech therapists to develop evidence-based practices to deliver effective therapy and possess a comprehensive understanding of the LGBTQIA+ community. This is crucial for understanding the contexts in which these communities live and work, as well as the obstacles that may affect communication, sometimes challenging personal beliefs and stigmas.

**Methods:** Based on scientific literature, proposed methods and techniques, as well as direct patient experience, a protocol was developed for the evaluation and speech therapy treatment of vocal feminization in transgender women, in the absence of surgical intervention for fundamental frequency (f0) elevation. The protocol focuses on creating a new communicative style through targeted work not only to achieve a "gender-acceptable vocal range"but also on suprasegmental features and effective resonance management. The protocol was applied to a 31-year-old transgender client and included comprehensive evaluation, specific counseling, resolution of any current vocal problem or compensation strategy (es. nasalization), vocal hygiene, and the development of a new communicative style.

**Results:** Data collected before and after speech therapy treatment showed a significant improvement in the perception of "femininity"across various communicative and vocal parameters, especially in the subjective evaluation and communicative satisfaction of the treated individual.

**Conclusions:** The proposed speech therapy protocol is in line with existing literature and has proven effective in producing both objective and subjective changes in the voices of transgender women. However, further studies are needed to generalize the results to a broader population and fully understand the protocol's long-term impact, including its effects on the daily lives of those treated.

**Keywords:** voice, communication, transgender, feminization, speech therapy

## ABSTRACT 123

### The Role of Music and Vocal Education In Humanistic Artistic Teaching

Anna Jeremus-Lewandowska

1. One of the fundamental factors which impede the use of violence, both in individual relations among people and in relations among entire societies, is the ability to understand, recognize and respect each other's values. Music and singing seems to be a particularly privileged area in which this type of understanding can be shaped. Music and singing are both an universal phenomenon characterized by cultural diversity. Assimilating these cultures requires the effort of learning foreign systems of thinking. At the same time, this is a deepening of our understanding of what is different and a common experience of humanity. Music education can enhance this interpersonal potential of art.

2. I will rely on experiences from many years of my professional work both artistic and pedagogical.

3. Music and vocal education should aim at better understanding and respecting the music of different cultures. It is not about educating performers of different music—but about shaping an attitude of openness, curiosity, appreciation and mutual admiration. Such education would have to tend to both understanding what is different and show a common, universal attitude towards music.

Multicultural musical and vocal education should include not only the music of other cultures, but also different musical styles of our own society and thus serve the possibility of mutual understanding.

4. It is important to believe that openness and sensitivity to other cultures create a common ground of understanding to which everyone can belong—without the risk of rejection.

**Keywords:** vocal education, music and culture, humanistic vocal pedagogy

## ABSTRACT 125

### Evaluation of The Voice And Communication Situation Questionnaire (Vcsq) Developed With And For Transgender And Gender Diverse People Presumed Female At Birth (Pfab)

Ulrika Nygren, Adrienne Hancock, David Azul, Anders Sand

**Objective:** Codes of ethics, professional standards, and best practice guidelines for health care professions increasingly include to provide culturally responsive, person-centered care. In this approach, the clinician and the client perspectives are given equal consideration, and clients are positioned as participants in their own health care in order to shape every aspect of it. Within this approach, questionnaires to explore Transgender and Gender Diverse (TGD) people's perspectives on their voice and communication-related quality of life are needed. Currently, a reliable and validated tool is lacking for TGD people Presumed Female At Birth (PFAB) that considers all possible identifications in terms of gender and intersections with other aspects of human diversity. The aim was to develop a self-evaluation tool for TGD people PFAB in the areas of voice, communication, and wellbeing and to evaluate the tool.

**Methods/Design:** Phase 1: Development of the Voice and Communication Situation Questionnaire (VCSQ PFAB) by the three first authors. The tool was created in English, Swedish and German. Phase 2: Community-led focus groups with TGD people PFAB were held to evaluate the face validity and to receive feedback on the VCSQ. Phase 3: Evaluation of the tool. The participants were 73 TGD people PFAB and 88 cis people who completed VCSQ once (31 TGD people PFAB completed VCSQ twice for retest). We evaluated whether TGD people PFAB seeking voice treatment and cis people not seeking voice treatment reported robustly different scores on the VCSQ (criterion validity), the amount of measurement error in the VCSQ (test-retest reliability), and whether the VCSQ could be streamlined (based on construct validity).

**Results:** Phase 1: The VCSQ PFAB contain questions regarding aspects of identity, difficulties with voice function, presenting sociocultural belonging to others, and being misunderstood by others. Phase 2: The qualitative content analyses resulted in three themes: Sociocultural positioning, Voice function and Communication-related wellbeing. Phase 3: The results show strong criterion validity (AUC=0.997). The degree of measurement error in the VCSQ PFAB was small (only 17% of the total range of the scale and ICC = 93%).

**Conclusions:** The VCSQ is a useful tool for culturally responsive clinical care.

**Keywords:** Self-evaluation, Psychometric testing, Reliability, Validity

**ABSTRACT 126**

## Memorising In Music and Learning Strategies

Elisabeth Eder

Memorising music plays an important role for singers and instrumentalists and has been the subject of only little research so far. Almost every musician is confronted with memorising music during their musical career. For numerous competitions, examinations (e.g. at universities), solo performances and the like, singing and playing by heart is considered compulsory. Singers and instrumentalists are often required to learn a piece by heart but are rarely given guidance on how to proceed. This was also confirmed by Eder's preliminary study to examine the topicality and relevance of the topic in which 111 singers and instrumentalists took part. The preliminary study revealed a great desire for more knowledge or information about learning strategies as well as a greater sense of security when performing by heart on stage through the use of learning strategies by those musicians who use learning strategies.

Eder's research focuses on learning strategies for memorising music. As part of a large-scale empirical study, 1091 musicians from 64 different countries described how they memorise. The participants in the study also evaluated their learning strategies and justified their choice in terms of the degree of effectiveness.

Based on the study and pedagogical literature, 100 learning strategies were identified and categorised, the strategies were examined with regard to their effectiveness and instrument-specific, age-specific, country-specific, gender-specific and training-related differences and similarities with regard to the choice of learning strategies were investigated. Her research also deals with forms and models of memory and how music-related information can be stored and recalled and also forgotten again. A further section deals with the possibilities that teachers and learners have to support the process of memorisation independently of learning strategies.

The findings resulting from Elisabeth Eder's research should enable musicians to memorise faster and more confidently.

**Keywords:** Memorising music, learning strategies, empirical study

**ABSTRACT 127**

## Experiences of Group Voice Training in Gender Diverse People: A Qualitative Study

Evelien D'haeseleer, Tine Papeleu, Heike Krenn, Cassandra Allighieri, Clara Leyns

Some gender diverse individuals wish to adjust their voice, speech, and communication to align with their gender identity. Group voice training can be a successful approach for gender diverse individuals to adjust different parameters of voice and self-perception. Exploring the perceptions of gender-diverse individuals is important because it allows a full understanding of their unique experiences, which could be considered in future scientific research on the topic of group voice training sessions.

**Objective:** The aim of this study was to investigate the perceptions and experiences of gender diverse individuals who have received group voice training.

**Method:** This study used a qualitative research design with semi-structured interviews. Through qualitative research, participants' experiences, feelings, and behaviours can be examined from the perspective of the participants themselves. Seven participants, aged between 20 and 57 years with a mean age of 32 years, were interviewed. Semi-structured interviews were conducted online via MS Teams. These interviews were transcribed and coded through the software program NVivo. Using thematic inductive content analysis, four main themes were found: (1) the impact of group voice training, (2) interaction with co-participant(s), (3) the influence of the therapist, and (4) differences with individual sessions. Attention was paid to the reliability regarding trustworthiness of the results in this study.

**Results:** This study found that participants expressed satisfaction and found value in the group voice training sessions, with some reporting a sense of accomplishment and increased self-confidence at the end of the group voice training sessions. However, prior concerns were highlighted, with some participants experiencing stress and discomfort at the beginning of the session. The social aspect of the group training sessions was found to be important.

**Conclusions:** Group voice training was perceived as positive by gender-diverse individuals and created a sense of acceptance, solidarity, and self-confidence. Understanding the needs and perspectives of gender diverse individuals can better support their journey towards an authentic voice.

**Keywords:** transgender voice, voice training, group training, perceptions

**ABSTRACT 128**

## Choral Singing As An Opportunity For Cultural Participation For People With Dementia And Their Relatives – First Results Of The Accompanying Research Of The Programme "Länger Fit Durch Musik" (BMCO, Germany)

Kai Koch, Franziska Heidemann

The growing prevalence of dementia due to demographic change is increasingly affecting our society. Dementia not only has an impact on the quality of life of those affected, but also on the social environment and care systems. Coping with this disease therefore requires both individual efforts and collective social measures. Musical interventions have been shown to improve cognitive status, contribute to emotional well-being, reduce depression and improve interaction and communication behaviour as well as relationships with caregiving relatives.

The German government's "Nationale Demenzstrategie"aims to improve the quality of life of people with dementia, strengthen care and advance research. In this context, the Bundesmusikverband Chor und Orchester (BMCO) is involved in the "Länger fit durch Musik"programme. Music not only promotes music-related skills throughout life, but also helps to develop an understanding of each other and a sense of community, which in turn supports cultural participation. In 2024, the programme will fund 21 exemplary vocal and instrumental projects for the musical participation of people with dementia. In addition to supporting local projects and educational work, the programme raises awareness of dementia in the amateur music scene.

The scientific monitoring of the projects includes participant observation at regular exchange meetings as well as group interviews with the ensemble leaders, choir members and relatives. The data collected is analysed using qualitative content analysis. The aim is to foster cultural participation for people with dementia by identifying opportunities and limitations of inclusive choral work. The experiences of the participants and choir leaders as well as conclusions for amateur music will be analysed.

In addition to the BMCO's programme, the methodology of the scientific monitoring and initial results of the surveys can also be presented in presentation or poster. In view of the ongoing demographic change and the limited opportunities for people with dementia and their relatives to experience cultural participation in the context of amateur music, it is important to focus more on conceptual questions of inclusive ensembles. The insights gained can benefit not only people with dementia and their relatives, but also other disadvantaged groups who can benefit from inclusive choral activities.

**Keywords:** Dementia, choral singing, participation, choral conception, evaluation research

## ABSTRACT 131

### Cross-Cultural Explorations: The Impact of Music Activities on Well-Being In Relation To Basic Psychological Needs

Hongjuan Zhu

**Objective:** This study aims to explore the relationship between cross-cultural variations in the Basic Psychological Needs (BPN) and their impact on well-being dimensions related to participants' engagement in solo/group music activities. Cultural factors are considered by examining university students from collectivistic cultures (China and Singapore) and individualistic cultures (the UK and Australia).

The well-being dimensions include mood and coping, esteem and worth, socialising, cognitive, and self-actualisation. The research questions (RQ) and hypotheses (H) are as follows:

**RQ:** Does a correlation exist between participants from diverse cultural backgrounds and distinct BPN, leading to variations in their engagement in music activities, which improves different dimensions of well-being?

**H1:** Populations from collectivist cultures are more likely to seek relatedness (e.g. socialising demission of well-being) within the BPN. Therefore, they are more likely to benefit from group music activities.

**H2:** Populations from individualistic cultures are more likely to seek autonomy (e.g. mood and coping, esteem and worth, cognitive, and self-actualisation dimension of well-being) within the BPN, and therefore, they are more likely to benefit from solo music activities.

**Methodology:** The study will use self-report surveys, targeting university students across the UK, Australia, China, and Singapore, with an expected minimum of 100 responses from each country. The survey comprises four sections: the first collects demographic information, the second assesses types of music participation, the third measures BPN using Krause, North, and Davidson's (2019) revised version of BPNES, and the final section applies Krause, Davidson, and North's (2018) musical activity and well-being measurement.

**Expected Results:** This investigation into cross-cultural differences across the UK, Australia, China, and Singapore aims to disclose distinct impacts of self-selected music activities on various aspects of well-being. It is expected that cultural factors will play a significant role, influencing how students from different backgrounds perceive and experience the well-being benefits of music activities in relation to their BPN.

**Conclusion:** The cross-cultural comparison will challenge the Western-centric nature of much existing knowledge of music and wellbeing, and present avenues for future research on the cultural specificity of emotional regulation and self-actualisation through music.

**Keywords:** music activities, well-being, cross-culture, basic psychology needs, university students

## ABSTRACT 134

### Spanish as an Educational Language for Singing

Jean-Yves Bosse Vidal

Although Italian has always been considered all over the world as the best language for studying singing, this can be questioned nowadays from different points of view: cultural, historical, phonetic, and educational.

Spanish culture has benefited from little respect for several centuries around the world and Castilian Spanish itself was often called "poor man's Latin" in different countries. This linguistic absurdity had long been accepted and integrated by much of the intelligentsia. Castilian is the official language in 20 countries, ranked fourth in the world and has given rise to a literature of rare riches and diversity. It is also the third most studied language in the world.

The phonetic approach to the language does not present any specific difficulties, as it is spelt just like it is pronounced, with very rare exceptions. The vocalic system is very simple: 5 clear vowels: a, e, i, o, u. The consonants are crispy and support beautifully the musical rhythm.

The rolled r is particularly interesting when it is doubled or initial as it is used by many teachers in their warmups. The tonic accent is marked and always identifiable in writing, unlike many languages including Italian. It follows that, apart for being familiar to a great deal of students who begin singing after studying Spanish at school, it is an easy language to pronounce, very approachable in vocal exercises and sung repertoire, and certainly as rewarding as Italian.

Singing in Spanish is a doorway to a vast repertoire that is hardly familiar to many teachers around the world: songs from Spain and South America from over 5 centuries, zarzuela, oratorio, opera and flamenco.

As many of my colleagues, I've used the Vaccaj Method successfully with my students for many years. After my first version in French, based on the texts of La Fontaine, I am finishing the Spanish version using morals of fables by Samarago and Iriarte. I will present a couple of the songs before they are published.

**Keywords:** Spanish language, vocal pedagogy

## ABSTRACT 135

### Speaking To the Body. Free Air Flow and Body In Balance: The High Road To A Free, Effective And Expressive Voice

Eleonora Bruni

Fundamental to vocal education and vocal technique is the synergistic functioning of the three main pillars: the sound source, the filter, and the breath. Breathing in vocal technique is associated with the concepts of "appoggio" and "sostegno", too often understood as restraint and the downward thrust of the diaphragm and energy. Breathing in singing is actually a very complex fundamental component that connects the voice to the body system. It is essential that breathing in singing always be in harmony with the needs of the body and its functions, promoting a balanced body posture, avoiding muscular rigidity, excessive pushing, holding and forcing. It is possible to teach vocal and respiratory technique by "speaking to the body", that is to say, by achieving a perfect balance between appoggio and sostegno, experienced and spontaneous, through specific training capable of stimulating perception and proprioception. The singer will learn, through the naturalness of the requests, to emit an air

flow with the correct direction (out), letting the diaphragm complete its ascent during exhalation, thus experiencing an effective unforced appoggio (thanks to the activation of the external intercostal muscles during phonation), always requested through metaphors of width, comfort, tightness and induced through specific exercises. One also experiences a soft and steady respiratory sostegno that accompanies the rise of the diaphragm, while at the same time feeling the connection with the pelvic area, the grounding and, in particular, the stance of the legs and feet. The overall trim, gently respecting the posture of each individual performer, will lead to the avoidance of (unwanted) activation of the rectus abdominis muscle, which inevitably leads to constriction and glottal closure. This avoids the risk of excessive glottal resistance, constriction and restraint, which are always harmful, risky and cause great vocal fatigue. During the lecture, the assumptions will be explained, specific exercises will be shown (including videos of artists), and testimonials and sound examples will be heard. Instrumental research is shown to demonstrate how respiratory and physical training improves vocal parameters. The artist is helped to find a free, more effective and expressive voice.

**Keywords:** voice, body, breath, diaphragm, support

## ABSTRACT 136

### Examining the Effects Of Virtual Reality Room Size On Singers' Vocal Behavior

Ruth Suarez, Irene Mezzacapo, Dario Strangis, María Borragán, Mohammad F. Obeid, Alfonso Borragán, David Meyer

**Objective:** Singers adapt their vocal performance depending on the environment in which they sing (classroom, auditorium, amphitheater). Unfortunately, many singers do not have the opportunity to practice in diverse environments, leading to increased performance anxiety when singing in unfamiliar spaces. Various singing environments can be simulated in virtual reality (VR), and these simulations may aid singer training. The objective of this study is to determine if western-classical singers modify their vocal production in virtual reality spaces. Specifically, we seek to explore the potential changes in singer intensity and projection within immersive virtual spaces, hypothesizing that larger simulated spaces might induce increased loudness and projection from the singers, comparable to the effects observed in large physical venues.

**Methods/Design:** Participants will include 30 trained and experienced classical-singers (adults). Five different environments will be presented four times (each) in virtual reality. These environments will include a practice room, a singing studio, recording studio, small performance hall, and a large auditorium. Singers will perform a 15-second segment of "Caro mio ben"in the key that best suits each participant, while wearing virtual reality glasses. The 5 environments are each repeated four times for a total of 20 singing tokens. Environment order will be randomized to reduce potential order effects. Audio recordings will be made of the singers with a calibrated omnidirectional microphone mounted on the VR headset. Data analysis will include intensity, dynamic range, and spectral measures. All VR simulations will be visual-only, and the psychoacoustic cues of the various rooms will not be examined.

**Conclusion:** If singers adapt their vocal performance to different visual environments, despite the lack of psychoacoustic cues, then VR may prove to be a useful training modality for singers to potentially reduce their performance anxiety in different environments. Pedagogical considerations will be discussed, as will directions for future research.

**Keywords:** Virtual reality (VR), Vocal performance, Environment adaptation, Singer training

## ABSTRACT 137

### Longitudinal Vocal Outcomes and Voice-Related Quality Of Life After Selective Bilateral Laryngeal Reinnervation: A Case Study

Kristiane Van Lierde, Imke Kissel, Evelien D'haeseleer, Anke Adriaansen, Tine Papeleu, Peter Tomassen, Jean-Paul Marie, Iris Meerschman

**Purpose:** Bilateral vocal fold paralysis (BVFP) is a severe disorder that can result in respiratory, swallowing and voice-related problems. Most surgical treatments do not restore laryngeal function and often need to compromise voice quality to preserve respiratory function. Laryngeal reinnervation (LR) may offer a solution to this problem, but literature on longitudinal outcomes of this procedure is scarce. This study aims to report the longitudinal vocal outcomes of BVFP after laryngeal reinnervation and subsequent voice therapy.

**Methods:** The case of a 23-year-old man with BVFP after traumatic dissection of both recurrent laryngeal nerves is described. Selective bilateral laryngeal reinnervation of both adductors and abductors was performed five months after the onset of BVFP. Voice therapy was provided after the LR procedure. Multidimensional voice assessments including acoustic, perceptual and patient-reported outcome measures (PROMS) were conducted 2, 5, 6.5, 8, and 31 months after LR.

**Results:** An improvement of vocal capabilities and voice quality was noticed 6.5 months after LR, after 4.5 months of voice therapy, with normative values after 2.5 years. PROMS showed an improvement of voice-related quality of life, but some limitations to activities of daily life were still present. Inspiratory arytenoid abduction was not observed on laryngeal videostroboscopic findings in this patient, but tracheostomy was not required.

**Conclusion:** Voice therapy after LR helps establish healthy and efficient voice use without increasing compensatory hyperfunctional behavior. More research is needed to examine potential merits of voice therapy in the rehabilitation of vocal and respiratory functions after LR.

**Keywords:** laryngeal reinnervation, vocal fold paralysis, voice therapy, case study

**ABSTRACT 139**

## Clinical Experiences of Speech-Language Pathologists In The Rehabilitation Of Unilateral Vocal Fold Paralysis

Imke Kissel, Evelien D'haeseleer, Iris Meerschman, Eline Wackenier, Kristiane Van Lierde

**Purpose:** Unilateral vocal fold paralysis (UVFP) is a neurological voice disorder that is often first treated by a speech-language pathologist (SLP). In literature, little consensus is found regarding voice therapy onset, duration, frequency, and content. The aim of the current study is to investigate the clinical practice of SLPs for treatment of UVFP regarding diagnostics and treatment characteristics. Additionally, the study examined the personal experiences of SLPs regarding UVFP care.

**Method:** An online survey was completed by 37 respondents, all SLPs with experience in treating UVFP. Demographic characteristics, experiences with voice assessments and treatment modalities were examined. Lastly, experiences and opinions of SLPs on evidence-based practice and their own clinical practice were surveyed.

**Results:** Almost all respondents used a multidimensional voice assessment with findings from laryngo-videostroboscopy to assess UVFP. Laryngeal electromyography is not yet integrated in regular clinical practices. The most commonly used vocal techniques were resonant voice exercises, laryngeal manipulation, semi-occluded vocal tract exercises (SOVTEs), vocal hygiene, and Vocal Function Exercises, with SOVTEs most often considered effective. 75% of the respondents feel confident treating UVFP, and 87.6% believe it is important to stay updated on evidence-based practice. Variation in therapy timing and dosage was observed, and 48.4% of SLPs usually started early voice therapy within four weeks after UVFP onset.

**Conclusions:** Flemish SLPs generally feel confident treating UVFP patients and show interest in improving evidence-based practice. Initiatives to train clinicians further in UVFP care and encouraging SLPs to provide practice-based evidence will enhance the knowledge base for evidence-based practice in UFVP.

**Keywords:** vocal fold paralysis, voice therapy, speech-language pathology, clinical practice, evidence-based practice

**ABSTRACT 140**

## Effect of an Intensive Voice Therapy Program on Vocal Outcomes In Patients With Unilateral Vocal Fold Paralysis: Comparison Between Water-Resistance Therapy And Vocal Function Exercises

Imke Kissel, Iris Meerschman, Evelien D'haeseleer, Tine Papeleu, Clara Leyns, Peter Tomassen, Sofie Claeys, Kristiane Van Lierde

**Purpose:** Dysphonia is an important and frequent complaint of patients with unilateral vocal fold paralysis (UVFP). Voice therapy may improve voice quality, eliminate hyperfunctional voice use, and avoid the need for medialization surgery, but efficacy studies are scarce. Additionally, the effect of specific techniques has not been investigated. Therefore, the purpose of this study was to compare the effects of water-resistance therapy and Vocal Function Exercises on vocal outcomes in patients with UVFP.

**Methods:** Case series with multiple baseline pretest-posttest design. Ten participants with UVFP were randomly assigned to either the WRT or VFE group and received 5.5 hours of therapy over a period of 2 weeks, followed by 3 hours of telepractice over a period of 6 weeks. Multidimensional voice assessments were performed after the intensive therapy, after telepractice, and at 3 months post-therapy.

**Results & Discussion:** TBD. Analyses of the data are ongoing, and the results will be available at the time of the conference.

**Keywords:** vocal fold paralysis, voice therapy, SOVT, water-resistance therapy, vocal function exercises

## ABSTRACT 141

### How Children Report On Voice Handicap: The New Children's Voice Questionnaire (Cvq)

Ofer Amir, Orr Yagev Bar-David, Adi Primov-Fever, Ilan Roziner

**Objective:** Self-report questionnaires are now common practice in the field of voice disorders. Yet, suitable questionnaires for children are still scarce. Moreover, researchers and clinicians view children as unreliable providers of medical information. Therefore, this study aimed to develop a valid and reliable self-report voice questionnaire suitable for dysphonic children.

**Methods:** As a preliminary phase, five groups of Hebrew-speaking dysphonic and non-dysphonic children, parents, teachers and speech pathologists were interviewed. Based on these interviews, a comprehensive set of over 100 statements was collected. This set was then arranged and reduced until a final list of 18 statements was constructed. Then, 73 dysphonic children (age 6-18) and 269 non-dysphonic controls completed this questionnaire, along with a general anamnesis questionnaire. Furthermore, the children's parents have completed the Pediatric Voice Handicap Index (pVHI). Finally, a subset of 30 children completed the questionnaire again after two weeks for test-retest evaluation.

**Results:** The Children's Voice Questionnaire (CVQ) has shown high reliability (Cronbach's alpha = .94) and strong test-retest repeatability ($r=.79$, $p<.001$). Strong and significant group differences were found between dysphonic and non-dysphonic children ($p<.001$). Significant medium to strong correlations were found between the children's responses on the new CVQ and the parent's responses on the pVHI ($.59 < p < .66$). No significant differences were found between boys and girls or age groups. A Hebrew version of the questionnaire will be presented, as well as an English version.

**Conclusions:** The new Children's Voice Questionnaire (CVQ) is a valid and reliable instrument for capturing voice handicap in dysphonic children.

**Keywords:** Voice, Children, Dysphonia, Questionnaire, Voice Handicap, CVQ

## ABSTRACT 142

### Comparing Articulator Behavior and Frequency Precision between Legato and Staccato Singing At Different Speeds

Marie Köberlein, Jonas Kirsch, Fabian Burk, Louisa Traser, Bernhard Richter, Michael Burdumy, Matthias Echternach

**Objectives:** During phonation, the vocal tract configuration determines the resonance settings, i.e., vowel qualities, timbre and loudness, and interacts with the voice source. Staccato exercises, i.e., phonation with separated tones, are frequently used in voice training to improve precision in fundamental frequency (fo) and articulator coordination. However, the impact of speed in staccato on vocal tract adjustments and phonation precision, had not been investigated, yet. It was hypothesized that singing separated tones would generally differ from singing uninterrupted, connected tones (legato) and that the behavior of staccato would differ between different speed conditions.

**Methods:** 12 professional singers, (4 sopranos, 3 mezzo-sopranos, 3 tenors, and 2 baritones/basses), underwent real-time 2D-MRI recording at 25 fps. They sang a scale of 6 ascending diatonic pitches on vowel [a:] in legato and various staccato speeds (60, 120, 180, and 240 bpm). Lip opening (LO), jaw opening (JO), jaw protrusion (JP), tongue position (HPT), pharynx width (PW), and larynx position (LP) were measured from the MRI data. Additionally, fo was analyzed from the concurrently recorded audio signal after noise cancellation.

**Results:** The articulator measurements reveal minimal differences in absolute values between legato and staccato phonation, even though being statistically significant for some articulators (p-values: JO: 0.049; HPT: 0.013; PW: 0.047, LP: 0.022. Median differences in mm: JO: 1.19 HPT: 1.75; PW: 0.21; LP: 1.03). No great variations were observed between the fastest and slowest staccato, despite JO being statistically significant (JO: p=0.001, Median difference: 0.70 mm). Noteworthy vocal tract adjustments occurred between staccato notes and pauses in the slowest staccato task but with a mean median difference of only 1 mm. The fo analysis showed an increasing imprecision from legato (least imprecision) to fast staccato (highest imprecision).

**Conclusions:** Comparing staccato and legato phonation in professional operatic singers, there are only negligible differences in vocal tract shapes, and the variation in speeds does not lead to significant alterations in vocal tract configurations. A minor pause behavior with small changes, interpreted as relaxation, occurs in slow staccato tasks. The fo precision decreases with acceleration, which is rather linked to laryngeal mechanisms than to articulation.

**Keywords:** Articulation, Vocal tract, Magnetic resonance imaging, Staccato

**ABSTRACT 143**

## Experiences with Healthcare of Patients with Unilateral Vocal Fold Paralysis: A Qualitative Study

Imke Kissel, Iris Meerschman, Evelien D'haeseleer, Peter Tomassen, Kristiane Van Lierde

**Objective:** Unilateral vocal fold paralysis (UVFP) is often characterized by severe dysphonia, which negatively impacts a patient's quality of life and merits treatment. Voice therapy and medialization surgery are usually advised and may have positive outcomes on voice quality and voice-related quality of life. However, it is still unknown how UVFP treatment is experienced from a patient-centered perspective. Therefore, the purpose of the current study was to explore the experiences with healthcare of patients with UVFP.

**Methods:** Twenty-four adults with UVFP (age range: 39-74) participated in the study. Qualitative data were collected from semi-structured interviews, which were recorded, transcribed, and analyzed with the software program NVivo. The interviews were coded using an inductive thematic approach.

**Results:** Five major themes were identified through thematic analysis: relationship with healthcare providers (HCPs), expectations, experiences with treatment, obstacles, and patient support. Overall, participants had positive experiences with HCPs and treatment, although certain issues may arise throughout rehabilitation. HCPs were expected to be knowledgeable, honest, and empathic. Patient narratives reflected the importance of setting realistic expectations regarding voice recovery. Voice therapy was generally considered useful, but also sometimes perceived as tedious. The speech-language pathologist (SLP) was often considered an important person of trust. Obstacles included finding the right HCP, time and distance to the SLP, and reimbursement of voice therapy. Valuable sources of patient support were the personal social circle, peer sufferers, and certain HCPs such as the SLP or psychologist.

**Discussion:** The themes in this study provide insights into important patient experiences and preferences, as well as obstacles during voice rehabilitation for UVFP. These findings may aid healthcare providers in improving individualized and patient-centered care.

**Keywords:** vocal fold paralysis, qualitative, patient experience, voice therapy

**ABSTRACT 145**

## Application Study of the Voice Range Profile In Fach Classification

Liyan Han

**Objectives:** This study aims to verify the value of Voice Range Profiles (VRP) in the evaluation of singer's voice quality and Fach Classification.

**Methods:** Twelve classical singers in different voice types were included in this study. Each of them was asked to take the VRP test. Examinations were blindly evaluated by two independent teams, and each team includes one experienced laryngologists and one vocal music teacher. Univariate and multivariate analysis was performed.

**Results:** After the VRP test for all the participants, we got the following results:

1. The comfortable tessituras of 5 elite singers can be demonstrated in the VRP which match their Fach classification.

2. The depth and ease of high C from 3 elite tenors can be reflected in the VRP.

3. 4 tenor students have different singing problems, which are also showed in the VRP.

**Conclusions:**

1. Fach Classification is chiefly based on the comfortable singing range where the best quality of vocal sound is located, which is also called tessitura. These best vocal notes must be mixed, flexible and resonant. The VRPs can visually and objectively show above all these characteristics. Therefore, the VRPs can become an important indicator to Fach classification.

2. The different voice type of the same singing ranges are based on the depth and ease of the singing voice. The VRPs can not only demonstrate the high tone quality and characteristics but also compare the vocal strength and depth. Therefore, the VRPs could be used as an important tool to distinguish different singing voice subtypes.

3. According to whether the strongest sound and formants curves steadily and smoothly with the vocal pitch going up, the singer's ability to control the mixed voice and the position of passaggio point could be determined.

4. According to whether singer's low notes are loud and bright and high notes are light and mixed, the singer's ability to control the subglottic pressure could be judged

**Keywords:** Fach Classification, Voice Range Profiles, Comfortable Tessitura, Mixed voice, Vocal strength

## ABSTRACT 147

### Treatment of Vocal Fold Scarring Using Mesenchymal Stromal Cells: Effect on Patient-Reported Outcomes and Voice Function—A Phase I/Ii Clinical Trial

Erika Bergström Börlin, Svante Granqvist, Ulrika Nygren, Maria Södersten, Katarina Le Blanc, Stellan Hertegård

**Objective:** Damage to the vocal folds (VF) can cause scarring that results in severe voice problems and dysphonia. Effective lasting treatment is lacking. A previous study indicates that scar resection and injection with Mesenchymal stromal cells (MSCs) may offer a safe and feasible therapeutic option for patients, but more studies are warranted to confirm these results. The aim of this study was to examine safety aspects and treatment efficacy on vocal fold function and self-reported vocal symptoms in patients with VF scarring. An additional aim was to develop and evaluate a post operative Voice Training program.

**Methods:** In this open-phase I/II clinical study with a repeated measures design, 8 patients with scarring (n=2) or sulcus+scarring (n=6) were treated with surgical scar resection followed by injection of autologous MSCs. One week after surgery participants were allocated to participate in Voice Training focusing on tube phonation following a strict protocol. Patients were monitored for serious adverse events and minor complications. Data to evaluate the therapeutic efficacy was collected at 3 time points; before, 3 and 12 months after intervention and included measurement of VF vibrations using high-speed laryngoscopy and phonation pressure threshold. Self-reported voice problems were evaluated using the Voice Handicap Index (VHI), Vocal Fatigue Index and ratings of most prominent symptoms and consequences in daily life. Clinically relevant changes were defined prior to data analyses based on approaches such as measurement theory, patient-reports, expert opinions, and reference data.

**Results:** No side effects related to the treatment were reported. VF vibrations improved for 4 out of the 8 participants. Group-level results on patient-reported outcomes showed a positive treatment effect; VHI mean difference score pre and 12 months post intervention was -26.1 (95% CI [-48, -4]). Individual-level results revealed that 63-88% of the participants improved to a clinically relevant degree depending on the measured variable.

**Conclusions:** The results indicate that injection of MSC to treat VF scarring is safe and that at least half of the participants improved to a clinically relevant degree. However, the study was small, and generalizability of the results is limited. Continued studies with a bigger sample are warranted.

**Keywords:** Vocal fold scarring, Sulcus, Cell Therapy, Voice Training, Patient-reported outcomes

## ABSTRACT 148

### Voice Pathology Prediction with Machine Learning Tools

Secundino Fernandez, Olast Arrizibita Iriarte, Nicolás López-de-Aguileta, Onintza Sayar, Beatriz del Rio, Uhaina Lakasta Aldabe

**Objective:** Vocal disorders represent a growing concern in public health due to their impact on individuals' quality of life and functionality. To effectively address early detection and management of these pathologies, it is essential to have accurate and advanced prediction tools. Machine learning

(ML) models offer a promising opportunity to identify subtle patterns in the acoustic parameters of the voice (disturbances, intensity and frequency) and predict the onset of vocal disorders at early stages. This study aims to develop and evaluate prediction models for different vocal pathologies, such as muscle tension dysphonia (MTD), neurological disorders, organic disorders, and vocal paralysis, using vocal frequency data from patients. The primary goal is to develop accurate models capable of giving reliable classification that will serve as an accessible decision support system for primary care clinicians and speech therapists.

**Design and Method:** The study uses the results of the acoustic analysis carried out on 155 patients of the Voice Laboratory of the Department of Otorhinolaryngology of the Clinica Universidad de Navarra. Two approaches were used: clinical decisions and data imputation using the KNN technique. Four separate machine learning models were designed and developed for each of the following vocal pathologies: MTD, neurological disorders, organic disorders, and vocal paralysis. Each pathology was paired with control cases, individuals without detected pathology. Three algorithms—Random Forest (RF), XGBoost, and Logistic Regression (LR)—were assessed for each pathology. Models were trained and tested on separate datasets. The algorithm with the highest accuracy for each pathology was chosen.

**Results:** The mean age of the population was 47.06±18.56 years, with 86% being female. The results showed XGBoost achieved 89% accuracy for MTD, RF attained 94% for neurological disorders, and RF also performed best for organic disorders, with 90% accuracy. For vocal paralysis, LR stood out with 96% accuracy.

**Conclusions:** These findings suggest that the use of vocal frequency data combined with ML models can provide an accurate and promising tool for the detection and classification of various vocal pathologies. Selecting the appropriate algorithm is crucial to achieving the best performance in predicting each specific vocal pathology.

**Keywords:** Machine learning, Decision Suport System, Voice Pathology, Acoustic Parameters

## ABSTRACT 150

### Listening To Ourselves: Auditory Feedback Modulation and Voice Perception

Isabel Sarah Schiller, Karolin Krüger, Patricia Weede, Melf Torge Sopha, Gerhard Schmidt

Auditory feedback modulation (AFM) is a method for studying vocal motor control in both healthy individuals and those with dysphonia. During AFM experiments, participants vocalize into a microphone and receive a real-time feedback of their acoustically perturbed voice through headphones. Previous research primarily focussed on manipulating pitch and amplitude. The recently developed VQ-Synth system, however, has been designed for manipulating voice quality in terms of inducing hoarseness. The aim of this study was to assess the impact of different VQ-Synth resynthesis settings on voice

perception. In a laboratory experiment, 36 vocally-healthy participants listened to sustained-vowel recordings of their own voice, which were either unmanipulated or resynthesized according to various combinations of four resynthesis approaches. After each trial, participants rated the perceived voice quality on six dimensions: vocal health, hoarseness, breathiness, strain, asthenia, and naturalness. Here, we present the results of these ratings and discuss the most promising approach to synthetically induce hoarseness. Moreover, we reflect on the implications of our research for AFM experiments with healthy and dysphonic speakers and potentially even therapeutic purposes.

**Keywords:** Auditory Feedback Modulation, Voice Quality, Voice Perception, Phonatory responses, Voice resynthesis

## ABSTRACT 151

### The Distracted Singer: Correlation between Voice And Executive Functions In Singers In Training

Stefania Porcaro, Bernardo Lanzaro, Chiara Falanga, Alfonso Borragán Torre, Andrea Di Somma, Daniele Apredda, Simona Cunato

**Objective:** Investigate the correlation between vocal performance and neuroscience to speed up and automate the effectiveness of long-term vocal speech therapy training, by subjecting singing students without vocal pathologies to an evaluation and treatment protocol integrated with vocal technique and training of the executive-attentive plan.

**Methods:** For vocal evaluation: all the patients underwent a laringostroboscopic examination to ensure they met inclusion criteria (absence of laryngeal lesions and pathologies) and a spectroacustical voice analysis before they started the threatment and at the end of the cycle of speechpathologist's sessions. We analysed both speech and singing voices of all the participants.For the neuropsychological evaluation: all patients went through the administration of the M.E.A. battery. (Measures of Executive Attention).

The patients were divided into two groups: vocal rehabilitation without integration of attentional-executive training and vocal rehabilitation with integration of attentional control-executive training.

**Results:** Patients who followed the rehabilitation plan integrated with the attention-executive plan training reported greater benefits and automatization on the long-term.

They improved both neuropsychologically and vocal performance.

**Conclusions:** Singing is learning and neuropsychology is at its basis, the integrated model in discussed indicates a multifactorial approach and a new vision of rehabilitation to take into account

**Keywords:** voice, attention, vocal acoustic analysis, neuropsychology, rehabilitation

**ABSTRACT 152**

## "Inner Voices". A Pilot Study on the Similarities between Neural Representations Underlying Vocal Imagery And Actual Vocal Production

Gláucia Laís Salomão, Naira Sardarian, Christoffer Forbes Schieche, Rita Almeida

**Background and purpose:** Auditory imagery, i.e. the generation in the brain of auditory "images", is frequently used in vocal pedagogy and therapy as a strategy to induce the recruitment of muscular activities involved in the production of a desired vocal sound. It has been argued that this strategy might be even more effective if it is emotionally motivated, as expressing emotions vocally (or even imagining the expression of them) may help to synchronize motor processes in a manner facilitating the production of the intended voice quality.

Research on auditory imagery using functional magnetic resonance imaging (fMRI) has focused primarily on speech sounds and/or whether auditory imagery relies on similar neural mechanisms as those underlying auditory perception. In this pilot study we use functional fMRI to investigate whether auditory imagery of emotional voices relies on similar neural representations as those underlying the actual motor execution involved in the production of such voices.

**Methods and reasoning:** Six volunteers familiar with some kind of expressive vocal activity took part in an fMRI experiment. They were asked to produce brief, nonverbal vocalizations attempting to express different emotions; and to imagine that they were producing brief, nonverbal vocalizations conveying those same emotions, attempting to experience the emotion imagined.

**Results and discussion:** Classical univariate analysis is currently being conducted in order to identify the areas of the brain activated during the expression and imagination of the different emotional voices. Multivariate pattern analysis will be performed in order to identify patterns of responses across voxels and provide a distributed representation of the activation patterns associated with both production and imagination of these voices. Similarities between neural representations underlying voice production and voice imagination will be investigated using machine-learning techniques; a classifier will be trained on the differences between activity patterns underlying production of the different emotional voices and then tested on activity patterns underlying the correspondent imagery task. A successful classification of the imagery conditions would indicate that auditory imagery of voice and the actual production of it rely on similar neural codes.

Results, novelties and limitations of the present study will be presented and discussed.

**Keywords:** Auditory imagery, vocal production, neural representations, emotions, fMRI

**ABSTRACT 153**

## Uniting Body and Soul: A Transdisciplinary Approach to Treating Muscle Tension Dysphonia and Anxiety

Jenevora Williams, Stephen King

**Objective:** Conventional voice therapy to rebalance hyperfunctional voice habits has been shown to be effective in multiple studies (Misono et al., 2019, Craig et al 2015). These have often been integrated with other therapies such as physiotherapy and laryngeal massage. This paper aims to show the unique possibilities of combining voice rehabilitation strategies and psychotherapeutic treatment for Muscle Tension Dysphonia (MTD). We will consider a single case study, where two practitioners have worked in tandem, integrating psychotherapeutic interventions alongside traditional voice therapy.

**Methods/Design:** Kristina presented as a complex patient; although she had no visible vocal fold pathology she was experiencing moderate to severe persistent throat symptoms, vocal fatigue, allergies, sleep issues and back pain. Numerous biomedical interventions were not helping her with these. Kristina underwent person-centred, humanistic psychotherapy with somatic interventions. This was combined with voice therapy: conventional flow phonation treatment, rebalancing extrinsic laryngeal muscle habits, breath and body balance work. At all times integrating this into an awareness of her anxieties, her beliefs around health, relationship issues, upcoming work and emerging identity work with a lower speaking pitch.

Results During treatment, there was a decrease in symptoms, including reflux (confirmed by ENT endoscopy), an increase in awareness of Self, and Kristina also had strategies to manage health-related anxieties. As a clear marker of the success, she was able to complete a successful major performance at high-profile event without her anxiety of a voice problem holding her back.

**Conclusion:** The findings suggest a need for transdisciplinary approaches to MTD treatment, incorporating both physiological and psychosocial interventions. The outcome advocates for psychotherapy as a viable adjunct to voice therapy, emphasizing the importance of addressing both physical and emotional aspects of MTD. This underscores the necessity of holistic care for individuals with MTD, integrating psychological interventions to manage underlying emotional stressors alongside traditional voice treatments.

**Keywords:** MTD, psychotherapy, voice therapy

**ABSTRACT 154**

## Swallowing Disorders in Patients with Dysphonia

Paulina Krasnodębska

**Introduction:** Coexistence of dysphonia with swallowing disorders is a topic rarely raised in the literature. Particular attention is paid to the aspect of dysfunction of laryngeal and pharyngeal muscles.

**Aim:** The aim of the study was to analyse cases of patients with dysphonia in relation to coexistence of swallowing disorder.

**Material and method:** The material of the study included 515 patients hospitalised due to dysphonia in 2018. Patients whose interview indicated swallowing difficulties were subjected to additional diagnosis for dysphagia (Fiberoptic Endoscopic Evaluation of Swallowing-FEES, extended speech therapy test, Superficial Electromyography-SEMG).

**Results:** 11.8% of people requiring treatment for voice disorders reported coexistence of swallowing difficulties. Dysphagia was diagnosed in 9.3%. The percentage of respondents diagnosed with swallowing disorder differed depending on the type of underlying disease and was the highest in the group with neurological disorders. Analysis of the correlation between the severity of dysphagia (according to the assessed grade, Dysphagia Handicap Index-DHI, Eating Assessment Too-EAT-10 results) and the severity of Voice Handicap index-VHI showed a weak correlation between VHI and EAT-10 ($p = 0.1$), statistically significant correlations ($p < 0,05$) between the value of VHI and Reflux Symptom Index-RSI in people with diagnosed neurological disease, between the value of VHI and DHI in people with hyperfunctional dysphonia and the value of VHI and BMI and EAT- 10 in people with chronic laryngitis. Moreover, statistically significant correlations were found between the severity of dysphagia and EAT-10 and DHI ($p < 0.05$). The speech therapy test indicated the co-existing problem of non-normative swallowing pattern. The electromyographic study showed the largest asymmetries in recording the average and maximum amplitude from masseters. A new scale has been created (Swallowing Disorder Scale – SDS) to identify dysphagia symptoms in patients with dysphonia. Conclusions: Treatment of patients with voice disorders requires interdisciplinary care. A history of dysphagia in these patients should complement the medical history of voice disorders. The characteristics of swallowing disorders vary depending on the cause of the voice disorder and their co-occurrence affects on average 9.3% of patients. Coexistence of muscle tension dysphagia with voice disorder requires separate diagnostic protocol. Logopaedic procedure.

**Keywords:** swallowing, dysphagia, voice, dysphonia

## ABSTRACT 156

### Reliability and Validity of Avqi (Acoustic Voice Quality Index) In Mandarin Chinese

Shuguang Li, Yue Fan, Xingming Chen, Liyan Han

**Objective:** To investigate the reliability and validity of the acoustic voice quality index-AVQI) in Mandarin Chinese.

**Methods:** 50 participants with normal voice and 50 participants with various voice disorders were enrolled in this study. All participants did their larynx check. They read aloud two sentences in Mandarin Chinese and the sustained the vowel /a:/; then filled the Voice Handicap Index (VHI-30) questionnaire. Two laryngologists evaluated the samples to determine the grade of dysphonia (G). The middle three seconds of vowel /a:/ and the two sentences were analyzed using AVQI script version 02.03 in Praat (version 6.0). The Kappa coefficient was used to determine the consistency of the evaluators. The receiver operated characteristic (ROC) curve and Youden index were used to analyze the accuracy of the diagnosis, and Spearman's correlation was to evaluate the correlation of AVQI values with other measurements.

**Results:** Kappa coefficient analysis found a high degree of agreement between two otolaryngologists who judged the results of stroboscope and between two otolaryngologists who scored GRBAS. ROC curve analysis of AVQI value was carried out using the results of stroboscope as the gold standard, and the result was AUC=0.920, P< 0.001. It indicates that AVQI value has good accuracy in the identification between normal and abnormal voice. The cutoff value of AVQI calculated by Youden index is 3.030, and the sensitivity is 85% and specificity is 93% respectively. Spearman correlation analysis showed that AVQI value was highly positively correlated with the results of stroboscope (rs= 0.730; P < 0.001) and a strong positive correlation with Gmean score (rs= 0.751; P < 0.001); while the correlation between AVQI and VHI-30 score was poor (rs = 0.376; P <0.001).

**Conclusions:** This study confirmed the reliability and validity in Mandarin Chinese for the first time. Due to its simple operation, non-invasive and sensitive and accurate outcomes, AVQI value has the potential to be used as a measurement tool in clinical practice.

**Keywords:** Voice disorders; Multivariate acoustic measurement; Acoustic voice quality index; Voice handicap index

## ABSTRACT 157

### Vocal Health and Competence in Speaking and Singing Voice in Future Preschool and Primary School Teachers

Cecília Gassull, Laura González-Sanvisens, Núria Molins-Macau, Ivet Farrés, Arantza Lorenzo de Reizábal

**Objective:** This study investigates the perception of vocal health and speaking and singing vocal competence among preschool and primary education students. The results of two parallel investigations conducted by the Kivoice team are presented.

**Method:** In the first study, 485 first-year education students were evaluated over four academic years using the QEVES questionnaire to analyze the perception of their own spoken voice and the VHI-10 to analyze their voice handicap index. In the second study, 120 first-year students and 104 fourth-year

students also answered the PUVCA questionnaire to understand the influence of family and school context, emotional perception when singing, self-concept of vocal and musical abilities, and the belief that everyone can sing.

**Results:** From both studies over 80% of students perceive good vocal health. Regarding the speaking voice, 82% feel they do not strain their voice, and 34.2% do not like their voice. 84.02% of the participants claim not to have resources to avoid strain in their voice and 52.1% of participants realize if they strain it. Students who have resources to avoid straining their voice have a more positive perception of their vocal health ($p<0.001$). Concerning the singing voice, students show a low self-concept of their vocal abilities. Only 30% believe they have a nice voice and are able to sing in written pitch and tune effortlessly. 66,4% of the sample do not consider themselves good singers. Conclusions of this work point to the need to promote voice education in the initial training of teachers to improve their vocal competence and prevent dysphonia. This will contribute to establishing appropriate vocal models in classrooms and improving the quality of teaching.

**Keywords:** voice education, vocal competence, speech voice, singing voice, voice health

## ABSTRACT 158

### Exploration of Stress and Anxiety Factors In Functional and Congenital Dysphonia

Laura González-Sanvisens, Cecília Gassull, Cori Casanova

**Objective:** In this study, we explore the differences between functional and congenital dysphonia, focusing on the relationship between stress factors, anxiety, and corporal tension during moments of nervousness.

**Method:** For this purpose, we analyze the results of the QEVES questionnaire and the VHI-10 in a sample (N=206) of patients diagnosed with functional and congenital dysphonia. Our aim is to understand the incidence of perception of anxiety, stress, and psychophysical tension in different parts of the body in relation to the perception of vocal handicap.

**Results:** The results show a strong correlation between perception of stress and anxiety and all variables of corporal tension ($p<0.001$). The results of VHI correlates significantly with the perception of anxiety and the items: discomfort affects my voice and I find it difficult to breathe/feel pressure in the chest when I am nervous. When analyzing the differences between both cohorts, the results show significant differences between functional and congenital patients in the experience of anxiety and some bodily tensions, in areas related to vocal production. It is noteworthy that patients with functional pathology perceive greater tension in the jaw, neck, and cervical areas, while also perceiving more stress in the body. Conversely, patients with congenital pathology present higher scores in the voice handicap index.

**Conclusion:** These findings highlight the need for differentiated therapeutic approaches according to the type of dysphonia and emphasize the importance of considering both physical and psychological aspects in the clinical management of these patients to improve their quality of life and therapeutic outcomes. It is crucial to develop interventions that address both the physical and emotional symptoms associated with dysphonia, thus offering a comprehensive approach to the treatment of this condition.

**Keywords:** voice pathology, stress, anxiety, corporal tension

## ABSTRACT 159

### 2d Vocal Tract Images to Induce Phonatory Vibrations and Formant Tuning

Patrick Hoyer, Martin Blaimer, Monika Riedler, Simone Graf

**Objectives:** Vocal tract resonances are localized within the vocal tract as alterations of pressure nodes and anti-nodes. Simulations based on 3D MRI models show the position of the pressure anti-nodes of the fourth formant within the vocal tract [1].

This study aims to investigate the use of 2D MRI-based visual material of the vocal tract, including the position of pressure anti-nodes of the 4th formant, to induce phonatory vibrations in singers.

**Methods:** Visual material was prepared using MRI scans of a male participant who adjusted his articulators to enhance phonatory vibrations as indicated in [1] Fig. 6 in which the locations of the pressure antinodes of the 4th formant are indicated.

The present study used the thus obtained visual material without and with perceived phonatory vibrations, the latter including the position of the vibrational sensation indicated in [1]. Three male and three female advanced singing students were asked to imitate the changes in the vocal tract shape (without and with phonatory sensation) and to experience a vibratory sensation at the tagged locations.

**Results:** The visual material induced significant changes in the formant structure of all participants across five vowels. Participants reported being able to adjust their vocal tract to produce phonatory vibrations. Formant tuning, particularly for formants 2-4, was observed during the intervention, as indicated by the analysis using Praat.

**Conclusions:** The results suggest that visual stimulation, including the indicated areas of phonatory vibrations, can help singers alter their vocal output and achieve formant tuning. This proposed stimulation technique holds potential for further studies on understanding and enhancing phonatory vibrations.

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**Keywords:** Phonatory Vibrations, Formant Tuning, Visual Stimulation of Vocal Output, MRI

**ABSTRACT 160**

## Public Speaking: Acoustic Characteristics of Voice in Giving a Speech Compared To A Reading Condition

Lamia Bettahi, Anne-Lise Leclercq, Michael Schyns, Elodie Etienne, Angélique Remacle

**Introduction:** Public speaking (PS) is a widespread vocal activity required in many personal and professional situations. Its quality can impact one's career success, reputation, and credibility.1 However, little is known about which voice characteristics are representative of PS.2.

**Objective:** This presentation aims to determine the acoustic characteristics of the PS voice by analyzing frequency parameters as well as long-term spectral features.

**Methods:** We conducted acoustic analyses on the speech productions of 40 university students in two conditions: (1) reading aloud a phonetically balanced text (control), and (2) giving a one-minute oral presentation in front of an 8-people audience (PS).

**Preliminary results:** Paired t-tests indicated a significantly enhanced vocal quality in the PS condition compared to the control condition, as evidenced by increased CPPS and spectral slope values. A higher center of gravity was also observed in the PS condition without reaching the significance level. We found a significant effect of condition on intonation as evidenced by an increased f0 SD in the PS task. No significant difference was found for median f0. Full results with 60 participants are expected in April 2024.

**Conclusion:** These findings suggest the existence of acoustic characteristics specific to PS that could be associated with Lombard speech3 and clear speech4. The two speaking styles are used in challenging communication situations to optimize intelligibility.

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**Keywords:** Public speaking, Oral presentation, Acoustic measurements, Spectral analyses, Fundamental frequency

## ABSTRACT 162

### Can Vocal Agility Be Maintained In The Mature Female Voice?

Rebecca Moseley-Morgan

**Objective:** The literature suggests that age-related changes to a singers' musculoskeletal system and the typical problem of atrophy, bowing or oedema of the vocal folds can result in loss of vocal agility. Furthermore, changes to the vocal tract due to the ongoing process of ossification and calcification can lead to constriction. The throat needs to be free of all tension in order to perform the virtuosic style of singing known as coloratura.

**Method:** There were 34 amateur choral singers and 10 professional singers a baseline comparison was drawn from both groups and a longitudinal analysis was drawn from the main cohort tested annually over 4 years. They were asked to perform 2 exercises one with text and one without. These were the first eight bars from lesson 7 of Vaccai's Metodo Pratico and the first eight bars from Panofka's 24 vocalizzi. The second exercise was sung to an Italian A vowel.

The volunteers sang these exercises, and the speed was noted in beats per minute. The task repeated getting faster each time. The fastest speed was noted. The data were collated in a column chart which indicated the results for each volunteer, over four years. Secondly, a box and whisker chart showed the distribution of the results and the extent of any outliers. Finally, the data set was analysed using JASP statistics software (Version 0.16.3). The results of the main cohort were compared to the group of professional singers which provided the comparative data, and the longitudinal data came from the analyses of the main cohort tested annually over 4 years.

**Results:** Either singing with text or without indicated that the main cohort achieved a statistically significant improvement over time. Comparison of the first data collection of the main cohort to the professionals showed that the professionals were highly significantly better, but comparison to the fourth data collection indicated very little difference.

**Conclusions:** Despite age-related changes it is possible for amateur singers to maintain or improve their vocal agility over time.

**Keywords:** mature, agility, voice

**ABSTRACT 163**

## Principle and Applications of Time Delay Difference Measurement between Voice Signals

Peter Pabon

This technique plays a role in two applications. (A) In the continuously checking of the microphone (dis)placement when picking up the voice signal at different mouth distances using a dual microphone headset in VRP measurement. (B) In the estimation of changes in larynx height by comparing the delay between an EGG signal, that is instantly picked up at the level of the vocal folds, and the corresponding audio signal arriving shortly after at some distance from the mouth. Despite the fact that in (B) both signals report on the same source and sync to the same closure epochs, the variation and deterioration seen in both EGG and audio waveforms is only vaguely related and of a different nature. This increases the complexity of the problem considerably and additional dynamic (non-linear) procedures are needed. For time delay estimation (TDE), established signal processing techniques exist, as the problem was solved long ago for radar applications. Although the modern engineering solution is often presented as finding the maximum in a cross-correlation function, a better (actually older) and more useful approach is presented by considering TDE an inverse filtering problem. With this entrance, TDE essentially relies on phase information only. The curves resulting from the inverse filtering model are easier to interpret and lead to robust and source independent delay estimates that are precise even within a fraction of the sampling period. This presentation aims at making the audience familiar with the principle, the terminology and logic of the underlying model and its resulting curves. It is explained (and when possible demonstrated life) to what extend detection accuracy depends on the quality and strengths of the input signals. It is shortly explained why, counterintuitively, the method does improve accuracy with a more aperiodic source. Results of calibration experiments are presented that test the effect of (de)correlation window length and placement. For application (B), test result for several nonlinear preprocessing options are presented, where their ability to compensate for the diverse waveform variations that are seen with the voice and EGG signal over a large pitch and level range, is discussed.

**ABSTRACT 166**

## Can Respiratory Function Be Maintained In The Mature Female Voice?

Rebecca Moseley-Morgan

**Objective:** Age-related changes to respiratory function can lead to problems in regulating sub-glottic pressure and inefficiency in initiating effective vibratory movement of the vocal folds. Hence in studying the longevity and functionality of the mature voice it was a crucial area of examination.

**Method:** There were 34 amateur choral singers, 10 professional singers and 10 self-proclaimed non-singers. A baseline comparison was drawn from all 3 groups and a longitudinal analysis was drawn from the main cohort who were tested annually over 4 years. They were asked to perform a 'Mesa di Voce' exercise over 20 beats. This required the singer to crescendo and decrescendo with skilled control of both breath flow and pressure. The speed of this exercise was set with a metronome. The task was repeated several times, each repetition was at a slower speed. The task was concluded when the singer was no longer able to complete the task in one breath. The slowest speed at which the singer executed the task was noted.

The data were displayed in a column chart which reflected the individual results of each volunteer at all four data collection points. Secondly, a box and whisker chart was created to visualise the distribution of the results and the extent of any outliers. Finally, the data set was analysed using JASP statistics software (Version 0.16.3).

**Results:** The baseline comparison showed that all volunteers were able to perform the test without difficulty. The non-singers were not able to match the performance of either the amateur singers or the professional singers. The professional singers produced better results than either the non-singers or the first data collection of the main cohort. However, comparison between the professionals and the fourth data collection of the amateurs showed very little difference. The longitudinal data of the main cohort showed statistically significant results indicating that over time, respiratory function could be maintained or improved.

**Conclusions:** Despite age-related changes it is possible for a singer to maintain or improve their respiratory function.

**Keywords:** Breathing, age-related change

## ABSTRACT 169

### Mapping Pathological Voices: Unveiling Voice Changes Across Vocal Fold Paralysis Treatment

Silvia Capobianco, Sten Ternström, Gunnar Björck

**Objective:** Most voice metrics are significantly influenced by fundamental frequency (fo) and sound pressure level (SPL), with complex and potentially nonlinear dependencies. While the voice mapping paradigm, employing fo and SPL as independent control variables, addresses this problem, one concern has been whether pathological voices can be periodic enough to provide a usable estimate of fo. This study aims to assess whether voice mapping, integrating acoustic and electroglottographic recordings, can meaningfully represent changes in voice quality and vocal fold contact following clinical interventions in pathological voices, specifically after hyaluronic acid injective laryngoplasty in patients with unilateral vocal fold paralysis.

**Methods:** Ten patients with unilateral vocal fold paralysis underwent hyaluronic acid injection laryngoplasty at the Phoniatrics Department of Karolinska University Hospital, Stockholm, Sweden. Voice recordings were conducted pre- and post-injection, combining electroglotto¬graphic and acoustic data using the program FonaDyn. Pre- and post-maps were generated to illustrate voice parameter alterations across the voice range for each patient and were compared using difference maps. Phonation and EGG clusters, trained on healthy subjects, facilitated the characterization of vocal fold contact quality across the voice range. Additionally, voice mapping findings were juxtaposed with endoscopic assessments of vocal fold closure degree by a trained phoniatrician. The joint application of EGG and endoscopy provided a more complete picture of the degree of vocal fold contact before and after the procedure.

**Results:** With an appropriate choice of periodicity threshold, it is possible to obtain useable voice maps even of severely dysphonic patients. Injection laryngoplasty in unilateral vocal fold paralysis patients typically led to a general increase in vocal fold contact and a substantial shift in speech range profile regarding fundamental frequency and SPL. However, significant inter-patient variability was observed, possibly influenced by compensation strategies and the baseline and final degree of glottal closure. Individual cases will be examined in detail.

**Keywords:** voice mapping; vocal fold paralysis; laryngoplasty; electroglottography; acoustics

## ABSTRACT 171

### Singing In Virtual Vs Real Venues: Is It The Same?

Pasquale Bottalico, Carly Wingfield, Charlie Nudelman, Joshua Glasner, Yvonne Gonzales Redman

**Background:** In the realm of classical singing, performances of identical repertoires in diverse acoustic and visual settings display significant adaptations. These adjustments in the singer's delivery are influenced by a myriad of factors, encompassing the artist's perception of the acoustic surroundings, the visual aesthetics of the performance venue, and the measured acoustic properties of the space.

**Objectives:** Voice production behaviors were evaluated to explore the effects of room acoustics on five voice parameters: vibrato rate, vibrato extent, vibrato jitter (Jvib), vibrato shimmer, and quality ratio (QR), an estimation of the singer's formant power.

**Methods:** The subjects were ten classically-trained professional singers (five males and five females). Subjects sang the aria da camera "Caro mio ben" by Giordani in their preferred key in three different performance venues with different acoustics and dimensions, with and without a virtual reality headset that simulated the same room.

**Results:** The study revealed significant adaptability in voice production behaviors among ten classically-trained professional singers, both male and female, as they performed the aria da camera "Caro mio ben"by Giordani in three different performance venues. Consistency in the performance was found between the condition in the real room and the condition with VR simulating the same room. Notably, vibrato rate, extent, jitter (Jvib), shimmer, and quality ratio (QR), an estimate of the singer's formant power, remain consistent due to the successful immersion provided by the virtual reality technology.

**Conclusions:** These results emphasize the complex interplay between room acoustics, visual perception, and vocal parameters in influencing the delivery of classical singing performances, shedding light on the multifaceted nature of artistic adaptation.

**Keywords:** Vebrato, singers, Virtual Reality, Room acoustics

## ABSTRACT 172

### Electromyographic Evaluation of Vocal Folds in Patients with Laryngeal Paralysis Referred For Injection Laryngoplasty

Beata Miaśkiewicz, Paulina Krasnodębska, Agata Szkiełkowska

**Background:** According to the literature, almost 80% of the patients diagnosed with permanent unilateral laryngeal paralysis experience vocal disability. Laryngeal electromyography (LEMG) provides information on the characteristics and progression of the disease process, allowing for optimal treatment. The aim of this study was to evaluate LEMG recordings in patients with unilateral vocal fold (VF) immobility referred for injection laryngoplasty (IL).

**Material and Methods:** 17 patients with unilateral laryngeal immobilisation as an iatrogenic complication after neck surgery. The patients were referred for IL surgery due to glottic insufficiency. All patients underwent a preoperative otolaryngologic-phoniatric evaluation with perceptual and acoustic voice assessment and LEMG.

**Results:** Patients with unilateral VF immobilisation referred for injection laryngoplasty for glottal insufficiency show significant differences on LEMG between the mobile and immobile folds. In these patients, electromyography (EMG) features of the thyroarytenoid (TA) muscle correlate with the severity of breathiness in the voice and pathological variation in the fundamental frequency. Despite the lack of mobility and features of VF atrophy, only 12% meet the electromyographic criterion for vocal fold paralysis. The immobile VF has a poorer recording from the TA muscle, the more material needs to be injected to surgically model the glottis during IL.

**Conclusions:** This study demonstrated that LEMG is a valuable criterion for qualifying patients for injection laryngoplasty in unilateral vocal fold paralysis.

**Keywords:** Electromyography, LEMG, Vocal fold paralysis, injection Laryngoplasty

**ABSTRACT 173**

## Self-Evaluation of Voice Quality, Laryngeal Symptoms and Vocal Handicap in Subjects with Voice Symptoms Associated With Moisture Damage At Work

Sarkku Vilpas, Eliina Kankare, Lauri Lehtimäki, Jura Numminen, Antti Tikkakoski, Pia Nynäs, Leenamaija Kleemola, Mika Helminen, Jussi Karjalainen

**The investigations' Objective:** There is a public concern about indoor air quality and its effect on health in Finland. The objective of this study was to find out 1) how patients with respiratory or voice symptoms associated with moisture damage at work and controls self-evaluate their voice quality and laryngeal symptoms and how their voice problems affect their voice related activity and participation, 2) if there is a difference how these patients' and controls' voice problems associate with self-evaluated activity and participation and laryngeal symptoms.

**Method:** The participants were 99 working-age patients referred to secondary healthcare with respiratory or voice symptoms associated with moisture damage at work and 568 general working-age controls. The patients and controls filled in self-evaluation questionnaires Voice Activity and Participation Profile 18FIN (VAPP18FIN) and Newcastle Laryngeal Hypersensitivity Questionnaire (LHQ). The first question in VAPP18FIN applies on the estimation of one's voice quality (from 0 = normal to 10 = very poor), the remaining 17 questions are on the effect of possible voice problem on the activity and participation (from 0 = never to 10 = all the time). In LHQ there are 14 assertions on certain laryngeal sensations (from 1 = all the time to 7 = none of the time).

**Results:** Ninety-one out of the 99 (92%) patients evaluated their voice something else than normal in VAPP18FIN 1 and 189 out of the 568 (33%) controls. The correlation between VAPP18FIN 1 and VAPP-18FIN.2-18 sum was 0.588 in the patient group (fair) and 0.356 in the control group (weak) with a significant difference between the groups ($p=0.026$). The patients had significantly lower LHQ score than the controls also after the effect of self-evaluated voice quality had been taken into consideration ($p<0.001$).

**Conclusions:** Patients referred to secondary healthcare with respiratory or voice symptoms associated with moisture damage at work consider often that they have voice problems at least in some degree. The patients' activity and participation are significantly more affected by a voice problem than that of the controls. The patients have more laryngeal symptoms than the controls independent of their voice quality indicating possible laryngeal hypersensitivity.

**Keywords:** Voice and laryngeal symptoms, moisture damage, vocal activity

**ABSTRACT 174**

## Measurement of Expiratory Pressure during Phonation as a Predictive Indicator of Phonatory Effort

Iris Maria Mariotti, Elisa Ghilardi, Silvio Santini, Irene Da Prato

**Objective:** The purpose of this study is to examine the potential of expiratory pressure measurement as a useful indicator for rehabilitation and voice training.

**Materials and Method:** Through the use of an oral-nasal mask equipped with a three-way valve connected to a manometer, expiratory pressure measurements were made of two healthy subjects, with a different level of experience in singing. Subsequently, a 2mm resistor was applied to the valve of the expiratory pathway. Subjects were asked to perform in both modes, three sustained notes (grave, medium and acute), to read a text for the duration of one minute and to sing a song for the duration of one minute. Before and after the measurements, the subjects were asked to complete a self-perception questionnaire (below) performing the same free voice tasks.

**Results:** For the "expert singer" the recorded pressure was less than 1cmH2O, with greater difficulty in performing the reading task than the singing task. For the "beginner singer" a pressure between 3 and 5 cmh2o was detected, with greater difficulty encountered in the singing test.

**Conclusions:** This work allowed us to observe how expiratory pressures tend to increase when pneumophonic coordination is poor and how a greater "training" allows to speak and sing with less effort. Expanding the study by incorporating more subjects is necessary to gain more knowledge to:

- confirm the usefulness of pressure measurements in identifying, even in advance, the subjects in which voice disturbances may occur as a result of an excess of expiratory pressure;
- verify if the instrumentation employed can be included among SOVTE devices;
- check whether these measurements can be used in a visual feedback system to regulate expiratory pressure itself.

**Biography:**

Croatto L. (1983). Trattato di Foniatria e Logopedia Vol. 1. La Granola editore. 21-46"

Iris Maria Mariotti, Elisa Ghilardi, Silvio Santini, Irene Da Prato

**Keywords:** expiration, pressure, effort, sovte, singers

## ABSTRACT 175

### Voice and Stomatognathic System

Valentina Camesasca

The term Voice derives from the Latin "vox" and originally referred to "Any sonority (sound or noise) that comes out of the mouth". However, over time, it acquired a deeper meaning, since "What comes out of the mouth", the product of the vocal folds, is much more than just a sound or noise. Voice means Word, Language, Singing... it has an informative and communicative value.

The Larynx is an organ in the middle of the neck, at the crossroads of the Upper Aero-Digestive Tracts and it is involved in breathing, swallowing and phonation. It has a unique role as aero-digestive carrefour and it is in a special position in the neck, "hanging"from the hyoid bone and in close connection with the other cranio-facial structures through the pre-laryngeal cervical muscles.

The simple morphological description of the Cranio-Cervico-Facial System is not sufficient to adequately represent its structural complexity. We need to observe all the anatomical components and their close dynamic connection to adequately interpret their function. Phono-Articulation of language, in fact, is achieved through an extremely complex system which includes not only larynx, but also the supraglottic structures of the vocal tract, the pulmonary system, the nervous system and the musculoskeletal system.

The Stomatognathic System is a very complex anatomical and functional system, that includes the muscular, skeletal and nervous structures involved in chewing, swallowing and phonation and it is mechanically and functionally connected to the other body districts through the myofascial chains that determine the global posture.

So, stomatognathic system and posture play a key role in this mechanical model of connections. Occlusal alterations, wrong lingual posture and dysfunctional swallowing can cause asymmetries in the postural chains, with consequent voice alterations.

Therefore, a multidisciplinary and interdisciplinary approach to Voice disorders is essential to obtain optimal and long-lasting results.

**Keywords:** voice, phonation, stomatognathic system, posture, multidisciplinarity

## ABSTRACT 177

# Relations between Emotional, Physical and Functional Voice Symptoms and Coping Strategies In Individuals With And Without Voice Problems

Kristin Daemers, Carole Chiers

This presentation addresses the relationships between the emotional, physical and functional symptoms associated with voice problems and coping measured by the Utrecht Coping List (Schreurs et al., 1993). The participants also completed a voice care questionnaire, the Current Speaking Effort Level or EFFT (Hunter & Titze, 2009), the Vocal Handicap Index or VHI (Jacobson et al., 1997) and the Vocal Fatigue Index or VFI (Nanjudeswaran et al., 2015).

The presented research is a follow-up study of previous research in a group of 73 future teachers and a control group of 60 future nonvocal professionals presented on PEVOC 2019. Thirty female and 4 male participants from the original research population volunteered to participate in this study after completing their education. Thirteen were working as a professional voice user, 21 were continuing their studies or performing a nonvocal occupation.

Correlations between the different questionnaires show us moderate and strong correlations are found between laryngeal discomfort (EFFT) and emotional impact (UCL and VHI). Finally, less efficient coping styles seem to be correlated with more severe vocal fatigue (VFI) and with higher VHI-scores.

The authors will critically review these results with the audience, compare these data with recent literature and formulate implications for treatment.

**Keywords:** emotional voice symptoms, physical voice symptoms, coping, self-assessment

## ABSTRACT 179

### Do We Really Need A Multidisciplinary Voice Assessment? Correlations Between The Auditory-Perceptual Evaluation, Self-Perception And Vocal Fold Function In Student Teachers Explained

Emilie Lavrysen, Ayla Benoy

**Objective:** The purpose of this study is to compare the auditory-perceptual evaluation of the voice, the vocal fold function by videolaryngostroboscopic examination, and self-perception of voice quality during a voice screening in starting student teachers.

**Method:** Identical voice assessments were carried out in 360 student teachers. The Voice Handicap Index (VHI) was used to examine the self-perception of voice quality. The voice therapist assessed the voice quality using the GRBASI method in a running speech sample. Using videolaryngostroboscopy, an otorhinolaryngologist investigated the function of the vocal folds.

**Results:** Female student teachers had an overall predominance in all levels of education, but the amount of men was higher in higher educational tiers. Although student teachers have low VHI and instability scores, the majority has an aberrant vocal fold function (62,5%). Significant correlations were found between most parameters of GRBASI, vocal fold function and VHI. G showed strong correlations with all parameters of vocal fold function, as well as R with MW, RE and SY. In contrast, I showed no or weak correlations with all other parameters. VHI-F did not correlate with any of the vocal fold function parameters. However, total score of VHI displayed weak correlations with all vocal fold function parameters.

**Conclusions:** A lot of student teachers have alterations in vocal fold function when starting their education, but they underestimate the impact of it on their life as professional voice user. A well-trained evaluator might be able to correctly predict glottic image. Instability (I) seems to be irrelevant for the vocal evaluation of this population. When a student teacher experiences a physical voice impairment, a malfunction of the vocal folds can be underlying. Thus, multidisciplinary voice assessment is recommended. Raising vocal awareness and proper voice training in student teachers are key.

**Keywords:** Voice Evaluation, Videolaryngostroboscopy, Voice Handicap Index, Perceptual Evaluation, Voice Quality

**ABSTRACT 181**

## The Impact of Fess on Acoustic Properties of the Voice—Preliminary Results

Noa Berick, Itzhak Braverman, Forsan Jahshan, Isaac Shochat

**Objective:** Functional endoscopic sinus surgery (FESS) is a commonly performed procedure. Previous research utilizing 3D models and cadavers suggested changes to the sound quality and voice features following such procedures. The current study aims to investigates the acoustic properties of the nasal tract in live human subjects before-, and after- FESS.

**Methods:** A prospective cohort study was conducted on patients undergoing FESS. The patients completed VHI-10, SNOT-22, and NOSE questionnaires, and vowels and nasal sounds (/m/, /n/) were recorded pre-, and one-month post-op in a standardize setting. Acoustic analyses were performed to assess changes in acoustic features using python librosa and parselmouth (praat) libraries.

**Results:** Eight patients, three men and five women, were recorded and complete the questionnaires before and after the surgery to date. Three patients reported voice problems (VHI-10 18, 13, and 12), and reported a post-op improvement (14.33 mean improvement). Except for one, all patients demonstrated improvement in the nasal outcome questionnaires. Subgroup voice analysis for improved vs. unchanged VHI-10 demonstrated shift in the tenth Mel-Frequency Cepstral Coefficient for both groups ($p$-value $< 0.05$); a noticeable, yet non-significant shift in the first MFCC mean ($p$-value $= 0.059$) for the improved, and in the 12th for the unchanged. Subgroup by sound showed more tendency for significant ($p$-value $< 0.05$) feature shifts in /a/ (13th and trend on the 4th), /o/ (first), /u/ (Seventh, and trend on the 12th), and somewhat in /n/ (Spectral flatness, 12th, and trend on the 13th). Manually comparing F2 to F1 formants ratio for the first three patients yielded a significant shift, with higher frequencies shift for the F2 post-op ($p$-value $< 0.01$). An inverse, significant trend was seen between F3 and F2 ($p$-value $< 0.01$).

**Conclusion:** Though preliminary, the current study demonstrates a measurable impact of the nasal and paranasal-sinuses reverberation on the human voice quality. Larger and more comprehensive studies should better define the changes in voice features for patients undergoing FESS and might elucidate those changes to singing- and voice professionals.

**Keywords:** Vocal Harmonics, Voice, Resonants, FESS, acoustic

**ABSTRACT 182**

## Relapses and Progression of Laryngeal Epithelial Dysplasia

Aurelija Vegiene, Greta Rokaite

Purpose of our study was to assess the nature, frequency, and progression of recurrences of laryngeal epithelial dysplasia in patients treated at the department of Otorhinolaryngology, Hospital of LUHS Kaunas Clinics from 2017 to 2019 due to chronic hyperplastic laryngitis and laryngeal papillomatosis. Their characteristics were evaluated only for patients who were followed up as outpatients until year 2022.

**Methods:** The study was conducted at the department of Otorhinolaryngology of the Hospital of LUHS, Kaunas Clinics. Data were collected from patients diagnosed with chronic laryngitis (histologically low or high-grade dysplasia) and laryngeal papillomatosis (histologically without dysplasia or with low or high-grade dysplasia). Retrospective data from medical records were collected and analysed. Diagnosis, relapses and progression were prooved by hystological examination.

**Results:** The study included a sample of 183 individuals who were examined and treated at the LUSH Hospital, Kaunas Clinics, Department of Otorhinolaryngology. 135 were diagnosed with chronic laryngitis with dysplasia, and 49 were diagnosed with laryngeal papillomatosis.

Patients with histologically confirmed low or high-grade laryngeal epithelium dysplasia, including carcinoma in situ, accounted for 70.3% (n=83). Laryngeal papillomatosis with or without low or high-grade dysplasia was diagnosed in 29.7% (n=35) of patients. On average, patients underwent surgery 2.85 times (SD=1.127) within the combined follow-up period of three years. The recurrence rate was in 44.1% (n=52) of patients. Within three years, 10.2% of the subjects were diagnosed with laryngeal carcinoma (n=12). Cases of laryngeal cancer occurred only in the laryngeal epithelium dysplasia group within the three-year period (p=0.018).

**Conclusions:** Low-grade dysplasia was statistically significantly predominant in the laryngeal epithelium dysplasia group. Recurrences of high-grade laryngeal epithelium dysplasia were statistically significantly more frequent compared to low-grade (p=0.022) and accounted for 54.5% of cases. Recurrences of high-grade laryngeal epithelium dysplasia were statistically significantly more frequent compared to low-grade (p=0.022) and accounted for 54.5% of cases. High-grade laryngeal epithelium dysplasia progressed to malignant tumors (p=0.039) statistically significantly more often and occurred in 24.2% of cases.

**Keywords:** Chronic laryngitis, laryngeal epithelium dysplasia, precancerous diseases, papillomatosis

## ABSTRACT 183

### Singing As a Tool for Learning English as a Second Language

Philip Salmon, Susana Caligris

The bio-psycho-social activity of singing exercises the whole social engagement system (Porges 2014). Among the complex interactions involved, controlled breathing enhances cognition, memory recall, attention and emotions (Heck et al, 2017). Brain scans show enhanced activity in singing compared to speaking (Ozdemir et al, 2006). Singing stimulates the vagus nerve's network of connections between

the cranial nerves and vocalization (Porges, 2014). It co-ordinates the 45 articulatory muscles required for language (Korner & Strack, 2023). Educators have long held that singing helps in the learning of language. However, the majority of research is not empirically grounded (Good et al, 2014).

**Objective:** To assess the effect of the act of singing on the learning of English as a second language.

**Method:** This empirical study, focused on Spanish speakers in Argentina, was integrated into short, intense courses of vocal coaching in choral workshops and solo master classes. 247 participants of mixed ability (ages ranging from 14 to 63), comprising school choirs, adult choirs and adult individuals, from a range of social backgrounds, performed classical, folk, tango, jazz and pop repertoire. Pedagogical resources included singing technique, phonetic demonstration, imitation, mirrors, call and response and small break-out groups. Individual students were each given a 40-minute coaching session, in a group context, learning by observation alongside active participation. Courses culminated in concert performances with audience, to test delayed recall and provide a focus to the course outcomes.

**Results:** Activities were assessed by the authors, and post-activity written feedback was received from self-selecting participants and teachers. The mechanics of singing facilitated sensory-motor control and feedback, aural feedback, concentration, attentiveness, social cohesion, a closer expressive sense of the language and enthusiasm to continue, creating a productive learning environment. Pronunciation, understanding, expressivity and memory retention of English all improved. Teachers resolved to apply the pedagogical and didactic strategies to their future teaching and curricula.

**Conclusions:** This study evidenced observable improvement in the assimilation of English through singing. Recent studies in Finland, Ecuador, Hungary and England have added to the body of evidence that singing facilitates the learning of a second language, but there is much scope for more investigation.

**Keywords:** Language, singing, pedagogy.

## ABSTRACT 186

# Analysis of Vibrato Variability and Adaptability in a Duet Singing Experiment: A Pilot Study

Gerardo Acosta Martinez, Helena Daffern

**Introduction:** The presence and control of vibrato in group singing situations has been of great interest in choral singing research. Previous studies have suggested that vibrato can be adapted and even synchronised between participants singing together [1,2] but these findings have been limited in sample size and the metrics used to assess vibrato variability. Further insights into the coupled characteristics of multiple vibratos could inform choral singing aestethics and pedagogy practices.

**Objective:** To study the characteristics of vocal vibrato particularly under conditions of solo/duet singing using analysis of acoustic features including rate, extent, variability, and synchronisation.

**Methods:** An experimental protocol for the recording of vocal vibrato under different singing conditions was developed. A pair of choral singing students—singing around 1.5 meters apart and recorded using DPA close-microphones and electrolaryngographs—were instructed to sing with vibrato on the vowels /i/ and /a/ sequentially on their own (solo singing) and together (duet singing with the intention of blending with each other).

**Results:** The analysis from this study shows that the singers were capable of adjusting the characteristics from their vibrato, as measured by rate and extent, depending on the singing conditions. Additionally, instances of high synchronisation measured via cross-recurrence quantification analysis were not uncommon on the recordings between the singers when blending together.

**Conclusion:** Understanding the possible physiological adaptations that might take place between participants during group singing through the lens of vibrato seemed plausible and informative using a bespoke recording protocol. The implications of further findings can also shed light on the relationship between vibrato perception and choral singing.

**References:**

1. Carter, N., Hopkin, J. A., & Dromey, C. (2010). Volitional control of vibrato in trained singers. Journal of Singing, 67(1), 9–17.

1. Daffern, H. (2017). Blend in singing ensemble performance: Vibrato production in a vocal quartet. Journal of Voice, 31(3), 385e23–385e29.

**Keywords:** Vibrato, Choral, Singing, Blend, Synchronisation

## ABSTRACT 187

### The Use of the Scratched Voice in Extreme Singing. Proposal For A Self-Assessment Questionnaire: "Subjective Evaluation Questionnaire of the Singer's Management of Scratched Voice Quality"

Ilaria Romagnoli, Enrico Di Lorenzo, Roberta Mazzocchi

**Aim:** The study aims to investigate the physiology of the scratched voice in the context of modern singing and the risk factors related to its use by the singer, integrating data from the literature with the results administration of a self-assessment questionnaire on the management of scratched voice quality.

**Methods:** Self-assessment questionnaire was constructed based on theoretical constructs correlated with dysfunctional use of the scratchy voice in singing and behavioral habits that induce a hyperkinetic vocal attitude. The questionnaire investigates the presence of vocal symptoms (acoustic and non-acoustic) during and after performance, emotional dimensions, and performance-related behavioral and

vocal hygiene habits. It is divided into 4 sections in which the singer makes a judgment about the frequency of occurrence of the symptom and behavioral habit using a Likert scale response system with an even number of steps. The questionnaire was administered to a sample of 26 rock singers. The sample was described according to gender (23 males, 3 females), age (mean age: 37.4) years of activity (mean: 18.8 years), musical genre (53.3 % rock), the use of an instrument during performance (42.3 % of the sample plays an instrument).

**Study design:** Descriptive survey.

**Results:** From the analysis of the distribution of symptoms by subject, 4 groups of subjects were identified: subjects with no symptoms (group 1: 7.7%), subjects with non-acoustic vocal symptoms and symptoms related to compensatory muscle hyperactivation (group 2: 11.5%), subjects with non-acoustic vocal symptoms, acoustic vocal symptoms and symptoms related to compensatory muscle hyperactivation (group 3: 73.1%), and subjects with only acoustic vocal symptoms (group 4: 7.7%).

**Conclusions:** Group 3 is the largest and accounts for 73.1 % of the sample in which, with low frequency of presentation, the co-presence of physical symptoms and a tendency to lower fundamental frequency after performance were observed; this may suggest a vocal abuse routine associated with hypermuscularization of the phonatory act, potentially harmful if ignored. This consideration may be useful for preventive and therapeutic intervention. Further study of the proposed self-assessment instrument may be useful, given the importance of self-assessment for screening, evaluation and completion of the diagnostic process.

**Keywords:** scratched voice, rock singing, self-assessment questionnaire, vocal abuse, compensatory muscle hyperactivation

## ABSTRACT 189

### Speaking To the Body: Intention, Direction, Emotion, Body Movement and Gestures

Erika Biavati

A good voice is the result of a synergetic work between the body and mind.

To achieve the maximum cooperation between body and mind while practicing, we have to motivate ourself in doing something that is incredibly important. To do so we have to focus on positive energy and find the right tools of work.

Engaging our face, arms and hands while training the voice can be extremely useful. A good example is simulating a happy or sad expression which helps us to better control the intonation; another example is the movement of the hands that, accompanying the emission of the note, helps us to control its duration and energy, obtaining a more stable and homogeneous sound; to obtain a good ascendant

glissando we can accompany the sound emission with a widening gesture of the arms, to improve the vocal tract enlargement moving to high notes. These are just a few examples. During the presentation videos will be shown, filmed during individual vocal technique lessons. The videos will clearly show how gesture and body language in vocal training are fundamental to balance the energy for a good vocal result.

**Keywords:** body, movements, gestures, vocal coach, singing teacher

## ABSTRACT 195

### The Teaching of Singing in Music Teacher Training In Brazil

Alicia Cupani

This paper presents part of the results of a research with forty singing teachers from Brazilian public universities, from the Music Teacher degree. Among the objectives, to outline a profile of these teachers, to find out about aspects of the vocal training they offer to future music teachers and their opinion on the difficulties and challenges of teaching singing in this context. With a quantitative design, the research used an ad hoc questionnaire with closed and open questions, which proved to be an effective instrument for the proposed objectives. The lack of time to work adequately, the low vocal/musical level of the students, keeping up to date, among others, were pointed out as difficulties and challenges of teaching singing at the Music Teacher degree. The presence and importance of singing in schools has been widely explored in the academic literature. In contrast, there is little research on the vocal training of music teachers who will work in this school context. With this study, we hope to increase knowledge of vocal pedagogy and contribute to the improvement of higher education in singing/music and teacher training.

**Keywords:** teaching of singing, music teacher training, higher education

## ABSTRACT 196

### Tracheo-Esophageal Voices – Developing A Set Of Voice Examples Used For Auditory-Perceptual Analysis And Description By Speech-Language-Pathologists

Anne Bingen-Jakobsen, Niels Reinholt

**Background:** Auditory-perceptual analysis is important in the logopaedic rehabilitation of patients with total laryngectomy in order to plan the intervention, describe advances, treatment outcome or

changes in voice quality, indicating possible recurrence of cancer. However, there is a lack of sound examples describing alaryngeal voices. A pilot-study revealed the lack of experience in Danish SLPs describing tracheo-esophageal voices.

**Objective:** Leaning towards the tradition of auditory-perceptual analysis of dysphonic voices in Denmark (J Voice, vol. 32, issue 4, 2018, J.Iwarsson et al) it is relevant to develop a set of reference voices.

**Methods:** More than 50 voice recordings from a voice clinic formed the basis. A primary selection of examples was made by an experienced SLP (more than 20 years) regarding overall grade and voice quality. 5 experienced SLPs from different parts of Denmark were invited to listen and discuss terminology, in order to reach a level of consensus.

**Results/Conclusions:** The selected sound examples will be released to the SLPs in Denmark.

In this oral presentation the process of the project will be presented, including pilot-study, selection of examples, consensus listening, overall grade and quality.

In addition sound examples will be presented.

**Keywords:** TE-voice, auditory-perceptual analysis, reference voices, anchor voices, consensus listening

## ABSTRACT 197

### Prevalence and Risk Factors for Voice Problems in the General Population

Sofia Holmqvist-Jämsén, Daniel Fellman, Patrick Jern, Susanna Simberg

**Objectives:** Only few epidemiologic studies examine the prevalence of voice problems and risk factors contributing to them in the general population. This study sought to examine the prevalence rate of voice problems and to identify health and work-related risk factors that was uniquely related to an increased risk for having voice problems.

**Methods:** A total number of 1220 participants (66.5 % women, 33.5% men) completed a questionnaire concerning speech, language, and voice. Occurrence of voice problems were assessed using a six-item screening tool for voice problems. These symptoms were as follows; voice gets strained or tires, voice gets low or hoarse, voice breaks while talking, difficulty in being heard, throat clearing or coughing while talking, and sensation of muscle tension or a lump in the throat. The participants reported how often they experienced these voice symptoms during the past year by choosing from the following alternatives: daily, weekly, less frequently, and never. This screening method for voice problems has been used in previous studies, and it has been shown that those participants reporting two or more frequently (weekly or daily) occurring vocal symptoms often have visible changes on their vocal folds. Thus, the criteria for having voice problems in the present study was if the participant reported two or more voice symptoms occurring weekly or more often. In addition to the voice screening,

dichotomous questions regarding eleven health-related and ten work-related risk factors were included in the analysis. Factor analysis and logistic stepwise regression models were conducted to investigate the association between the work and health related factors and increased risk for voice problems.

**Results:** Preliminary results showed that the prevalence of voice problems was significantly higher among women compared to men. Age did not have any significant influence on the prevalence of voice problems. The prevalence of voice problems in the complete population-based sample as well as the results regarding variables that are uniquely associated with an increased risk of voice problems will be presented during the conference.

**Keywords:** Voice problems, Voice disorder, risk factors, predictors, factor analysis

## ABSTRACT 198

### Comparing Different Vocal Fold's Hydratation Methods

Chiara Falanga, Alfonso Borragán Torre, Daniele Apredda

The study aimed to compare two common methods to hydrate vocal folds (damp gauze and nebulisation with saline solution) in order to state which one is more efficient in terms of improving voice quality and vocal folds mobility and pliability. Fourteen voice professionals, such as singers or speech therapists, were enrolled to experiment the different hydration methods for five minutes while doing some vocal tasks, on consecutive days. All of them were assessed before and after the treatment with a laryngostroboscopic examination (in order to evaluate the glottis closure, the amplitude of the mucosal wave, and the maximum opening of the glottal space), a spoken and singing voice acoustic analysis, a self-assessment questionnaire and an evaluation made by voice experts. Results showed that all the methods were efficient in improving voice quality. All participants reported a cleaner voice, improved vocal pitch, and a more elastic voice in particular with the use of the damp gauze hydration. The laryngostroboscopic findings showed an improved wave amplitude and glottal opening in particular with the dump gauze, while glottal closure was better after nebulisation. The acoustic analysis showed a better AVQI after both methods, and a Shimmer% reduction in particular with the gauze use. Both methods were judged efficient by the jury in improving voice quality; nebulisation seemed especially efficient in giving participants a clearer and more resonant voice. In conclusion, we can assume that both methods are effective in improving voice quality and can be used by voice professionals or patients to obtain a clearer and more elastic voice. According to our results, the damp gauze appeared to be more efficient in improving mucosal wave regularity, which is responsible for a more elastic and agile voice and better voice quality. Our sample preferred the damp gauze to the nebulisation, also because of its ease of use and portability, which is an important aspect as it increases the adherence to the treatment plan.

**ABSTRACT 199**

## How Do Pre-Service Teachers Promote Interaction In Teaching Through Prosodic Features Of Voice? – A Pilot Study

Kati Järvinen, Anna-Leena Kähkönen, Pasi Nieminen, Terhi Mäntylä

**Objective:** In learning research, language and interaction in the learning environment have been in focus and dialogical acts, linguistic and/or gestural behaviors, found to correlate with learning. Teachers´ voice plays an important role and teachers can support interaction and learning by speech. This study aimed to investigate if and how different speech objectives are manifested in teachers´ voice.

**Methods:** Two female pre-service physics teachers were recorded while teaching electricity tasks to pre-service elementary school teachers. Speech samples indicating instructional explanations were extracted and categorized following the conversation analysis tradition. The teachers´ responses, based on the students´ initiations, were categorized as question, hesitation, understanding, and two types of continuers: with dull (CDT) or with enthusiastic (CET) tone. The total number of samples was 30. The samples were annotated on syllable level and a Praat prosody script was used for acoustic analyses.

**Results:** The fastest articulation rate, and biggest ratio of silent pauses was found when teachers answered the students´ questions. These answers also had lowest F0, SPL and widest F0 variation, and smallest energy proportion below 1kHz (EPB). Hesitation was responded to with lowest ratio of silent pauses and widest SPL range. Speech turns after students´ indication of understanding had slowest articulation rate and narrowest SPL range. The continuers (CDT) were followed with highest F0, SPL and smallest F0 variation, and largest EPB.

**Conclusions:** According to this study, pre-service teachers´ prosodic patterns were affected by the objective of speech. The results suggest that answering questions may have more emphasis in speech or be more promotive in nature, while responses to CDT initiations may reflect more presentative speech. Increased ratio of pauses may indicate that the teachers admit more time for information processing when answering a direct question. Decreased pausing and larger SPL variation when responding to students´ hesitation, may indicate encouragement.

As pre-service teachers seem to use different kinds of prosody depending on the objective of speech, it would be interesting to investigate how prosody guides teaching discussions and verbal communication. Further study with larger number of participants is required and the students´ speech turns should be analyzed.

**Keywords:** teaching, instructional explanation, interaction, prosody

## ABSTRACT 202

### Kaleidoscopic Voice Pedagogy: Developing a Cross-Training Voice Program with Latin-American Repertoire

Luciano Simoes Silva

Based on the experience of almost ten years developing and implementing the first voice program specifically to educate hybrid singers specialized in Latin-American vocal styles in a four-year program at the XXX University, this proposal explores the possibilities and advantages to structure a program based on a variety of vocal styles from this culturally diverse region.

The methodology applied in cross-training pedagogy is based on the following principles: a) teaching two or more styles during the lesson; b) functional training (focus on building the instrument); c) interleaved and spaced practices, with variable repertoire and/or styles (such as bossa nova on Mondays and tango on Tuesdays), without focusing primarily in repetition; d) goal towards achieving an optimal level in different styles, not a perfect level in one style; e) vocal music appreciation of Latin-American styles (knowledge of the possibilities of this repertoire); f) focus on peer-to-peer learning, where students from different backgrounds and experiences can exchange musical insights; g) foment professional preparedness and independence (to create a band, buy a microphone, know song forms and decide about keys). The theoretical framework for this pedagogy comes from the writings by LeBorgne and Rosenberg on the hybrid singer, Helding's work on motor learning, Canclini's ideas on hybridity in Latin-American culture and the Brazilian philosophy of cultural anthropophagy created by Andrade and applied by Veloso.

The results, based on the profile of students who graduated, point to an increase in artistic and aesthetic boundaries, strength, coordination and endurance as well as an expansion in vocal flexibility and stylistic independence. Also, there is a perceived growth in employability, since the music business look not only for singers who can perform in more than one genre, but also who have adaptable skills, varied repertoire, entrepreneurship, individual expression, creativity and enjoy collaborating with peers.

In conclusion, the training of the hybrid singer is an evidenced way to ameliorate voice habilitation. Furthermore, the expansion of the traditional pop repertoire toward Latin America can considerably improve a singer's perspective, resulting in a more pliable, adaptable and knowledgeable professional for real life situations in today's music market.

**Keywords:** Voice pedagogy, Latin-American music, Brazilian music, cross-training, hybrid voice

## ABSTRACT 203

### Perception and Neural Processing Of Disordered Voice Stimuli: An Encephalography Study

Baiba Trinite, Anita Zdanovica, Daiga Kurme, Evija Lavrane, Ilva Magazeina, Anita Jansone

Professional voice users like teachers and university professors frequently experience voice disorders. These disorders can adversely affect both the individuals experiencing them and listeners, impacting speech perception, listening and cognitive load, and task performance.

**Aim:** The study investigated the effects of disordered voice instructions on behavioral and event-related brain potential (ERP) measures in spatial directional tasks.

**Methods:** Forty-three right-handed, healthy, Latvian-speaking university students (21 female, mean age 21.11 ± 2.41 years) were exposed to auditory instructions in Latvian indicating spatial directions (left, right, up, down). All auditory stimuli consisted of two-syllable words: /kreisa:/, /laba:/, /augʃa:/, and /leja:/. Instructions were delivered in both disordered and normophonic voice qualities. Disordered voice stimuli were recorded by a male with severe spasmodic dysphonia (44 years, G3R3B1A0S3I3, DSI -7.2) and a female with chronic laryngitis (52 years, G1R1B0A1S0I0, DSI -0.35), alongside normophonic recordings from age- and sex-matched controls. Each participant responded to 576 stimuli, half in a disordered voice, by moving a joystick in the instructed direction. The mobile EEG recording solution with 64 referential channels (ANT Neuro) was used for ERP measurements.

**Results:** Statistical analysis revealed a significant effect of dysphonic voice on reaction times ($p < 0.001$, Mann-Whitney U Test), with a median reaction time of 0.634 s (SD = 0.369 s) for disordered voice instructions compared to 0.594 s (SD = 0.270 s) for normophonic voice instructions. Interestingly, reaction times decreased for instructions by the speaker with severe spasmodic dysphonia. Task accuracy remained high across conditions (97.6%–98.4%), with no significant effect of voice quality on task execution accuracy ($\chi2(2) = 5.165$, $p = 0.076$). The results regarding neural processing of the disordered and neutral voices will be presented at the conference.

**Conclusions:** Dysphonic voice quality significantly affects reaction times in spatial direction tasks, suggesting a likely increase in auditory and cognitive exertion. The forthcoming results from the ERP investigation are anticipated to give insight into the neural processing of disordered voice quality, thereby supplementing current findings.

**Funding:** This work was supported by the Latvian Science Council [lzp-2021/1-0159], the project "Affective and disordered vocal stimuli neural processing during mobile tasks".

**Keywords:** voice disorders, reaction time, accuracy, perception, event-related brain potential

## ABSTRACT 204

### Compensation of Perspective Distortion by Laser-Based 3d Laryngoscopy

Marion Semmler, Reinhard Veltrup, Stefan Kniesburges, Jann-Ole Henningson, Michael Döllinger

**Objective:** The examination of the larynx and phonation process through visual inspection is crucial in laryngological diagnostics. Beyond identifying structural changes and neurological disorders, the

dynamic behavior of the vocal folds (VF) provides key diagnostic insights. Insufficient closure, asymmetry, and irregular oscillation patterns of the VF are indicators of functional dysphonia and chronic hoarseness. In the course of oral laryngoscopy, controlling the distance and angle between the glottal plane and the imaging system is challenging and varies based on the subject's anatomy and compliance, as well as the operator's skill and handedness. Under certain recording conditions, symmetric oscillations may be inaccurately perceived as asymmetrical. We demonstrate that 3D symmetry parameters are less affected by recording perspective than 2D parameters, leading to more accurate diagnostics.

**Methods:** A systematic analysis is conducted using a validated synthetic VF model, which yields consistent and symmetrical oscillation patterns. The reproducible dynamics of the VF are captured from 9 distinct angles ranging from ±20° at three different heights (50 mm, 65 mm, 80 mm) above the glottal plane. For each angle, a combination of a laser projection unit (LPU) and a high-speed (HS) camera operating at 4 kHz is utilized to gather both 2D and 3D data of the oscillating surface. Additionally, as a benchmark, a second synchronized HS camera is strategically positioned directly above the synthetic model, capturing 2D data at a 0° angle.

**Results:** The 2D recordings obtained from both the reference and perspective views undergo segmentation, and objective parameters for spatial/temporal symmetry are calculated. The 2D analysis is based on the glottal area waveform, utilizing a specialized in-house software (Glottis Analysis Tools). Similar to established 2D parameters, we quantify 3D asymmetry utilizing the reconstructed 3D surface model. This approach allows for a comparative analysis of the proneness of both 2D and 3D parameters to perspective distortion.

**Conclusions:** We have successfully quantified the extent of perspective distortion in video recordings obtained from rigid laryngoscopes. Furthermore, we want to raise awareness on the susceptibility of both 2D and 3D imaging techniques to potential diagnostic misinterpretations due to such distortions.

**Keywords:** 3D imaging, perspective distortion, laser projection, symmetry, laryngoscopy

## ABSTRACT 205

### 3d Mri-Based Vocal Tract Configuration and Acoustic Characteristics of Various Period-Doubling Phonation Types in a Metal Singer

Fiona Stritt, Louisa Traser, Daniel Priegnitz, Marie Köberlein Köberlein, Johannes Fischer, Michael Bock, Bernhard Richter, Matthias Echternach, Mario Fleischer

In pop/rock/metal and classical Asian singing, a virtuous control of glottal and supraglottal vibration patterns, was described.

In addition to chaotic vibrations, nearly-periodic oscillations occur in which the supraglottic vibrations are tuned to the vocal fold vibration in a specific ratio. We previously identified four types of

period-doubling phonation using trans-nasal high-speed endoscopy in a professional singer. The ratio of the glottal to supraglottal fundamental frequency (GSR) was primarily 1:1 for "Distortion" and 2:1 for "Undertone", staying constant over the entire pitch range. For "Rattle", GSR changed from 4:1 to 7:1 during a pitch glide, and for Growl, GSR changed from 2:1 to 3:1. Entrainment phenomena seem to be the key to synchronizing the two oscillators. From a voice pedagogic point of view, however, the vocal tract configuration also appears to be important for the development of irregular vocal qualities.

To investigate whether the resonatory properties of the vocal tract play a role in the perpetuation of supraglottic vibrations, we analyzed the vocal tract morphometry using 3D magnetic resonance imaging (MRI).

Sustained phonation of the bevor mentioned voice qualities on vowel [a:] was performed at two different pitches. We segmented the whole vocal tract cavity (VT), considering additionally implemented teeth, and calculated the acoustic transfer characteristics using the finite-element method.

We further analyzed the vocal tract length and derived the area function. The lowest laryngeal position was found for "Growl", the highest for "Rattle" and "Distortion", while "Undertone" had an intermediate laryngeal position. A megaphone VT configuration occurred for "Rattle" that is also reflected acoustically in an association of the second harmonic with the first VT resonance. In turn, the VT configuration for "Growl" is comparable to that of classical singing with laryngeal lowering and hypopharyngeal widening. A coincidence of the second/fourth harmonic of the glottal vibration with the inertance maxima of the first VT resonances occurred for "Growl"Phonation. Such a coincidence did not occur for "Undertone" and "Distortion".

Whether the association of the harmonics with the inertance maxima of VT resonances actually plays a role in supporting period-doubling mechanisms should be closer examined in future studies.

**Keywords:** irregular voice, metal singing, MRI, vocal tract, transfer function

## ABSTRACT 208

### Measuring the Impact of Monitoring Devices on Bone Conduction for Singers

Kim Steele, Helena Daffern, Damian Murphy

Different types of monitoring are commonly used by Contemporary Commercial Music, from personal in-ear devices to wedge monitors distributed across a stage. However, especially as technology for performing in virtual acoustics for networked performance is developed, all performers including classical singers are sometimes required to perform with monitoring over headphones or similar devices. For singers this is a complex issue, that can impact upon their performance in multiple ways. These impacts are not well understood, but are likely connected to proprioception and the occlusion effect.

The aim of this pilot study is to develop and test a protocol to measure the impact of different types of monitoring devices, such as headphones, on a singer's performance. In particular, it explores the use of contact microphones to measure bone conduction during singing, especially during monitoring.

Subjects sing different phonemes at different pitches and dynamics, both on a sustained note and a short melody, with contact microphones affixed to their heads. After initial baseline measures, singers repeat these tasks whilst wearing different monitoring devices, such as closed-back or open back headphones, and in-ear monitors. Subjects are asked to maintain the same voice level throughout using a sound level meter placed in front of them. This is to avoid a change in level due to the occlusion effect of the monitoring devices being worn in or around the subjects' ears.

Additionally, acoustic recordings are analysed to assess whether different aspects of the singer's performance are affected by monitoring devices, including pitch, vibrato and spectral features. Qualitative data is also collected to assess singers' preferences for different monitoring devices.

Results of the pilot study will be presented. Preliminary findings suggest that contact microphones may be a valuable tool in measuring the impact of monitoring devices on singers, but placement and thresholds of significance require further research.

Discussion will include the type of contact microphones used, and the positioning of the contact microphones. An analysis of the observed impact of wearing such monitoring devices will also be reported. The preliminary results suggest that this is a valuable area for future investigation. Keywords: Singing, Bone Conduction, Monitoring.

## ABSTRACT 209

### A Narrative Review on Virtual Group Singing (Vgs): Benefits, Challenges, and Future Directions

Dana L. C. Greaves, Mimi O'Neill, Helena Daffern

**Objective:** The aim of this narrative review is to identify the functions of singing and community building in virtual group singing (VGS) as well as examine the benefits and challenges being reported in VGS participation. Furthermore, analysing the existing literature on VGS may inform future research to both develop and promote the use of technology in (group) singing practice in the wellbeing and mental health sectors. This review discusses the current definitions of "virtual choirs", explores the methods being used to measure group singing experiences, and critically considers their findings.

**Methods:** A multitude of studies from the fields of music, psychology, technology, health sciences, philosophy, and sociology are examined, critiqued, and reviewed. Taking this interdisciplinary approach will provide insight into the relationships between the various mechanisms contributing to

the VGS experience. The materials used for this review were found via Google, Google Scholar, University of York library database, and other online journal databases such as SAGE Journals.

**Results:** The COVID-19 pandemic played a vital role in normalising VGS participation through Zoom and Virtual Reality choirs. Using virtual social spaces for group singing offers many of the same benefits as in-person group singing such as increased self-confidence, life satisfaction, and sense of belonging. Regarding the use of other virtual social spaces, such as social media, studies report more negative effects on wellbeing comparatively which may suggest that singing (or musicking) is the primary facilitator of the aforementioned benefits. This poses an interesting tension as the main challenge being seen in VGS is that it cannot emulate "the real thing" musically which then emphasises the significance of the social elements within the experience.

**Conclusions:** It seems that one of the most influential factors in the experience of group singing is the community that is built through the musical and social interactions of the participants. For VGS this is both the source of its benefits and challenges. Further exploration of VGS spaces can provide deeper insights into the functions of singing and community building by allowing separation and control of the social and musical aspects of the experience.

**Keywords:** virtual group singing, virtual choirs, community building, wellbeing, music psychology

## ABSTRACT 211

### Rethinking Isometric; How the Modern Biomechanics Findings on Coactivation Help In Defining Better Isometric Concept

Lucia Cossu

**Rethinking isometric:** Isometry is a position maintained into a precise joint angles positions. We know how helpful is the finding of isometry in the voice production of the singers or patient we have in front of us, still we know how some situations do not progress beyond a certain point and the causes remain not understood or ascribed as the normal rate of success. If we put a modern biomechanical look and analysis we can see when part of this interventions are acting into a now/short term immediate effect, useful certainly, still lacking the longer terms adaptive effects of a more complete understanding of isometric. The more functional and modern biomechanics advised position (based on joint by joint approach and eccentric/reversing of the actions findings on tissue development and mechanics) show that isometric is the combination of position of all the joints involved plus the work of the muscles involved, this being determined by the capacity at that moment of the structure to enter precise range of motion and of muscles to provide the ratio of the function in those angles, also said the same outside geometrical position can be obtained by very different angles on real joint positioning and -with or without compensations- by very different muscles work depending on more sophisticated patterns that modern biomechanics start to unravel. Modern rehab and biomechanics show strategies to develop or gain back tissues and muscles capacity/agency in greater ranges of motion, so to give tools to get

to different isometric. All my work and biomechanics point to being the different emissions and styles also a different organisation of different isometric of the structures, as the Belcanto (especially the Italian version of it) as a set of isometries in more extended positions and the Estill the most flexed. This presentation is to clarify utility and actual implementability of those more sophisticated tools for longer term interventions and higher skilled necessities (singers of classical or MT, high demanding touring singers, high technical jazz vocalists, or simply high artistic individual request) or is some of the more difficult cases chronically refractory to treatments.

**Keywords:** isometric, biomechanics, joints and voice, singing training

## ABSTRACT 216

### The Challenge of Artificial Intelligence for Pathological Voice Diagnostics and the Promising Role of Transformer Models: A Preliminary Investigation

Marco Fantini, Alkis Koudounas, Gabriele Ciravegna, Tania Cerquitelli, Elena Baralis, Erika Crosetti, Giovanni Succo

**Objective:** AI for medical early diagnostics stands as one of the biggest challenges of our times. Voice represents a very interesting field for AI application, since its samples can be collected non-invasively and remotely. Yet, voice has been an underexplored field so far. The main reasons are related to the struggle of standard AI models — such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN) — in the analysis of long sequential data, the scarcity and the intrinsic complexity of pathological voice data. In this preliminary investigation, we aim at overcoming these challenges through the use of transformer models.

**Methods:** A pre-trained transformer model was directly applied to the raw voice signal, employing first 1D-CNN working on 25 ms of speech signal at a time, followed by a transformer encoder working on the entire sample. Secondly, we applied a strong data augmentation as input preprocessing to introduce a sufficient diversity in our data, including noise injection, time stretching, and pitch shifting. Finally, both sustained vowels and continuous speech recordings by means of a Mixture of Experts (MoE) ensemble were considered for each patient. This ensemble exploits the patterns and nuances found in the different sample types and outputs the most certain prediction.

**Results:** Our approach achieves state-of-the-art results on two public datasets, namely SVD and AVFAD. It improves the AUC over existing 1D-CNN, 2D-CNN, and standard transformer models up to +20% on SVD and +21% on AVFAD. We also achieve the best results on an Italian pathological voice dataset, comprising 1044 voice recordings, including 687 pathological and 347 healthy control voices. On this dataset, we also consider the classification of the macro-pathology causing the disorder among 6 possible classes. Our model achieves again very interesting results, with an average 0.811 F1 score, while standard CNN only achieve 0.278 (1D-CNN) and 0.335 (2D-CNN).

**Conclusions:** The present preliminary investigation proposes a transformer model applied to pathological voice diagnosis, with very promising results that overcome some limitations of the currently used AI models. The presented results position the proposed methodology as a significant advancement in the automatic detection of voice disorders.

**Keywords:** Artificial intelligence; Voice; Diagnostics

## ABSTRACT 217

### The Physiology of Vocal Damping: A Descriptive Study on Professional Singers

Marco Fantini

**Objective:** Vocal damping is a distinctive phonatory glottic behavior where the posterior part of the vocal folds is strongly adducted and vibration occurs in the anterior part. The aim of the present descriptive study is to analyze anterior glottis phonation patterns in professional singers through a multidimensional approach, in order to better understand the physiological underpinnings of vocal damping and their relation to glottic vibratory mechanisms.

**Methods:** Ten professional singers (five males and five females) with no vocal complaints were recruited. Each subject was asked to produce ascending and descending glissandos in a spontaneous way; sustained vowels and little sung fragments in vocal fry, chest voice, falsetto, and laryngeal whistle. Each singer was asked to produce – where possible – damping sounds.

A multidimensional investigation including acoustic analysis, electroglottography and videolaryngostroboscopy was carried out.

**Results:** Among the enrolled singers, nine out of ten successfully produced vocalizations with a typical anterior-vibrating glottic pattern indicative of damping. All nine singers achieved a damping glottic configuration when vocalizing in the falsetto register and five were consciously able to switch between a full-glottic falsetto and a damping falsetto upon request. Three male and two female singers were able to produce a damping glottic configuration while emitting laryngeal whistle notes. Three male singers demonstrated damping glottic configurations when producing chest notes in a belting style.

**Conclusions:** In conclusion, it is possible to state that damping is an existing and documentable glottic behavior, with a wide range of manifestations across vocal registers. The present preliminary study describes damping in the domains of chest voice, falsetto and laryngeal whistle. A proper damping phenomenon, defined as the modification of the glottic vibratory boundaries according to pitch variations, is described for M2 emissions, both in male and female larynx. The analysis of passaggio patterns allows to describe damping-M2 as a possible vibratory sub-mechanism.

**Keywords:** damping, voice, physiology, singers

**ABSTRACT 218**

## Riffs and Runs in Singing Voice: Physiological Underpinnings and Didactic Perspectives

Michele Grandinetti, Marco Fantini

**Objective:** Vocal riffs and runs refer to a series of notes sung quickly and precisely on one or more vowels. Other terms, like melisma, ad-libs, and ornamentation, are nowadays often used interchangeably. Mastering the art of "riffing and running" is one of the most significant challenges in modern singing instruction. The aim of the present preliminary descriptive study is to give physiological insights into riffs and runs and to speculate on didactic methodological perspectives.

**Methods:** A group of 12 contemporary commercial music singers were recruited. Multidimensional investigations including electroacoustic analysis, video analysis and videolaryngostroboscopies were carried out on each singer while performing precise vocal tasks involving both riffs and runs.

**Results:** When executed correctly, riffs and runs involve rapid, rhythmic laryngeal oscillations similar to those observed in artistic vibrato. These swift movements allow for the acoustic definition of rapid note progressions, resulting in the characteristic artistic perceptual outcome. The primary dynamic patterns endoscopically observed during the execution of riffs and runs involve rapid movements of the base of the tongue and of the pharyngeal constrictors. Video recordings analysis showed that some singers achieve the desired effect with the aid of rapid mandibular movements and/or small head movements, while others do not exhibit any macroscopic diadochokinesis.

**Conclusions:** In conclusion, mastering vocal riffs and runs requires a comprehensive approach that encompasses physiological understanding and methodical practice. By focusing on both the technical and expressive aspects of singing, singing teachers can help students navigate the complexities of this vocal technique, leading to improved performance and artistic expression. As this field of study evolves, further research into the physiological underpinnings and pedagogical strategies will undoubtedly enrich our knowledge and teaching methodologies.

**Keywords:** riffs, runs, voice, singing, pedagogy

**ABSTRACT 219**

## A Vowel Driven Approach to Register Manipulation in Contemporary Musical Theatre Singing

Justin John Moniz, Kevin Wilson

One of the greatest hurdles in contemporary musical theatre pedagogy is the absence of a systematic pedagogic approach that accounts for both stylistic considerations and vocal health. Over the past

decade, composers have continued to push the boundaries of the human voice, often exploiting registration and voice type altogether. Singers are regularly required to create sounds that would otherwise have been looked upon as impossible just years ago. Similar to how AFAB musical theatre artists had to adapt their vocal technique to produce the Broadway belt sound in the 1930's, current AFAB (assigned female at birth) musical theatre singers have had to adjust resonance models and manipulate register events to balance both vocal production and endurance (Roll, 2016).

Vowel choices directly impact a singer's ability to navigate elements of laryngeal and pharyngeal (acoustic) registration. The utilization of open vowels in Mode 1 keeps the mechanism in an open vocal posture and results in a delay of the primo passaggio, specifically in AFAB singers. Many AFAB singers can utilize this approach up to and surrounding C5 and D5, at which point the voice seldom will continue to respond to the significant level of openness, pressure, and stress placed upon the thyroarytenoid muscle. Often, this will result in a sudden flip into Mode 2. While this flip can be stylistically appropriate and even desirable in certain instances, it is imperative to consider the ramifications of this extreme vocal loading, particularly in this high tessitura.

The contemporary musical theatre canon has arguably challenged the ways in which we effectively engage in pedagogic practice within the teaching studio. A heightened awareness and understanding of anatomy, vocal function, and vocal health are essential components of effective teaching (McCoy 2016). Employing a vowel driven model which accounts for both laryngeal and pharyngeal registration works to create balance within the vocal apparatus with greater probabilities of efficiency and sustainability of production. Exploring and implementing a devised systematic approach will begin to guide the pedagogic process for even the novice voice teacher.

**Keywords:** vocal pedagogy, musical theatre, contemporary styles, voice science

## ABSTRACT 220

### Long Term Functional Results of Office Based Injection Laryngoplasties Using Cross Linked Hyaluronic Acid through a Flexible Endoscopic Phonosurgical Approach: A Prospective Study

Marco Fantini

**Objectives:** Injection laryngoplasties (IL) are a group of surgical techniques aiming at restoring glottic competency in patients with unilateral vocal fold paralysis. IL can be performed using both reabsorbable and not reabsorbable materials and can be carried out either under general anesthesia by direct microlaringoscopy or under local anesthesia through percutaneous or endoscopic approaches. The former ones can be performed office-based. The present study aims at investigating long term vocal results of patients who underwent office-based injection laryngoplasties with a flexible endoscopic phonosurgical approach using cross linked hyaluronic acid.

**Materials and Methods:** Twenty patients with glottic insufficiency due to unilateral vocal fold paralysis in intermediate position were enrolled. The participants had unsatisfactory vocal results despite voice therapy. Each patient underwent office-based injection laryngoplasty followed by timely voice therapy. Perceptual analysis, acoustic/aerodynamic analysis, self assessments and videolaryngostroboscopies were carried out to analyze voice oucomes at various checkpoints: T0 (before surgery); T1 (3 moths); T2 (1 year); T3 (2 years).

**Results and Conclusions:** Significant improvements of voice quality were detected after ILs at T1, with a further improving trend at T2 and stability of the obtained functional results at T3. The present prospective study suggests that office-based ILs carried out with cross linked hyaluronic acid through a flexible endoscopic approach followed by timely voice therapy may represent safe and effective procedures for the treatment of glottic insufficiency due to unilateral focal fold paralysis in selected patients, with excellent long term vocal outcomes.

**Keywords:** injection laryngoplasty, hyaluronic acid, unilateral vocal fold paralysis

## ABSTRACT 224

### Speech Phonetics vs. Singing

Wolfgang Saus

Singers, unlike speakers, have to adapt their vocal resonances to partials of the singing voice. Vowels can therefore deviate greatly from speaking vowels, especially in high singing ranges. It would therefore be sensible for singers to understand how their harmonics interact with the vowel resonances.

This lecture introduces a simple to use singing phonetics chart that illustrates in an intuitive way how the vowel resonances interact with vocal harmonics. It displays the distribution of harmonics in the acoustic-phonetic vowel triangle for any pitch and pitch change.

Singing vowels are pitch sensitive. The chart assists in distiguishing psychoacoustic and subjective sensations, such as vowel perception and vocal feel, from measurable acoustic parameters, such as frequencies of harmonics and resonances. And it provides vocal teachers with objective criteria for handling resonances.

A didactic approach for controlling vocal tract resonances to within a semitone will be introduced for opera and other professional singers. Sound examples will demonstrate how subtle vowel nuances improve intonation in a cappella ensembles and how intonation and homogeneity can be controlled with this technique.

**Keywords:** singing phonetics, harmonics, resonances, formants

**ABSTRACT 225**

## Efficiency Considerations of Vocal Tract Acoustics of Different Voice Qualities with Four Trained Singers

Fiona Stritt, Stefanie Rummel, Johannes Fischer, Michael Bock, Bernhard Richter, Matthias Echternach, Mario Fleischer, Louisa Traser

Understanding the efficiency across voice qualities can be crucial for maintaining vocal health. An efficient voice production is defined by achieving high sound pressure levels relative to energy and biomechanical properties expanded by the singer. It is mainly influenced by the voice source (e.g., spectral slope) and vocal tract (VT) acoustics (e.g., amplification of psycho-acoustically relevant frequencies) as well as their interactions.

In this study, 3D-MRI data of four singers (2♂, 2♀) with a high qualification level in Estill Voice Training® were included. They phonated vowel [a:] in six voice qualities (Belting, Twang, Opera, Sobbing, Falsetto, Speech) on ♀415Hz/♂**207Hz**. From the MRI-data 3D VT models were segmented, inserted with teeth and analyzed according to their volume velocity transfer functions obtained by finite-element-modeling. Those were combined with audio recordings and electroglottography (EGG) to calculate the particle velocity and acoustic pressure at the glottis as well as EGG-related quantities to evaluate voice efficiency at the glottal level.

VTs were grouped based on voice quality, revealing consistent configurations: megaphone, neutral or hourglass-shaped. This grouping was also reflected in the VT acoustics with a strong association between voice quality and the position of the first two resonances ($f$R1/2) and thus vowel color. An efficiency gain can be discussed for the association of $f$R1 with $f$o for Opera and Sobbing and of $f$R1 with $2f$o for Belting and Twang for the female subjects.

Opera/Belting exhibited enhanced harmonic energy in the psycho-acoustically relevant region of 2-4 kHz, as well as Twang (for two subjects) while Sobbing showed anti-resonances in this region. Falsetto/Speech demonstrated inter-individual acoustic differences, with either no specific or varying strategies for enhancing acoustic energy regarding their preferred and more trained way of singing. EGG-based contact index varied across voice qualities, being highest in Belting and lowest in Falsetto while Opera, Sobbing and Twang revealed similar values. For Speech individual differences were observed.

Despite the studies limitation by the sample size, the uniformity of acoustic properties and EGG data across different individuals suggest the trainability of defined strategies for efficiency. Future studies plan to explore VT efficiency in relation to the voice source.

**Keywords:** 3D vocal tract MRI, finite-element-modeling, voice efficiency, vocal tract resonance

**ABSTRACT 226**

## Concordance in Vocal Tract Configuration of Different Singers for 6 Voice Qualities

Stefanie Rummel, Fiona Stritt, Johannes Fischer, Michael Bock, Bernhard Richter, Matthias Echternach, Mario Fleischer, Louisa Traser

In voice training programs like Estill Voice Training® (EVT®), precise definitions and training of specific sound characteristics are emphasized. Anatomical structures and their influence on vocal output are trained independently, their specific combination resulting in six voice qualities (VQ: Belting, Twang, Opera, Sobbing, Falsetto, Speech) Training effectiveness is also assessed via acoustic spectrograms. However, since information of voice source and vocal tract (VT) overlap in spectrograms, we propose 3D magnetic resonance imaging (MRI) to enable direct analysis of vocal tract adjustments.

This study involved four highly qualified EVT® singers (2♂, 2♀) performing sustained phonation on vowel [a:], across 6 VQ on ♀415Hz / ♂207Hz during 3D VT MRI recording. Segmentation of MRI data, insertion of teeth, measurements of the area function, and analyses of partial volumes of defined VT segments were performed. The mean oropharyngeal (OPV) and hypopharyngeal volume (HPV) ratio was calculated.

The data revealed distinctive vocal tract configurations for each quality with a high level of inter-individual agreement in volumetric analysis.

Belting/Twang exhibited a similar configuration in megaphone shape (high OPV/HPV ratio, low VT length), while Opera/Sobbing showed an hourglass-shape (reduced OPV/HPV ratio and a low laryngeal position). Falsetto/Speech demonstrated intermediate characteristics with greater individual variance.

The greater the influence of the VT on the vocal output, the more consistent the vocal tract configurations were among the four singers. This indicates trainable muscle shaping of the vocal tract.

The variances were not sex-related, suggesting that individual anatomical differences may influence the ease of adopting specific vocal tract configurations, potentially influenced by preferred singing styles and increased training. Despite the limitations in sample size, the uniformity of the reproduction of vocal tract configurations across six VQ in four individuals highlights the potential for conscious training in shaping vocal tract anatomy.

Utilizing 3D models as visual aids could assist singers in understanding vocal tract anatomy and required muscle activation for specific configurations. This study underscores the potential for targeted training in shaping vocal tract anatomy to achieve desired voice qualities, offering insights into effective voice pedagogy.

**Keywords:** 3D MRI, vocal tract configurations, voice qualities, Estill Voice Training®

**ABSTRACT 228**

## Voice and Body Movements: A Preliminary Study for a Didactical Project Dedicated To Musical Theater Performers

Francesco Furlanis

Musical Theater students learn to both sing and dance... but it is often difficult to combine these elements together. The aim of the study is to investigate the effects of movements on voice and to establish any correlations. A further study of these correlations has been carried on, to find an appropriate fruition for musical students.

The study was conducted involving 30 singers / singing teachers in order to evaluate the effects of movements on voice. The subjects provided their own postural analysis. A list of various physical movements has been structured to be performed in combination with some vocal tests (sustained, glissando, crescendo / decrescendo with different laryngeal mechanisms). All participants completed an evaluation questionnaire to describe the effects on voice for each individual movement. The singers were also involved in the following steps of testing some exercises after analyzing the emerging results.

The results of the questionnaires were analyzed and the movements were categorized into 3 categories: facilitating–irrelevant–contrasting singing.

The results of this study encourage greater awareness of the possible combinations between voice and movements in singers and dancers. They also give a useful perspective for both performers and teachers.

**Keywords:** teaching, posture, movement, musical

**ABSTRACT 231**

## An Update on Conversation Training Therapy (Ctt)

Amanda Gillespie

**Introduction:** Since its inception in 2016, Conversation Training Therapy (CTT) has emerged as an innovative approach to voice therapy, using patient-led conversations as the sole therapeutic stimulus. CTT has undergone rigorous evaluation to assess efficacy, patient adherence, suitability, and the impact of its core elements on treatment outcomes. This presentation aims to provide a comprehensive update on the effectiveness and efficiency of CTT, drawing upon a synthesis of recent studies.

**Methods:** This presentation will distill findings from six peer-reviewed studies published over the last eight years, covering a broad spectrum of topics including the motor learning principles underpinning

CTT, its proven efficacy in prospective trials, criteria for patient selection through stimulability testing, the benefits of group therapy delivery, enhancements in adherence through mobile app-supported practice, and the role of cognitive effort in spontaneous speech practice and vocal learning.

**Results:** Developed by six voice specialized speech-language pathologists, CTT is grounded in fundamental motor learning principles. Prospective trials have revealed that CTT demonstrates superior outcomes in acoustic, aerodynamic, auditory-perceptual, and patient-perceived measures at the conclusion of treatment and at a three-month follow-up, compared to traditional therapy methods. The speed of improvement in CTT is notably faster in patients who can discern changes in vocal effort and sound quality at pre-treatment stimulability assessment than those without such discernment. Patients participating in CTT via group and telehealth sessions reported significant reductions in Voice Handicap Index scores and treatment generalization, comparable to those in in person one-on-one therapy settings. Additionally, the use of a mobile app to support CTT practice doubles the frequency of practice sessions and enhances practice fidelity of practice compared to unassisted practice.

**Conclusion:** CTT is rapidly gaining recognition as a standard of care voice treatment approach across the United States. Its unique focus on facilitating the transfer of therapeutic concepts to spontaneous speech distinguishes it from other treatment methods, promising enhanced learning and sustained outcomes. Ongoing research continues to affirm its efficacy, effectiveness, and the significant impact of its treatment components on these results.

**Keywords:** voice therapy, CTT, efficacy

## ABSTRACT 232

### Patient Perception of Mental Effort In Voice Therapy

Amanda Gillespie

**Introduction:** Voice therapy is the primary intervention for the majority of behavioral voice disorders. One challenge in voice therapy is that mastering new vocal techniques for rehabilitation is inherently cognitively effortful. While effort is critical for learning, it can also lead to frustration and reduced patient engagement. The purpose of this study was to investigate the relationship between patient-perception of voice handicap and cognitive effort in voice therapy, and to determine if different therapy approaches and stimuli elicit different perceptions of mental effort.

**Methods:** A non-experimental, prospective investigation of adults with voice disorders enrolled in voice therapy. Prior to therapy, patients completed the Voice Handicap Index-10 (VHI-10) acoustic and auditory-perceptual evaluations. To assess cognitive load, both a Borg mental effort scale and the NASA Task Load Index (NASA-TLX) were administered following each therapy session. Two speech-language pathologists reviewed therapy session records and documented therapy approach and treatment stimulus. Pairwise comparisons and linear random-intercept mixed-effects model were used to determine correlation between baseline measures and mental effort, therapy approach, stimulus, and mental effort.

**Results:** Twenty-seven participants (89% female, 60% white) completed the study. There was no significant difference in VHI-10 or baseline perceptions of mental effort among races or voice disorder diagnoses. Semi-occluded vocal tract exercises, Conversation Training Therapy and resonant voice were the most common treatment approaches. There was a significant positive correlation between VHI-10 and mental effort ($r= 0.64$ $p<.001$). There was no significant difference in effort ratings among therapy approaches, but effort was rated as significantly greater with connected speech practice than other stimuli ($p = 0.014$). Perceived mental effort significantly decreased over time ($p = 0.003$).

**Discussion:** Voice therapy imposes a cognitive load on the patient, and is particularly challenging for individuals with more severely perceived voice disorders. Further, voice treatment approaches that utilize connected speech stimuli are more effortful than those that use other stimuli lower in the treatment hierarchy. However, effort for all decreased with time. Results have implications for therapeutic patient counseling and for treatment decision making.

**Keywords:** voice therapy, mental effort

## ABSTRACT 233

### Development and Validation of Personal Technology to Treat Hypophonia in Patients with Parkinsons Disease

Amanda Gillespie

**Introduction:** Parkinson's disease (PD) severely impacts communication in 70-90% of patients. Behavioral voice therapy can be effective in Parkinson's-related voice and speech disorders by increasing vocal loudness and improving speech intelligibility. However, success in treatment is dependent on an intensive intervention schedule. This treatment burden, combined with reduced ability of patients with Parkinson's to self-monitor voice leads to a high rate of symptomatic relapse following treatment. The purpose of this study was to develop and validate wearable technology to improve vocal intensity in patients with PD.

**Methods:** Our multi-disciplinary, multi-institutional team created a low-profile headset device that can isolate, monitor, and analyze vocal output for time and loudness and provide haptic biofeedback in the form of vibration to the wearer when minimum threshold intensity targets are not met. In this study, we tested the device in 8 patients with PD during a 60-minute treatment session. Each session consisted of 30 minutes with and 30 minutes without speech pathologist's feedback on vocal intensity. Intensity change and time between cues to increase intensity were measured and analyzed for differences between baseline and each condition.

**Results:** There were no significant differences ($p = 0.25$) in time between cues to increase intensity in the SLP assisted condition compared to the device condition. There was no significant difference for change in vocal intensity in decibels between the SLP assisted condition and the device assisted condition ($p = 0.66$). When groups were split by disease severity, those with mild to moderate PD

required significantly fewer intensity cues and increased vocal intensity significantly more than those with severe PD for both the SLP and device-assisted conditions (p<.001).

**Discussion:** Patients with mild to moderate PD respond positively to the haptic feedback provided by an individually calibrated low profile headset. This technology may serve as a helpful adjunct to standard-of-care voice therapy. Future studies will investigate if the addition of the device in voice therapy improves outcomes including a reduction in treatment time and relapse.

**Keywords:** Parkinsons disease, voice therapy, biofeedback

## ABSTRACT 234

### Voice Screening In Future Professional Voice Users in Flanders: How to Do the Job?

Carole Chiers, Kristin Daemers

This study reports on the results from 73 future teachers and a control group of 60 future nonvocal professionals. Grade, roughness and breathiness of their voices were evaluated by 5 experienced voice therapists and several questionnaires were completed: a voice care questionnaire, the Current Speaking Effort Level (Hunter & Titze, 2009), the Voice Stress Inventory (De Bodt et al., 2008), the Vocal Tract Discomfort (Luyten et al., 2015) and the Vocal Fatigue Index (Nanjudeswaran et al., 2015).

Correlations between the perceptual evaluation and the questionnaires are very weak or non significant showing that perceptual evaluation of the students' voices is insufficient to map their voice problems in a complete way. These results suggest the need to supplement the voice screening of future professional voice users in Flanders with self-assessment scales on voice and laryngeal discomfort. The authors will formulate suggestions for achieving this goal taking into account the current literature on this topic.

**Keywords:** voice quality, laryngeal (dis)comfort, future teachers, voice screening

## ABSTRACT 236

### Medicine Meets Arts. Opera Songs Students Experiences Of Undergoing Laryngoscopy To Enhance Vocal Development. A Qualitative Explorative Study

Hilde Haraldsen Sveen, Elisabeth Grov Beisland, Petrine Veierød Solli, Ola Drange Røksund, Maria Vollsæter, Asgjerd Litlere Moi

**Objectives:** In this interdisciplinary collaborative project we aim to explore opera song students' experiences of undergoing laryngoscopy during song sessions, with real-time visual monitoring of their

larynx. We aim to explore whether visualizing the vocal tract can foster development in the singer, when being supervised by a song professor in traditional technique exercises like scales and intervals.

**Methods:** Individual semi-structured in-depth interviews were conducted with ten opera song students who had undergone laryngoscopy sessions during singing. Five students worked twice and five students five times with laryngoscope. Braun and Clarke's thematic reflective analysis method was applied. The study complied with the Consolidated Criteria for Reporting Qualitative Research (COREQ).

**Findings:** our preliminary thematic analysis generated four themes; 1) Concerns related to the voice were dispelled. All ten students expressed that the laryngoscopy sessions gave them a long-awaited confirmation that everything was fine with their voice, and it was a great relief to have this confirmed. 2) Getting to know your own instrument. All singers expressed that they developed a clearer understanding of the muscle combinations in the throat, and their motivation increased in regard to taking out the full potential of their own instrument. 3) New commitment was redeemed. All students expressed that the laryngoscopy sessions had led to development of their singing technique and that it had strengthened their motivation for a future career as professional singers. 4) Voice physiology took a new meaning. The understanding of the voice physiology's place in the education was strengthened, and all students recommended undergoing laryngoscopy sessions to other song students, and that it should be included in the curriculum.

**Conclusion:** Getting visual access to one's own instrument was experienced as being very useful by the singing study participants. The laryngoscopy sessions contributed to new insight into the physiology of the voice and released a sense of security and motivation for developing their voice. The experience strengthened the song students' belief of a future as professional singers."

**Keywords:** opera song students, experiences, laryngoscopy, vocal development, qualitativ study

## ABSTRACT 237

### Acoustic Refurbishments In A University Lecture Room: Effects on Speaker's Comfort and Voice Use

Viveka Lyberg Åhlander, Nicole Cansu, Greta Öhlund Wistbacka, Roland Rydell, Sofia Holmqvist-Jämsén

Poor acoustic conditions in learning spaces can adversely impact speakers' health and serve as a risk factor for voice disorders. While previous research suggests that acoustic refurbishment of learning environments has the potential to enhance well-being and reduce voice-related health issues among teachers, such studies remain limited. In this investigation, we explored how varying acoustic conditions influence speaker voice use and self-perceived comfort. We collected voice recordings during a three-step acoustic refurbishment of an actual university lecture room. Participants (n= fif-

teen) engaged in short speech tasks, and their self-evaluations of speaker's comfort were recorded. We also examined the impact of background babble noise and a classroom sound field amplification (SFA) system on vocal parameters and perceived comfort. Our findings, analyzed using mixed linear models, revealed the following: The self-perceived comfort of speakers increased significantly due to the acoustic refurbishment. Notably, there were statistically significant differences between the baseline condition (absorbers on ceiling and walls) and subsequent steps: Step 2: Absorbers + acoustic ceiling with reflectors and step 3: Absorbers + ceiling with diffusers. Speaker's comfort decreased in the presence of background babble noise and an interaction emerged between sex and background noise since female participants reported a greater decrease in comfort compared to men when exposed to babble noise. The participants perceived the SFA as providing good support, except during the baseline phase. In summary, in line with previous research, our results indicate that acoustic refurbishment have a positive impact on speakers. However, what is new is that the speaker's perception of noise impact depends on the speaker's sex, and that the study examines the effect of reflectors/diffusers on speaker position. These findings underscore the importance of optimizing acoustic conditions in educational settings to promote speaker well-being.

**Keywords:** Room acoustics, voice changes, vocal effort, soundfield amplification

## ABSTRACT 239

### The Effect of One-To-One Singing Lessons on Adolescent Female Voice Change

Wendy Rolls

The literature of singing voice suggests that adolescent girls undergoing peak voice change frequently experience symptoms such as loss of core tone, vocal strength, and physical discomfort while singing. The combination of the onset of vocal discomfort, and loss of singing ease and ability, can have a negative impact on the psyche of girls for whom singing had previously been a source of personal enjoyment and social cachet.

**Objective:** The current PhD research project was designed to chart the vocal development of adolescent girls who undertook a series of one-to-one lessons for the duration of peak voice change, with data collected during an 18-month period.

**Method:** A mixed methods embedded multiple case study employing longitudinal assessments was designed and the research conducted to span across the age range when girls' peak voice change would be expected to occur (Gackle, 1991). All participants were 12-13 years of age and entering Year 8 of schooling (Australia) at the beginning of the study. Weekly one-to-one singing lessons (averaging 35 in total) were then conducted.

Both quantitative and qualitative data were collected at three points, namely the beginning and end of Year 8 and midway through Year 9. Quantitative data comprised acoustic analysis using lingWAVES

voice protocol followed by perceptual assessment of the participants' singing by a panel of experienced singing teachers. Qualitative self-reflective data were collected via participants' reflective writing into a 'Reflection tool' document. This data provided the researcher with insight into the girls' relationship with and perception of their singing voice and emotional and psychological responses to their own voice change over time.

**Results & Conclusions:** Preliminary findings will be presented which describe characteristics of voice change and offer meaningful, informing pedagogy to assist teachers in their work with this population of singers. Some of the emergent themes are proving to be unexpected, whilst others aligned with those in the literature.

**Keywords:** female voice change; adolescent female singing voice, vocal development, phases of vocal development, voice function exercises.

## ABSTRACT 240

### Training Proposal to Support Vocal Performance by Using the Proprioceptive Elastic (Proel) Method

Andrea Scacchioli

**Objective:** Vocal performance is tedious and it takes a lot to change or improve it.

The purpose of this study is to support vocal performance by applying exercises and protocols of the PROEL method to singers. The research is based on an experimental approach which is aimed at assessing, with the aid of investigation tools, the real short-term efficacy of the PROEL approach on singers who engage in intense performance activity.

**Method:** Nine singers took part in this experiment. They were evaluated before (pre) and after (post) the training stage with the PROEL method. The training lasted two weeks and took place for 15-20 days before the second performance. Every day, twice a day, singers would complete different exercises: hydration through a damp gauze, singing with airway impedance in the vocal tract (anesthesia mask, glove/balloon full of water), singing in unstable balance to optimize ease of emission, elasticity and vocal resonance. The evaluations of the participants were based on the comparison of their self-assessment questionnaires and the listening, by the jury, to the recordings of the "a"vowel, emitted for a few seconds, and the two concerts which took place before and after the PROEL training.

A group of six experts subjectively analyzed the audios through a random listening, evaluating intonation, vocal wellbeing at the end of the concert, physical wellbeing at the end of the concert, vocal agility, projection, resonance, vocal control, lightness, breath.

**Results and conclusions:** Results showed significant improvements in singers' voice after the training stage. Particularly, projection and resonance improved significantly more based on the experts'

evaluation. In line with these results, singers' self-assessments improved in terms of resonance. In conclusion, the results obtained confirm that the PROEL training positively contributed to singers' performance.

In fact, each singer perceived, to a larger extent than the other metrics, a higher resonance and ease of emission during their second performance vs the first one.

The PROEL training may represent a strong ally for singers/performers who engage in intense singing activity.

**Keywords:** Elasticity, resonance, performance, stamina, ease of emission.

## ABSTRACT 242

### Acoustic Voice Characteristics of Healthy Aging in Continuous Speech

Sandra Rojas, Elaina Kefalianos, Adam Vogel

**Objective:** The natural process of aging involves structural and physiological changes to the vocal tract that might affect vocal performance. Acoustic analysis can measure age-related changes in voice. Previous studies have used small subsets of acoustic features which may not adequately characterize these changes. We examine which acoustic parameters predict age-related voice changes in healthy aging using continuous speech elicitation.

**Method:** Older participants (N=150) aged between 50 and 92 years performed two speech tasks involving reading a set passage aloud and performing a monologue about a personal life event. Acoustic features were measured using the Analysis of Dysphonia in Speech and Voice. We used data reduction techniques and linear regression to assess which of these acoustic features predicted age. We further explored potential relationships between these acoustic features and clinical assessments of cognitive function and hearing thresholds.

**Results:** Chronological age was significantly predicted by six acoustic parameters: low-high spectral energy ratio, the mean and variability of cepstral fundamental frequency, cepstral peak prominence, the cepstral slope, and cepstral intensity variability. When controlling for hearing loss and cognitive function, age was only significantly predicted by low-high spectral energy ratio, the variability of cepstral fundamental frequency, cepstral peak prominence, and cepstral intensity variability; cognitive function was not a significant mediator. Hearing loss accounted for age-related increases in voice pitch and cepstral noise.

**Conclusions:** Findings from this study differ from those in studies on sustained vowels. When accounting for hearing loss, sustained vowels only demonstrated increases in amplitude perturbation and voice loudness. Continuous speech demonstrated increased loudness, and decreased SD of

Low/High spectral ratio, SD of CPP F0, and Mean CPP relative to average cepstral energy. Age-related changes in control over vocal pitch and cepstral pitch clarity could be attributed to sub-clinical hearing loss between 250Hz and 4000Hz. Older individuals present with acoustic variations that reflect physiological voice changes (e.g., vocal fold bowing), therefore, data from this study can provide a clinically relevant acoustic profile for accurate diagnosis and further analyses with pathological groups.

**Keywords:** Ageing voice, acosutic parameters, speech

## ABSTRACT 243

### The Phonetic Nature and Conservation Status of Metaphony In Pasiegan Speech

Carolina Portilla Ramos

In Phonetics, metaphony is an assimilatory phenomenon of vowel harmony whereby some or all features of the triggering vowel spread to the right, left, or bidirectionally and reach other vowels within the same harmonic domain, which is typically the word (e.g. [pul kãmĩnu] 'por el camino', "along the way"), for reasons of articulatory and auditory ease.

The present study seeks to determine the actual conservation state of the phenomenon of metaphony in mountain valleys of Pas, in centralsouthern Cantabria, and to account for the speed of the metaphony loss process described in the scarce research that exists on the subject.

The first and second vowel formant frequencies of a word list were analyzed across three age groups and two gender groups (men and women) in the Alto Pas region. Vowel samples were collected from grandparents, parents, and grandchildren, totaling 48 individuals (8 per each subgroup).

The results obtained show that the metaphonic harmonization of Pasiego involves the raising of the height of the affected vowels. In cases where metaphony was found, the F1 values of the harmonized vowels (tonic vowels due to the final vowel [u]) are notably lower than the average values in natives—considering age and sex factors—indicating an elevation of the tongue position in the articulation of these vocal sounds.

Then, comparing the samples with the reference values for standard central-northpeninsular Spanish, it has been found that metaphony disappears at a very accelerated rhythm. In the generation of grandparents the mid-tonic vowels [a], [e], [o] are systematically harmonized to the same degree between both sexes. In parents there is a clear progression of metaphony towards loss: there is still vowel harmonization, but to a lesser extent and not systematically. In the speech of Pasiego children (barely studied until now) no harmonization has been found at any level.

In addition, the mean values of F1 in the samples of grandfathers and fathers deviate more from the reference values than those of grandmothers and mothers. This means that the vowel height of the examined vowels aligns more closely with the standard in the case of women.

**Keywords:** Phonetics, Pasiego dialect, metaphony, vowel harmony, Dialectology

## ABSTRACT 244

### 13th Century Phonetics

David Howard

**Objective:** This paper reports on practical work that validates acoustic phonetic work previously reported in the 13th century by Robert Grossteste in: De generatione sonorum (On the generation of sounds).

**Method:** Desciptions from De generatione sonorum examine speech production through a discussion of the sounds produced and the five so-called 'motions' of the human speech articulators during the production of vowels. Five vowel motions are presented with which Grossteste shows how, when referenced to the vocal tract, they produce five vowels that can be associated with their letter shapes. In this work his hypothesis is tested experimentally using vocal tract models built from the Arai's 10 mm thick 75 mm square achryllic plate vocal tract modelling kit and the stimulated with the associated artificial larynx. Listeners were asked to label a randomised set of the 5 vowels created from the Arai tracts.

**Results:** The results of the listening tests indicated that the labelling by the majority of participants conformed with the dimension of scaling and F2, or vowel backness, and the dimension and F1, or vowel height. This conforms with human vowel discrimination being primarily gained through perceived vowel height (close/open dimension corresponding to F1) and secondarily through vowel advancement (front/back dimension corresponding to F2).

**Conclusion:** Vocal tract shapes derived from the 13th century writings of Robert Grossteste produce vowel sounds with first and second formant frequencies that modern listeners can readily and accurately label based on today's vowels. Grossteste's 'motion shapes' have therefore been shown to be good representations of what is understood today about vowels; phonetic science has been around for rather longer than some might think.

**Keywords:** Vowel knowledge in 13th century, vowel perception, vowel formants

**ABSTRACT 245**

## Are There Sub-Registers In Counter Voices?

Katrin Neumann, Philipp Mathmann, Malte Kob, Niccolò Clemente, Benjamin Barsties von Latoszek, Johannes Euler, Matthias Echternach, Nicholas Tamagna, Michael Döllinger, Peter Pabon

**Objective:** Transition of the male singing voice from the modal (M1) to the falsetto (M2) register has been well studied both acoustically and physiologically. Registers within the modal voice were also studied for male and female voices. To date, it has been assumed that the falsetto register is a relatively uniform register. Recently, however, professional countertenors have expressed that they too must manage transitions from one (sub)register to another in their falsetto voice to prevent discontinuities from occurring, for example, in an ascending or descending scale. This raised the question of whether there are further (sub)registers within the trained falsetto voice of countertenors, at least in some singers, and if so, what characterizes them physiologically and acoustically. This question has been addressed in a joint research project of phoniatricians, acousticians, and voice researchers.

**Methods/Design:** Twenty-seven professional countertenors were examined during various vocal exercises such as ascending and descending scales with soft, medium and loud tones on different vowels or glissandi. Vocal range profiling with spectral Voice Profiler software, high-speed glottography, ingressive phonation, spectral cluster analysis, electroglottography, impedance measurements, perceptual analysis by the examiners, and self-assessment of the singers through questionnaires were conducted to obtain as much information as possible to answer the research question.

**Results:** The most valuable information was obtained from the acoustic analysis using vocal range profiles. The majority of countertenor singers showed spectral and level transitions within M2 suggesting (sub)register transitions, characterized by a spectral peaking followed by a steep drop in level when with raising pitch, subsequently H4, H3 and H2, stop contributing to the overall spectral power. Most singers seemed to have two transitions, some only one, mostly in their lower M2 range. A few singers covered their falsetto register without any evident discontinuity.

**Conclusion:** This qualitative and quantitative study suggests the existence of (sub)registers in the falsetto voice of professional countertenors that seem to be caused by acoustic rather than laryngeal adjustments.

**Keywords:** countertenor, register, transition, resonance, spectral

**ABSTRACT 247**

## Emotional State throughout the Vocal Rehabilitation Sessions

Núria Bonet, Montserrat Bonet

The voice is still how we express ourselves, how we live, communicate or keep silent about what is happening. Emotions have an impact on the voice, but voice problems have a greater emotional impact.

Sometimes we disconnect from our physical and bodily sensations in everyday life. Stress, tension and work make us focus on work. Working on the voice also means stopping and listening. It is to take an introspective look. And take a look at how we feel and how the body reacts to emotions.

Throughout the process of vocal rehabilitation (VRh) emotions change depending on how the patient's voice evolves. You need to take care and always be alert. The understanding of the speech therapist, the ability to listen, to be there, to give hope and trust are also essential for the rehabilitation to bear fruit. He must feel that he is not alone on this journey, that he is accompanied.

**Objective:** Identify vocal comfort and improve the voice along the VRh.

**Methodology:** Sample of 30 patients who have assessed their vocal condition in VRh. A vocal comfort scale (Jackson-Menaldi) from 1 to 7 is used: 1 (no voice at all), and 7 (very good voice). The patient assesses vocal comfort at the beginning, middle and end of speech therapy treatment.

Design proposal Vocal Rehabilitation sessions. (VRh)

**First session:** How are you feeling? how is your voice today?

**Middle session:** What happened? Relation of what happens and what the patient feels.

**Last session:** How do you feel now? What has changed?

**Results:** An improvement in vocal comfort is observed in relation to the positive emotional state of the patient, whatever the initial injury.

**Conclusions:** Patients have learned to identify the state of vocal health in relation to their comfort and emotions. Its improvement helps maintain adherence to treatment and satisfaction with the effort and the positive result.

**Keywords:** Emotions, Comfort vocal health, Vocal rehabilitation

## ABSTRACT 248

### Effects of Menopause on Voice Onset Time in Spanish Native Speakers

Filipa M.B. Lã, Nuria Polo Cano, Pluvio Jesus Coronado Martin

Literature on the effects of variations in concentrations of sex steroid hormones (oestrogens, progesterone and testosterone) on voice onset time (VOT) is still scarce, especially concerning Spanish female native speakers. Furthermore, previous studies on the effects of sex steroid hormones on VOT

of female native English speakers at reproductive stages are controverse. On the one hand, high concentrations of oestrogens have been found to increase contrasts between voiced and voiceless consonants. On the other hand, no effects on VOT were found for female oral contraceptive pill users as compared to non-users. The current investigation aims at assessing the effects of menopause, when concentrations of oestrogens are low, on VOT of Spanish female native speakers.

A total of 57 female professional voice users (FPVUs) produced three repetitions of the Spanish words "bata", "pata", "dama", "tata", "gama" and "cama". Participants were allocated into pre and postmenopausal groups according to a combination of menstrual and hormonal characteristics, as recommended by the stages of reproductive aging workshop: (i) premenopausal (n = 31)—with regular menstrual cycles or, if irregular, no more of 3 consecutive months of amenorrhea; (ii) postmenopausal (n = 26)—with more than 12 consecutive months of amenorrhea without surpassing 5 consecutive years, and with concentrations of follicle stimulating hormone (FSH) higher than 30 UI/L and of oestradiol (E2) lower than 25 pg/mL. Voice recordings and blood samples were collected at the Hospital Clínico San Carlos (Madrid, Spain). All recordings were made in a sound treated booth using a headset microphone (DPA Microphones, Denmark). A script in Praat was used to calculate VOT as the time interval between the release of the stop burst and the onset of voicing. Contrasts between voiced and voiceless pairs were calculated for /b-p/, /d-t/, and /g-k/ consonants.

Results seem to indicate that postmenopausal FPVUs tend to have a higher VOT as compared to those at pre-menopause. In addition, type of profession seems to affect VOT contrasts between voiced and voiceless consonants. The results seem to agree with previous investigations mentioning effects of menopause and aging on neuromotor control of speech.

**Keywords:** Voice onset time; Menopause; Sex steroid hormones; Spanish native speakers; Professional female voice users

## ABSTRACT 249

### Correlating Degree of Thyroid Tilt Independent of Fo Control As A Mechanism For Phonatory Density With Egg And Acoustic Measures Across Loudness Conditions

Mathias Aaen, Noor Christoph, Cathrine Sadolin, Julian McGlashan

**Introduction:** Traditionally, fundamental frequency increase has been viewed as largely associated with vocal fold length as a consequence of thyroid forward and downwards articulation, a so-called thyroid tilt, caused by cricothyroid muscle contraction. Recent pilot studies suggest vocal fold elongation independent from fo as related to a pedagogical denotation of vocal weight in the parameter called 'density', suggesting a further discrete mechanism of the thyroid cartilage related to voice quality. This study endoscopically, EGG, acoustically, and auditory-perceptually explores degrees of thyroid tilt articulation independent of fo across loudness and voice quality conditions.

**Methods:** Case-control with 20 professional singers performing sustained-vowel samples (C4 males, B4 females) for 8 different voice quality conditions with different degrees of auditory-perceptual 'density' while undergoing endoscopic examination and concurrent EGG measurement. Vocal tract assessments were blindly rated according to a 33-item systematic forced consensus paradigm. Manova, Spearman's Rho, and factor density were calculated at p≤0,05. Auditory-perceptual assessments of 64 samples of the 8 voicing conditions were performed by 33 professional singing teachers. Fleiss' kappa and percentage agreement were used to calculate assessor accuracy and inter-rater reliability.

**Results:** Thyroid forward and downwards tilt was related to the perceptual category of 'reduced density' as the only statistically significant endoscopic assessment variable: fuller density conditions exhibited little to no forward thyroid articulation, whereas reduced density conditions exhibited visible to marked forward thyroid articulation across tested conditions suggesting vocal fold elongation for reduced density conditions while maintaining an unchanged fo with high ICC for the assessors (r = .70 and r = .94 for male/female data sets respectively). Correlation analyses revealed negative correlations for SPL, Shimmer, and CPP measures for reduced density conditions, while Qx did not vary with statistical significance. Panel assessors accurately assessed the 8 tested conditions with 87% accuracy with ICC k 0.772 p<0,001.

**Discussion:** Phonatory density, as an auditory-perceptual denotation of vocal weight, is controlled by the degree of thyroid cartilage tilt. The study documents systematic variations in vocal fold lengths across several conditions of loudness while fo is maintained suggesting a further mechanism of the thyroid cartilage related to voice quality beyond fo control.

**Keywords:** Fundamental frequency, Pitch, Thyroid Tilt, Density

## ABSTRACT 250

### Complete Vocal Technique-Voice Therapy as a Novel Intervention for Rehabilitation of Laryngeal-Phonatory Dysfunction in Acquired Brain-Injury Patients – An Exploratory Retrospective Study

Mathias Aaen, Alies Rose, Noor Christoph, Cathrine Sadolin, Julian McGlashan

**Purpose:** to explore the use of Complete Vocal Technique (CVT) Voice Therapy in Acquired Brain-Injury (ABI) patients

**Study:** exploratory retrospective study

**Methods:** 5 ABI patients (2 female and 3 male) with an average age of 20,6 (SD 3,5) received CVT voice therapy from an Authorised CVT Teacher at a neurorehabilitation facility in conjunction with physical rehabilitation therapy and Speech and Language Therapy. Pre- and post-measures included Voice Handicap Index, Maximum Phonation Time, electroglottography, and acoustic measures.

**Results:** All voice measures improved for all 5 patients after receiving CVT voice therapy. Voice Handicap Index scores decreased from an average of 48,4 to 22,8. Maximum Phonation Time improved while the electroglottography and acoustic data showed improved phonation stability in Jitter and Shimmer measures. Overall, following the intervention, patients demonstrated improved loudness range, improved range in contact quotient for different sound conditions, faster-paced speech, extended functional pitch-range, and decrease in unwanted creaking and breathiness.

**Conclusion:** The findings suggest that Complete Vocal Technique may be used as therapy in ABI populations with promising results. Both patient self-assessment and objective voice measures demonstrate improved voice function. Given the longitudinal nature of recovery in ABI patients, more studies are needed to qualify at which stage(s) of recovery the CVT interventions are most effective and beneficial. Randomised controlled trials for specific patient populations of ABI are needed to assess the interventions' effectiveness in specific ABI diagnoses.

**Keywords:** Acquired Brain Injury, Dysphonia, Rehabilitation, Complete Vocal Technique

## ABSTRACT 251

### Supraglottic Vibration Phenotypes and Taxonomy in Pathological Speaking and Healthy Singing Voice – Towards a Unified Physiological, Acoustic, and Functional Terminology

Mathias Aaen, Cathrine Sadolin, Julian McGlashan

**Objectives:** Supraglottic structures can act as a sound source in both pathological and healthy voice production. Supraglottic vibration phenotypes, functional categorisations, as well as differences between healthy and pathological use remains unclear. The present report reviews existing clinical and pedagogical literature to propose systematic and distinct phenotypes, a taxonomy of the vibrational function, and a comparison of three data sets representing the phenotypes across pathological phonation and healthy professional voice use.

**Methods:** A small case series of 5 patients identified as using vibration of supraglottic structures exemplifying a developed taxonomy is synthesised with two previously reported studies, including a longitudinal study of 20 professional singers singing with supraglottic structure vibrations and a case-control study of 32 professional singers singing with supraglottic structure vibrations were assessed using stroboscopic, electroglottographic, and acoustic measures.

**Results:** Supraglottic vibration can be separated into a taxonomy covering supplementary, compensatory, or substitutional functions of vibration with sub-categorisation related to intentional or unintentional level of control, uni-source or multi-source number of supraglottic sound sources, and involved supraglottic phenotypes. Previously identified distinct phenotypes were determined in both patient and healthy performer populations according to the anatomical vibration source,

including ventricular fold vibrations, arytenoid against arytenoid vibrations, cuneiform/arytenoid against epiglottis vibrations, and vibrations in the aryepiglottic free edge along with large vocal fold amplitude of vibrations. The study proposes hypotheses as to differences between healthy and pathological use of supraglottic vibrations along dimensions of laryngeal, respiratory, and resonatory technical ability and control allowing separation of supraglottic vibrations from vocal fold oscillation.

**Conclusion:** The study presents the first integrative systematic supraglottic vibration taxonomy including phenotyping for both pathological and healthy voice. Diagnostic, surgical, preventative, and pedagogical relevance is discussed.

**Keywords:** Supraglottic structure vibration, phenotype, vocal effects

## ABSTRACT 253

### Inferring Physiological Parameters in Phonotraumatic Vocal Hyperfunction: Insights from Ambulatory Voice Data

Matías Zañartu, Carlos Calvache, Emiro Ibarra, Robert E. Hillman

**Objective:** The aim of this study is to estimate distributions of physiological parameters such as laryngeal muscle activation and subglottal pressure in patients with phonotraumatic vocal hyperfunction (PVH) by using ambulatory measurements of sound pressure level (SPL) and spectral tilt (H1-H2) and to relate these distributions with the PVH severity by Daily Phonotrauma Index (DPI), a logistic regression model.

**Method:** The study sampled a cohort of PVH-diagnosed patients and a control group for comparative purposes. The Voice Health Monitor (VHM) was employed to collect ambulatory voice data on all subjects. The VHM utilizes a miniature neck-skin accelerometer to detect phonation. Participants were monitored for one week, with the VHM application facilitating daily sensor calibration, system checks, and vocal status queries. To infer physiological parameters, the collected voice data were mapped onto synthetic data generated by a physiologically-relevant low dimensional voice production model. Inverse mapping strategies were employed, selecting model simulations that represented the ambulatory distributions using stochastic (random) sampling weighted by phonetic content. Analysis using DPI, a two-component logistic regressor, differentiated vocal pathology severity. A categorical approach was used to assess the relationship between daily vocal dose and expected physiological adaptations.

**Results:** Clear patterns of muscle activation and subglottal pressure movements were identified across different DPI categories, suggesting that these factors may serve as significant indicators of voice disorder. Specifically, higher DPI scores were associated with increased muscle activation and subglottal pressure. The findings demonstrated a mechanistic link between DPI scores and physiological changes, emphasizing the role of the compensatory adjustments observed in muscle activation and pressure associated with PVH.

**Conclusions:** This study illustrated the potential of non-invasive acoustic measurements to shed light on the physiological mechanisms behind vocal hyperfunction. The findings suggest that compensatory muscle activation and elevated subglottal pressure play significant roles in PVH. Future research will aim to enhance the model ability to predict outcomes and explore the implications of these compensatory mechanisms. This deeper understanding will contribute to elucidating the causes and development of PVH, ultimately leading to improved methods for prevention, diagnosis, and treatment.

**Keywords:** Ambulatory voice data, Inverse mapping, Voice production modeling, Vocal hyperfunction, Daily Phonotrauma Index

## ABSTRACT 255

### Effect of Water Resistance Therapy Frequency: A Cross-Sectional Study in Healthy Adults in One-Day Practice

Sandra Rojas, Alejandro Ianiszewski, Anthony Marcotti

**Introduction:** Resonance tube has become preferable due to the dual vibration source effect, that is, vocal folds and the bubbling of the water. Variables such as diameter, depth level in the water, tube material, exercise execution time/frequency, and phonatory tasks play a relevant role in the effect of the execution of resonance tubes. An excessive use of these exercises could trigger vocal discomfort, pain, or higher voice perturbations. Although, evidence describes the effect of some of these variables, the number of repetitions (frequency) of a resonance tube exercise program in a day have not been reported yet.

**Aims:** The principal aim is to describe the effect of straw phonation frequency (number of repetitions in a day) on voice parameters in healthy adults between 18 and 40 years of age.

**Methods:** 42 participants aged between 20 and 40 years produced at least five seconds of a sustained vowel /a/, and S/Z ratio before and after the voice exercises. They were randomly allocated in 3 different groups according to number of sessions.

**Results:** Acoustic parameters (Jitter; Shimmer; NHR), EGG measures (OQ; CQ) and S/Z ratio did not illustrate statistically significant results. Only VAS illustrates statistically significant outcomes after 2 and 3 sessions of exercises.

**Conclusion:** Acoustic parameters did not illustrate significant variations across repetitions, however participants perceived similar positive changes in their voices after practicing vocal exercises. Variables such as minimal submersion of the straw; a small sample size per group, a lack of laryngeal examination, and/or the adaptation of the Vocal Function Exercise (VFE) program might explain these outcomes.

**Keywords:** Voice therapy, resonance tube, water resistance therapy

## ABSTRACT 256

### Neural Architectures and Adaptive Brain Processes Underlying Singing

Boris Kleber

**Objective:** Human singing behaviour exhibits remarkable variations, rooted in complex interactions between genetic factors and experience-dependent neural plasticity. This talk aims to provide an integrated perspective on the neurobiology of singing, spanning structural brain differences, functional auditory-motor interactions, and meta-analytic findings on singing expertise.

**Methods:** Focusing on neural differences associated with variations in human singing skills, four interrelated studies are presented: (1) Structural MRI exploring corpus callosum thickness, (2) Fixel-based analyses of diffusion data evaluating white matter pathways connecting dorsal and ventral larynx/phonation cortices, (3) fMRI employing a pitch-shifting paradigm to probe auditory-motor interactions, and (4) the first Activation Likelihood Estimation (ALE) meta-analysis concentrating on singing expertise.

**Results:** The first study reveals significant negative correlations between the age of first singing lessons and corpus callosum thickness in various sub-regions. The second identifies enhanced dorsal-ventral larynx/phonation cortex connectivity in more trained individuals. The third uncovers differential functional activation patterns within the auditory-motor network, with unique contributions from professionals suggesting a role for enhanced interoception. The meta-analysis in the fourth study offers an overarching view, demonstrating a distinct neural network for singing expertise that both parallels and diverges from speech production.

**Conclusions:** These findings collectively illustrate the neural architectures and adaptability underlying singing ability. By integrating these multi-level insights, this talk advances our understanding of how both 'wiring' and 're-wiring' contribute to variations in singing skills and their broader implications for well-being and rehabilitation.

**Keywords:** neuroscience, brain, singing, expertise

## ABSTRACT 257

### Safety of Medication Use in Voice Professionals

Izabela Jezowska, Bozena Karolewicz, Artur Owczarek

Developments in the supervision of pharmacotherapy safety highlight the need for continued research into the effects of medication on vocal function, which might determine treatment strategies for voice professionals. Most medications were never formally evaluated in terms of their effects on the voice and finding scientific proof in this scope presents a considerable challenge; in standard

clinical practice, adverse effects of medication on the voice have not been fully explained. Several studies have documented the indirect influence of possible side effects of selected drug groups or active ingredients of medicinal products on the voice, the larynx and the vocal tract. The effects of some drugs on mucosal fluid balance and water deficiency have been described, which may alter the viscoelastic properties of the laryngeal mucosa, thereby affecting the aerodynamic and acoustic measurements of voice emission. The evaluation of the effects of drugs on the voice must include all medications taken by the patient, also over-the-counter drugs, especially antihistamines, which have a drying effect, causing such symptoms as reduced hydration of the vocal folds, often coughing and increased grunting. Similar effects apply to the use of oral steroids. These symptoms are particularly important for professional singers, due to the risk of mucosal damage and inflammation and consequent hemorrhage of the vocal folds or laryngitis. Another groups of drugs that have significant potential to dry out/damage the mucosa and consequently disrupt vocal emission, are: diuretics, drugs used for treating gastroesophageal reflux disease i.e. proton pump inhibitors (PPIs), antidepressants, muscle relaxants, antihypertensive drugs including angiotensin-converting enzyme (ACE) inhibitors, anticholinergics, oral contraceptives, drugs used in estrogen replacement therapy or those used in patients with hypothyroidism. Finally, use of the popular aspirin can increase the tendency to bleeding, including hemorrhages in the vocal folds, the formation of polyps. Compiling a full list of medications taken by voice professionals is important for improving the quality of medical treatment, knowledge of healthcare providers, but also building their awareness of self-administration of medications. Medical care in this group of patients should include a comprehensive approach to understanding the possible interactions of the drugs used and their potential side effects.

**Keywords:** medication, drugs, voice, pharmacotherapy, safety

## ABSTRACT 258

### From Villa to Villani: Brazilian Art Song from the 20th Century

Luciano Simoes Silva, Juliana Franco

Brazilian art song is a genre still rarely performed by singers and pianists outside Brazil. In this presentation, a result of more than twenty years of research that includes performance, interviews, and analysis of this repertoire, we intend to expose the indigenous, African, and European influences that shaped Brazilian art songs in the 20th century. The focus will be on works from major composers from the 20th century, from Heitor Villa-Lobos, the author of Serestas, which were among the first songs which integrated elements of Brazilian popular and traditional music with classical elements, to Edmundo Villani-Côrtes, one of the most important composers from the late 20th century, whose works demonstrate a range of influences including bel canto style, atonal techniques, popular and folk music. Put side by side, the songs from these two composers demonstrate the remarkable, though uncommon, path art song traversed in Brazil. Alongside names such as Lorenzo Fernandez, Camargo Guarnieri and Waldemar Henrique, they express the notable richness and suppleness of this music.

With the help of a few examples taken from chosen scores from some of the best songs written last century, we intend to show how Brazilian urban and traditional music genres and styles, including modinha, choro, baião, and samba, are translated into voice and piano. The results will show a diverse and unique repertoire one may find very different from Hispanic cultures, enhanced by the particular intonation and prosody of the Portuguese spoken in Brazil. With the goal of making the language more accessible, we will provide valuable tools to master Brazilian Portuguese diction, improve interpretation, and better connect with audiences. The parameters most commonly related to the performance of this repertoire will also be included. A greater appreciation for this rich vocal tradition will allow musicians to perform some of the most interesting and diverse vocal music in the world. Brazilian art song offers performers and musicians a style of music that is innovative, challenging, and infused with passionate energy. These songs, with their variety of styles, influences, and melodic contour, are among the best products of this genre in the Americas.

**Keywords:** Brazilian music, art song, voice pedagogy, Portuguese diction, Villa-Lobos

## ABSTRACT 261

### Musical Theatre Sound for Middle Eastern Voices

Kathleen Bell, Hened Choueiry

**Objective:** Experiential workshop exploring the effects of utilizing a series of Pilates exercises with singers.

**Design:** Physiotherapist and pilates expert Hened will lead the participants will take the participants through a series of Pilates exercises focused on breath, thoracic mobility, core control, limbs organization and movement integration to facilitate and support a singing practice. Exercises like roll down, roll up, swan, mermaid and spine twist will work on moving the spine in all the ranges of motions available to it to enhance the movement space of the musculoskeletal structures in the torso. Other exercises like chest lift, bridge, sidekick, dart, swimming and plank variations will aim to facilitate core control mechanisms and movement integration strategies in order to provide an optimal neuro-physical preparation for a singing practice or performance.

Dr. Kathleen and Hened will also share the results of their pilot study utilizing these same exercises with a sample of music theatre students for 6 weeks. Dr. Kathleen led the students through a vocal warm-up, collected pre-pilates exercise self-perceptual measurement of effort with the Adapted Borg-10 scale, conducted the same vocal warm-up and collected the same post-pilates self-perceptual Adapted Borg-10 measures. 10 participants participated in the 6-week program and data was analyzed intra-subject by day.

**Results:** Participants of this workshop will be asked to fill out the same Adapted Borg-10 effort scale and then together we will compare their results with the results from the participants in the previous pilot study.

**Conclusions:** At the end of this workshop participants will learn a series of pilates exercises that could be incorporated in their own practice to facilitate more ease of vocal function.

**Keywords:** pilates, voice pedagogy, alignment, neuro-physical preparation, Musical Theatre Sound For Middle Eastern Voices

## ABSTRACT 262

### Formative Assessment Model for Acting Students' Vocal Performance: Theatrical Experience and Cooperation

Gala Fernandez-Fresard, Luis Flores-Prado, María Duarte

Based on a social-behavioral perspective centered on cooperation, the present study offers an innovative analysis of the assessment of acting students' vocal performance. Findings may contribute to improving the assessment process of acting students when vocal performance is involved. Results could be transferred to school, university, and adult education.

The vocal performance of acting students is a fundamental part of their training as actors/actresses. Additionally, it is widely acknowledged that assessment is an important component of the formative process for students. In practice, one can now observe the widespread application of assessment practices for the vocal performance of students in which the teacher must apply the assessment instrument while perceiving the performance. It can also account for the poor training in assessment methodologies received by most teachers in professional acting majors who are usually artists rather than pedagogues. Considering the above, we consider observing the assessment processes associated with vocal interpretation and their formative value very relevant.

We conducted an experimental study with 22 teachers and 14 students who participated in a simulated assessment experience in two different contexts of vocal performance perception. The results showed that teachers' cooperative tendencies might contribute to the assessment's formative character perceived by the students. Also, the assessment experience's structure may provoke a liminal emotional response in the teacher. The bodily correlate of this can feed back into the student's vocal expressivity through the co-construction of the experience.

Based on these findings we propose an innovative formative model of vocal performance assessment for acting students. Our assessment model is based on five fundamental considerations that we developed: a) the role of spectation and cooperation b) the distribution of space c) the viewing of video recordings d) the specific assessment instrument, and e) the accuracy of feedback.

This model is not exclusive to theater education. It can be transferred to other educational and professional environments where the principles of cooperative interaction between speaker and listener are considered relevant (political managers, therapists, lawyers, social leaders, communicators, health workers, among others).

**Keywords:** Theater, Vocal Performance, Cooperation, Formative Assessment, Assessment Model

## ABSTRACT 263

### Does Menopause Affect The Phonatory Function Of Singers?

Filipa M.B. Lã, Johan Sundberg, Pluvio Jesus Coronado Martin

Previous investigations have suggested a decline in respiratory function in postmenopausal women. In addition, ageing contributes to a decrease in glottal competence. Both these changes may contribute to the decrease in maximum phonation time (MPT) as reported in previous studies at post-menopause. This parameter is obviously of great relevance to singers, where musical phases can be quite long. In addition, phonatory air consumption is highly affected by phonation type, which can be varied between breathy, neutral and pressed. In previous studies, both these two factors, singing and phonation type, were not considered. By comparing pre and postmenopausal singers (age ranges between 40 and 48 and 51 and 60, respectively), the present study investigates the effects of menopause of these factors in terms of MPT, lung volume (LV) and flow rate, for the mentioned phonation types. Groups were identified by means of blood circulating concentrations of follicle stimulating hormone (FSH) and of oestradiol (E2). A total of 17 singers were recorded and their blood samples taken at the Hospital Clínico San Carlos (Madrid, Spain). Postmenopausal singers all had FSH > 30 UI/L and E2 < 25 pg/mL and presence of no more than 5 consecutive years of amenorrhea. Participants were asked to sustain the vowel /a/ as long as they could at similar loudness and in breathy, neutral and pressed phonation. This task was repeated three times for each phonation type. Recordings were made in a sound treated tent using FonaDyn software (Sten Ternström, Sweden). This software synchronously recorded both the headset microphone (DPA Microphone, Denmark) and RespTrack signals (Johan Stark, Sweden). The latter system collected ribcage and abdominal displacements, picked up by respbands. Results showed that flow rate varied with phonation types, being lower in breathy and higher in pressed phonation in the postmenopausal group. Further, not only MPT varied with phonation types, but also postmenopausal singers presented longer MPT for breathy and shorter for pressed phonation. The lung volume difference between inhalation and phonation stop was greater in postmenopausal singers for all phonation types. These findings might be related to deterioration of glottal competence, typically occurring with biological ageing.

**Keywords:** Menopause; Maximum phonation time; Lung volume; Flow rate; Professional female voice users

## ABSTRACT 264

### Laryngeal or Cervical Electrotherapy? Comparison of Acoustic Parameters and Vocal Symptoms in Women with Hyperfunctional Dysphonia

André Araújo, Kelly Silverio, Leonardo Lopes, Inês Carneiro, Letícia Bonini, Stephano Varela, Daniela Hencke, Larissa Siqueira, Angélica Antonetti-Carvalho, Alcione Brasolotto

**Objective:** To evaluate the effectiveness of three different forms of electrotherapy for voice therapy with Transcutaneous Electrical Nervous Stimulation—TENS on acoustic parameters and vocal symptoms in women with hyperfunctional dysphonia, comparing the stimulation fields: TENS on the cervical area (TC), TENS on the larynx (TL), and TENS on the larynx with vocal exercises (TLEx).

**Method:** Experimental study approved by ethical committee. 27 adult women with behavioral dysphonia, larynx with vocal nodules/cysts, where randomly divided into three groups for voice therapy. The TC group (10 women, mean age=28.70 years) received TENS with four silicone-carbon electrodes on the supraglottic area and descending fibers of the trapezius muscle, bilaterally; participants in dorsal decubitus position; TL group (9 women, mean age = 29.30 years) – received TENS with two electrodes on the lamina thyroid cartilage, bilaterally; participants in sitting position; TLEx group (8 women, mean age=30.30 years) received TENS with electrodes identical to the TL group, with vocal exercises. Twelve 30-minute sessions were conducted twice a week over six weeks. TENS parameters: symmetrical biphasic square pulse, pulse duration of 200μs, frequency of 10Hz, and motor threshold intensity (strong in the TC group and weak in the TL/TLEx groups). Before and after the interventions, the voices were recorded (sustained vowel /a/, number counting tasks), and edited for extraction of measures (PRAAT 6.0.37): smoothed cepstral peak prominence (CPPS), alpha ratio, and L1-L0, Acoustic Voice Quality Index (AVQI), and Acoustic Breathiness Index (ABI). Participants reported voice symptoms using the Screening Index for Voice Disorders (SIVD). ANOVA and Tukey test ($p < 0.05$) were applied.

**Results:** After therapy, the CPPS ($p=0.001$), L1-L0 ($p=0.043$) parameters in vowel, alpha ratio ($p=0.037$) in number counting increased, and ABI index ($p=0.042$) decreased only in the TL group; all groups decreased the SIVD score ($p=0.007$) with no difference between them.

**Conclusion:** In women with hyperfunctional dysphonia, TENS applied to the larynx promoted a significant change in acoustic parameters, indicating better vocal quality compared with TENS applied to the cervical area, and TENS applied to the larynx with vocal exercises. The frequency of vocal symptoms improved significantly after the three forms of electrotherapy.

**Keywords:** voice, voice therapy, TENS, dysphonia, acoustic parameters

## ABSTRACT 265

### Laryngostroboscopic Sign Patterns in Laryngeal Pathologies

Andrea Bianchino, Francesco Stomeo, Ionut Sebastian Mihai, Alfonso Borragán Torre, Dario Strangis

**Introduction and Objective:** The study of signs and symptoms combined with the patient's history are the cornerstones for investigating the etiological aspect of pathologies. This study aims to explore characteristic sign patterns observed in laryngostroboscopy, evaluating their correlation with laryngeal pathologies associated with dysphonias. Preliminary data are presented.

**Methods:** This is a retrospective case-control study design. Video-endoscopic materials from the Ear, Nose, and Throat (ENT), Audiology, and Phoniatrics Unit of the University Hospital of Ferrara over the past decade were examined. Patients were divided into two groups: cases, exhibiting detectable laryngeal pathologies according to the Classification Manual for Voice Disorders-I–1st Edition (Verdolini K., et al. 2008); and controls, devoid of detectable pathologies upon laryngoscopic examination. Standardization of signs was achieved by integrating various standardized scoring systems and investigation models, including Voice-Vibratory Assessment with Laryngeal Imaging (VALI) (Poburka, B. J., et al. 2017), revised and expanded in VALI-R (Patel R., et al. 2022); Videolaryngostroboscopy Basic Findings (VBF) (Ricci-Maccarini, A., et al. 2018); Reflux Finding Score (Vance, D. et al. 2023); and Mucus Aggregation Report (MAR) (Bonilha, H. S. et al. 2012). Additionally, the perceptual acoustic profile was assessed using the extended GRBAS scale (Ricci-Maccarini, A., et al. 2022).

**Results and Conclusion:** preliminary data reveal a systematic correlation between laryngeal pathologies and endoscopic signs, with particular emphasis on signs associated with morphology, functionality, inflammation, and vocal tract compensation. Future developments of the study will focus on elucidating the prognostic value of objective signs in malignant laryngeal pathologies.

**Keywords:** laryngostroboscopy signs, voice disorders, voice pathology, dysphonia

## ABSTRACT 267

### Voice Outcome of Glottoplasty in Trans Women

Evelien D'haeseleer D'haeseleer, Tine Papeleu, Clara Leyns, Anke Adriaansen, Iris Meerschman, Peter Tomassen

**Objective:** This study investigates the short- and longer-term effects of glottoplasty on acoustic voice parameters, listener perceptions, and patient-reported outcome measures in trans women. Secondly, the impact of chondrolaryngoplasty and voice therapy on the glottopasty outcomes was investigated.

**Methods:** A prospective longitudinal non-controlled trial was used. Thirty-five trans women undergoing glottoplasty or a combination of glottopasty and chondrolaryngoplasty were included in this study. A voice assessment was conducted before surgery and 1 week, 1 month and 6 months after surgery including acoustic analysis of the fundamental frequency (fo) and intensity, determination of the voice range profile, the Dysphonia Severity Index (DSI), and the Acoustic Voice Quality Index (AVQI). Self-perception was assessed using the Voice Handicap Index (VHI), the Trans Woman Voice Questionnaire (TWVQ), and visual analogue scales (VAS). A listening experiment was conducted to collect naïve listener perceptions of masculinity-femininity. Linear Mixed Models were used for statistical analyses.

**Results:** Significant differences over time were found for all fo and intensity parameters, DSI, AVQI, VHI and TWVQ scores. Listener perception and self-perception of femininity was higher after surgery.

Significant differences in evolution of listener perceptions were found between the groups with and without voice therapy.

**Conclusion:** Glottoplasty improves voice related quality of life and is an effective method to increase the fo and associated perceptual femininity. After glottoplasty an immediate and short-term decrease in voice quality, vocal capacity and frequency range was measured with a progressive recovery on the longer term. Long term side effects of glottoplasty are a reduction in speaking intensity and intensity range. Voice therapy improves the outcomes of glottoplasty, and should be further investigated in future studies using standardized protocols for voice therapy.

**Keywords:** glottoplasty, transgender voice, Transwomen, voice outcome

## ABSTRACT 268

### Effects of Augmented Body Proprioceptive Feedback via External Resonance Tube on the Modern Singer'S Voice

Marcella Spinola, Federica Avolio

Our experimental work with the metallic resonator was based on fundamental principles of PROEL utilizing phases of the perceived model method and the phenomenon of RESONANCE, where an oscillating system efficiently absorbs energy from an external source only at specific frequencies. The aim was to stimulate the vocal tract through the resonant body to facilitate positive modifications in vocal energy, reducing singers' effort, enhancing harmonic quality, decreasing noise, and minimizing technical difficulties, efforts, and vocal fatigue sensations.

Referencing studies on helmholtz resonators, acoustic resonant cavities for sound and perception study, oscillating air within generates standing waves resonating with the cavity's frequency, acting as a selective sound amplifier within a narrow frequency range. Thus, constructing our metallic resonator necessitated adherence to fundamental principles:

- **Physical dimensions:** larger dimensions reinforce lower frequencies.
- **Molecular density:** higher density correlates with lower frequency.
- **Mechanical tension:** greater tension corresponds to higher frequency.

**Materials:** A cylindrical metallic surface was constructed, topped with a matching lid and a wooden base, featuring an accessible entry point. Optimal vibration and resonance generation required specific dimensions: 2.20 meters in height, 80 cm in diameter, with 1 mm thick metallic material. Iron, with its sound conductivity, and thickness facilitated oscillation and energy transmission, minimized welding points for material flexibility, enhancing tube vibration, promoting resonance without reverberation. Additionally, its use directed attentive focus proximally to the body, aligning with motor learning principles.

**Methods:** Preliminary phase: ten singers with technical difficulties in executing specific passages termed "critical points"were selected. Vocal samples were collected using microphones and professional software, consisting of prolonged vocalization, critical passage singing, and phrase repetition, followed by subjective evaluations through structured interviews.

**Study phase:** Participants replicated the critical passage within the resonator, followed by post-resonance interviews and a repeat of the passage outside the resonator, and repeated thrice, inducing perceptual changes in vocal patterns.

**Results:** Audio recordings pre- and post-resonance revealed significant improvements in vocal quality, as analyzed through HNR, jitter, shimmer, PSD, and GNE parameters. Subjective evaluations indicated reduced vocal strain and improved stability near critical points.

**Conclusion:** The metallic resonance chamber enriches sound, enhancing harmonic presence, reducing noise, stabilizing frequency peaks, and intensity, effectively facilitating vocal emission during critical passages, overcoming various vocal difficulties.

**Keywords:** resonance, proel, proprioceptive feedback,metallic resonator, motor learning principles

## ABSTRACT 269

### Fundamental Frequency in Spoken Interactions Mediated By Sex, Power and Distance

Paula Barriendo, Nuria Polo, Filipa M.B. Lã

In informal verbal interaction, speech features of conversation partners usually adapt to sex composition of pairs (male-male, female-female, male-female), power and familiarity between pairs. These changes in language use are usually made to attune to the conversation partner. Previous investigations have looked at conversational analysis in terms of relative talkativeness, relative production of intrusions into speech, interruptions and overlaps, relative production of varying assent forms, and turn-talking. However, vocal features in conversation, such as, variations in mean fundamental frequency (fo) and related parameters, are still to be explored, especially when regarding Spanish native speakers.

This study aims at investigating whether the fo of female Spanish native speakers varies according to sex, power and familiarity of their conversation partner.

An actress and an actor, both professional and in their twenties, were recorded in a sound treated room of a radio station. They were instructed to role-play six daily-life conversation situations presented as the interlocutor stimuli in the subsequent listening experiment: (1) "unfamiliar-powerful"; (2) "unfamiliar-powerless"; (3) "unfamiliar-equal power" person; (4) "familiar-powerful"; (5) "familiar-powerless"; (6) "familiar-equal power". By adopting these roles, the influence of power and distance moti-

vates specific linguistic choices in the answers of the listeners. The latter were female Spanish native speakers, also in their twenties, randomly recruited in Madrid. The participants' spoken interactions were recorded in a sound treated booth using a headset omnidirectional microphone. To allow comparisons between conversation situation responses, participants were led to use the words "lavanderia" (laundry) and "domingo" (Sunday) in their responses. A script in Praat was used to extract mean fo and related parameters.

The results suggest that listeners fo and related measures change more according to the conversation situation than to the sex of the interlocutor. The "unfamiliar-powerful" situation presented the biggest drop of fo regardless the sex of the interlocutor. This supports the assumption that, also in Spanish, females express their power by lowering their voices, a feature associated with males' vocal behavior to convey power in a conversation. This study contributes to realizing the importance of incorporating situational elements when understanding the relationships between voice, language, and social function.

**Keywords:** Fundamental frequency, language use, power, distance, speakers' sex

## ABSTRACT 270

### Gender Affirming Voice Training For Trans Women: Effectiveness of Training on Patient–Reported Outcomes and Listener Perceptions of Voice

Ulrika Nygren, Jennifer Oates, Georgia Dacakis, Victoria Kelly, Maria Södersten, Georgina Smith, Anders Sand, Sterling Quinn

**Objective:** Many trans women seek voice training from Speech Language Pathologists to achieve personal goals related to gender expression. While there are studies supporting the effectiveness of this training, these are generally limited by their sample sizes, scant reporting of training details, and lack of focus on clinically relevant change and maintenance of this change in the long-term. To address these research gaps, we collaborated internationally to conduct a prospective study investigating the effectiveness of voice training for trans women with the self-identified goal of developing a 'female-sounding' voice.

**Methods:** N=74 trans women completed the voice training across two sites based in Sweden and Australia. Trans women completed audio-voice recordings, the Trans Woman Voice Questionnaire, and a visual analogue scale rating their satisfaction with voice at four time points: (1) three months pre-training, (2) immediately before training, (3) immediately after training, and (4) three months post-training. Participants also reported on their perception of whether voice training improved their voice post-training. N=40 cisgender speakers completed audio-recordings for comparison. Naïve listeners rated both the trans women's and cisgender speakers' audio-recordings on a 5-point scale from 'very male' to 'very female'.

**Results:** Primary outcome measures included participant self-ratings in three areas (voice-related satisfaction, the impact of voice on daily life and social participation, and self-perception of whether training improved voice) as well as listener ratings. Group-level analyses revealed positive effects on all measures as well as maintenance at follow-up. However, individual-level analyses revealed significant individual variability, and not all participants made positive changes sufficient to fully achieve their goals.

**Conclusions:** Trans women undertaking gender affirming voice training with similar goals to our participant group can expect to feel that training improved their voice, feel more satisfied with their voice, and feel less hindered by their voice in their daily lives and social interactions.

**Keywords:** transgender, voice, training, effectiveness, outcomes

## ABSTRACT 272

### Gender Affirming Voice Training For Trans Women: Acoustic Outcomes and Their Associations with Listener Perceptions Related To Gender

Ulrika Nygren, Maria Södersten, Svante Granqvist, Jennifer Oates, Georgia Dacakis, Anders Sand, Sterling Quinn,

**Objective:** Many trans women seek voice training with Speech Language Pathologists (SLPs) to develop a voice that sounds perceptually female/feminine to themselves and to listeners. This study investigated the acoustic properties of the voices of trans women undertaking a gender affirming voice training program as they attempted to change their voices from being perceived as sounding male towards sounding female. A wide variety of acoustic investigations were included to expand the existing evidence base related to what acoustic measures may have utility as outcome measures in gender affirming voice training programs.

**Methods:** N=74 trans women with the self-identified goal of developing a 'female-sounding' voice were recorded twice before and twice after they had completed a gender affirming voice training program. N=40 cisgender speakers were recorded once for comparison. Average, minimum and maximum fo, SPL (Leq), and LH1-LH2 were analysed in reading and spontaneous speech using RecVox. Formants F1-F4 were analysed from extracted vowels from the reading passage using Praat. The average training effect was estimated using a linear mixed effects model and at an individual level to determine how the acoustic measures were related to listeners' perceptions of gender, via a successive partial correlation procedure.

**Results:** Participants, on average, increased all fo and formant frequency measures, Leq, and LH1-LH2 after training. The three strongest predictors of a female-sounding voice were fo, average formant frequency, and Leq. Some participants changed their average fo to cisgender levels but were still not rated as sounding female. Those participants generally had lower formant frequencies and/or higher Leq compared to cisgender female voices.

**Conclusion:** In agreement with previous studies, trans women in our study who increased fo and formant frequencies after training were perceived to sound more female. This study also found that Leq may be an important acoustic variable predicting participants perceived to sound less female, even when fo and formant frequencies are raised. These findings indicate that fo, formant frequencies, and Leq may all be valuable training targets in gender affirming voice training and valuable measure when evaluating the effectiveness of gender affirming voice training programs.

**Keywords:** transgender, voice, training, acoustics, auditory-perception

## ABSTRACT 274

### Speech Pathologists' Perspectives on Gender Diverse People's Psychological Wellbeing and Identity in the Context of Gender Affirming Care

Julia Tanase, Sterling Quinn, Hilke Hansen, Jennifer Oates

**Objective:** Speech pathologists work with a variety of clients, some of whom are gender diverse and do not identify with their gender category presumed at birth. Gender diverse people might experience discomfort with the sound of their voice (Holmberg et al., 2023). A primary goal of gender affirming healthcare is to support clients' psychological wellbeing (Coleman et al., 2022), closely connected to a person's view of their own identity (Ryff & Singer, 2008). Apart from traditional speech pathology practices that assist the client to alter their voice to develop a desired gender presentation, literature suggests supporting clients to manage distress to address psychological wellbeing (Azul et al., 2022). To provide such care, speech pathologists need to see themselves in the position to support clients holistically (DiLollo & Neimeyer, 2022). At present, it is unclear how speech pathologists see their role in supporting gender diverse clients' psychological wellbeing and clients' view on identity and what practices clinicians apply in their work beyond voice modification techniques. This study aims to explore these topics from speech pathologists' perspectives.

**Methods:** In this qualitative study fourteen speech pathologists providing gender affirming care participated in three focus group discussions. Data are analysed with reflexive thematic analysis (Braun & Clarke, 2022). The research process is supported through collaboration with the gender diverse community.

**Results:** Current preliminary results from an early stage of data analysis show that speech pathologists assist their clients to develop desired gender presentation through voice modification techniques. Some clinicians pause intervention if client emotional distress poses a barrier for voice modification work, whereas others provide emotional support beyond voice modification work. Despite varying approaches, speech pathologists agree that supporting client psychological wellbeing plays a role in their work.

**Conclusions:** Preliminary findings suggest that there is some uncertainty about speech pathologists' scope of practice in the gender affirming space. Therefore, there may be a need to (re-) define the

role speech pathologists play in supporting gender diverse clients' psychological wellbeing (DiLollo & Neimeyer, 2022). Interdisciplinary research and community collaboration could assist speech pathologists to further tailor practices to gender diverse clients' unique needs.

**Keywords:** Speech Pathology, Gender Diversity, Psychological Wellbeing, Narrative Identity

## ABSTRACT 275

### A Systematic Performance Evaluation of Ai-Powered Voice Separation Technologies

Tiago Cruz, Pedro Andrade, Christian Herbst

**Introduction:** In scientific voice analysis, using high-quality laboratory data is crucial for accurate results. This often restricts participant selection to those locally available – excluding famous singers and historical role models. Available recordings typically contain complex orchestral backgrounds detrimental to voice signal separation for the estimation of time-varying fundamental frequency (fo). However, recent advancements in voice and music separation technology, often supported by artificial intelligence (AI), now allow for more precise vocal component isolation. This could potentially enable the inclusion of commercial recordings in scientific analyses.

**Methods:** This study systematically evaluated the performance of two voice separation methods (Izotope RX10, Music.ai) and a baseline scenario without voice separation in extracting fo from commercial recordings of "Ombra mai fu"by G. F. Händel, featuring seven different orchestrations. An artificial singing voice, synthesized at the vowels /u/, /ɪ/, and /ʌ/ with known fo, was mixed with the orchestral intro at five different signal-to-noise ratios (SNR), treating the orchestral accompaniment as "noise". After subsequent voice separation of the resulting 105 sound samples, fo estimation was performed using Praat's autocorrelation method.

**Results:** The analysis revealed that SNR significantly impacts fo estimation quality, with additional minor influences from the extraction method, orchestral accompaniment type, and synthesis vowel. Overall, samples processed by Izotope RX10 and Music.ai supported fo data extraction with median success rates well above 80 %, but only for signal-to-noise ratios above 0 dB. In our synthesized data set, Music.ai performed slightly better than Izotope RX10.

**Discussion & Conclusion:** The study underscores the efficacy of voice separation methods for accurately identifying fo in commercial recordings. These methods open new possibilities for the large-scale AI-powered analysis of contemporary and historical recordings of vocal performance, extending the analysis to international superstars and historical role models. The newly gained data are expected to have substantial impact on musicological and pedagogical perspectives.

**Keywords:** voice separation, fundamental frequency, singing, artificial intelligence

**ABSTRACT 276**

## Beyond The Laboratory: Using Ai-Powered Voice Separation for Large-Scale Vibrato Analysis of Commercial Recordings of Classical Singing

Tiago Cruz, Pedro Andrade, Christian Herbst

**Introduction:** Vocal vibrato is a well-documented feature of the singing voice, with significant physio-physical and pedagogical implications. Traditionally, research in this area was constrained by the need for high-quality, noise-free laboratory data, limiting studies to small sample sizes and often excluding elite professional singers. However, the recent advancement of reliable voice separation techniques now allows for the large-scale analysis of commercial recordings across a wide spectrum of highly professional and iconic singers, both contemporary and deceased.

**Methods:** This study utilized 150 commercial recordings of G. F. Händel's aria "Ombra mai fu", sung by world-class, international, and national singers of all voice classes, as categorized by the Bunch & Chapman (2000) taxonomy. The orchestral accompaniment was removed using the "music.ai" vocal separation method, an approach which has been systematically verified in a recently presented study, using synthesized "ground truth"samples. Within each recording, six sustained notes were chosen for subsequent analysis. Vibrato rate was computed by fitting sine waves to the respective fundamental frequency ($f_0$) contours, using a Bayesian-enhanced linear regression method. Vibrato extent was estimated as the root-mean-square (RMS) value of the logarithmically transformed $f_0$ data. All results were double-checked visually (by inspecting spectrograms) and against a computed goodness-of-fit metric.

**Results:** Preliminary appraisal of the data hints at an $f_0$-dependent decrease of vibrato extent within voice class. Across voice classes – with the exception of boy sopranos – there appears to be a trend for high voices to have a higher vibrato rate than lower voices. Notably, performers classified as "Superstar" and "International" appeared seemed to sing with higher vibrato rates and lower vibrato extent, as compared to singers from other taxonomy categories.

**Discussion:** To our knowledge, this is the first study to apply AI-powered voice separation techniques to support large-scale analysis of commercial recordings. Our preliminary findings suggest that this novel investigative paradigm produces dearly needed generalizable data. Our study thus provides valuable new insights about the singing style of highly professional singers, which are often used as role models in pedagogic contexts.

**Keywords:** vibrato, classical singing, fundamental frequency, artificial intelligence

**ABSTRACT 282**

## Does Singing Training during Pregnancy Enrich Foetus' Exposure to the Mother's Vocal Sound and Mother-Foestus Bonding?

Filipa M.B. Lã, Ricardo Panela, Maria Eduarda Carvalho, Alexandra Quaresma

The human hearing system is fully developed by the fourth month of pregnancy. After that, the foetus can hear both the mother and their own body's sounds. Distorted external stimuli can also be heard, especially from week 37, when the foetus nervous system is fully developed. Speaking, storytelling and singing to the foetus during pregnancy can strengthen the mother-foetus bond and improve the wellbeing of both. However, the impact of the foetus exposure to the mother's vocal sounds is still unclear. The present study hypothesises that the mother's voice can be improved during pregnancy with singing activities, especially those focussed on developing vocal function. Furthermore, this improvement can impact the mother-foetus bonding. To test this hypothesis, female non-singers were randomly allocated into two groups and recorded at weeks 32 and 37 of pregnancy, corresponding to before and after two interventions of five consecutive weeks each: individual singing lessons (A) and music-therapy voice-based sessions (B). A third group (C) received no intervention. Singing lessons included: (i) breathing exercises with a flow ball; (ii) semi-occluded vocal tract exercises (humming, flow ball, and vox lax tube in water); (iii) syllabic vocalises; and (iv) excerpts of lullabies, all within a low pitch range using flow phonation. Group-singing sessions aimed at creating an individual song for the baby. Voice recordings were made at Maternidade Alfredo da Costa (Lisbon, Portugal) using a headset omnidirectional microphone placed 3 cm from the mouth (Sennheiser HSP essential, Germany) and a focusrite Scarlet 2i2 external sound card. The vocal task consisted of spontaneously speaking directly to the baby for five consecutive minutes. All recordings were calibrated and measures of mean fundamental frequency (fo), fo variation, fo range, fo slope, equivalent sound level (Leq), speech rate and speech articulation rate were extracted. Mother-foetus bonding was measured with a validated self-reported perception scale using the Portuguese version of Antenatal Maternal Attachment Scale (MAAS, Condon). Results showed that vocal parameters changed after both interventions. Changes were more pronounced for group A, especially for vocal loudness and speech and articulation rates. Future investigations on foetal response to the mother's vocal sounds seem worthwhile.

**Keywords:** Pregnancy, Vocal sounds, Mother-foetus bonding, Singing, Voice training

## ABSTRACT 285

### Self-Reported Vocal Health of Chilean Pedagogy Students

Maria Celina Malebran Bezerra de Mello, Felipe Cerda Sandoval,
Lady Catherine Cantor-Cutiva

**Background:** Occupational dysphonia is a work-related disease that has progressively increased over the last 10 years in Chile. The prevalence of dysphonia in Chilean teachers has risen from 45% to 75%, with elementary and preschool teachers being the highest-risk group.

**Objective:** To characterize vocal self-perception of Chilean pedagogy students, focusing on the awareness of vocal symptoms, with a long-term aim of facilitating the preservation of vocal health in the context of training future teachers.

**Methodology:** This study was approved by the ethics committee of USS with number 141-22. It has a longitudinal and quantitative design, and its first two measurements, using the same instrument, were already applied to 76 pedagogy students in Santiago, Chile. The instrument is a self-perception vocal survey validated by experts, to be administered for 4 consecutive semesters between 2023 and 2025.

**Results:** 87% of the interviewed participants completed the survey; 14% of the participants were male and 86% were female, with ages ranging from 19 to 39 years. Approximately 8% of respondents have reported moderate to severe vocal symptoms, 28% of whom frequently use their voice in teaching-related activities, and nearly 80% have not consulted a specialist when experiencing vocal issues. Additionally, the surveyed students exhibit limited self-care practices, low water consumption, frequent cigarette smoking, and a lack of awareness of real and effective measures to recover from voice issues.

**Conclusions:** Considering the importance of anticipating the development of a voice disorder due to exposure in the work context, there is an urgent need to generate knowledge for preserving vocal health during the college years of prospective teachers. This is crucial as educators make their initial forays into classrooms and face high vocal demands, aiming to equip them with the tools to confront vocal challenges they will encounter throughout their professional lives.

**Keywords:** Occupational Dysphonia, Pedagogy Students, Vocal Symptoms

## ABSTRACT 286

### Voxplot in Italian Language: Validation of the Acoustic Breathiness Index

Erennio Natale, Franco Fussi, Chiara Pavese, Serena Calabrese, Annamaria Cimmino, Annamaria Bellomo, Giuliana Pisanu, Francesco Stomeo

**Introduction:** VoxPlot is a free, scientifically reliable and user-friendly software for acoustic voice analysis available in many languages (including English, German, Spanish, Portuguese). It utilizes proven PRAAT algorithms with scientifically based presets to calculate some of the currently most reliable acoustic parameters, including the two multidimensional acoustic indices Acoustic Voice Quality Index (AVQI) and Acoustic Breathiness Index (ABI). The latter is the result of a multivariate model combining 9 parameters for the specific evaluation of breathiness, obtaining a single score ranging from 0 (optimal voice) to 10 (maximum degree of dysphonia). ABI is based on the analysis of concatenated continuous speech (CS) and sustained vowel (SV) and has already proven to be a robust and valid objective measure across at least 11 languages, with high sensitivity and specificity.

**Objective:** The aim of our work was to validate the ABI in the Italian language by assessing its feasibility and robustness. Concurrent validity and diagnostic accuracy were investigated within the Italian-speaking population. This study, along with the validation conducted for AVQI, allows us to use VoxPlot with scientific reliability in Italian as well, implementing the language-specific ABI cutoff in the software.

**Methods:** Voice samples of continuous speech (CS) and sustained vowel (SV) [a:] from 235 subjects, both healthy and dysphonic, were recorded. Perceptual evaluations of breathiness severity were performed by 5 expert voice clinicians using the "B"score of the GRBAS scale; ABI was calculated using the same voice samples. For CS, we used the phonetically balanced text previously validated by Fantini et al. for AVQIv3-IT calculation. Concurrent validity and diagnostic accuracy of ABI were then analyzed.

**Results:** Perceptual evaluations from three out of five raters showed substantial intra- and moderate inter-rater reliability and were therefore chosen for the study analysis. A strong correlation was found between ABI score and perceptual evaluations of the breathiness severity ($r = 0.82$, $P < 0.001$), along with excellent diagnostic accuracy (94%). The best diagnostic outcome was found for a threshold of 3.33 (sensitivity of 80% and specificity of 93%).

**Conclusions:** ABI is a valid and robust tool for quantifying breathiness severity in the Italian population.

**Keywords:** Voice quality, Acoustic Breathiness Index, Acoustic analysis, Assessment of dysphonia, Italian language

## ABSTRACT 287

### Illness Perceptions and Voice Related Coping in Western Classical and Carnatic Singers

Aparna Ramachandran, Katerina Hilari, Ruth Epstein, Shashivandan Hirani

**Background and Objectives:** Singers, often referred to as vocal athletes use their voices excessively or in extreme ways. Given the increased prevalence of voice problems among singers, understanding how they cope with their voice problems is important. One concept which is linked to coping is illness perceptions (IP) which refers to how individuals experience their health condition (voice problems) and perceive its consequences. Research evidence suggests that both coping and IP interact with each other and influence health outcomes. The objectives of this study were to: 1) explore IP of singers from two different music genres: Western classical (WC) and Carnatic, 2) identify coping strategies employed, and 3) compare IP and coping strategies between the groups.

**Methods:** An exploratory cross-sectional design using a self-reported online survey of IP and coping strategies was completed by WC and Carnatic singers. The study adhered to the Checklist for Reporting of Survey Studies (CROSS) reporting guidelines. The Brief Illness Perception Questionnaire (B-IPQ) and the Voice Disability Coping Questionnaire (VDCQ) were used to measure IP and coping respectively. Descriptive and comparative statistical measures were employed to analyse the data.

**Results:** 102 Carnatic and 63 WC singers (total n=165) completed the survey. For B-IPQ, singers perceived they had a good understanding of their voice problem, believed that voice treatment was helpful and felt in control of their voice problem. For VDCQ, Information seeking showed highest scores among both groups. A comparison of B-IPQ scores between groups revealed a significant difference

for Coherence-IPQ 7 (p=0.05) with greater coherence in WC singers. Comparison of VDCQ scores indicated significant differences for Social support (p=0.044), Distancing (p<0.001) and Information seeking (p=0.018). While Carnatic singers showed higher scores on the Distancing subscale, WC singers scored higher for Social support and Information seeking.

**Conclusion:** The present study attempted to fill some crucial gaps in the literature as IP and coping are under-researched areas. The impact of IP and coping on vocal health of singers and clinical practice are discussed. The implications of genre-specific differences in coping and IP are also discussed. Future directions for intervention development based on these constructs is suggested.

**Keywords:** coping, illness perceptions, singers, self-report

## ABSTRACT 288

### Evaluation of Gender Affirming Voice Training for Transwomen: Self-Evaluations and Audio Perceptual Ratings by Naïve Listeners

Victoria Kelly, Maria Södersten, Anders Sand, Ulrika Nygren

**Objective:** Many transwomen experience being vocally misgendered. The aims of this study were to evaluate how listeners´ perception of transwomen's voices, and transwomen's own ratings, change after a gender affirming voice intervention.

**Methods:** This study is part of a project between Karolinska Institutet, Sweden, La Trobe University and Monash Gender Clinic, Australia. Thirty-one transwomen were recorded at a first visit (T1), before voice training (T2), after voice training (T3), and at follow-up (T4). A reference group of 10 cismen and 10 ciswomen were recorded. Voice samples from each timepoint (T) constituted the listening material. Reference voices and duplicated voices for intra-rater reliability calculation were included. Naïve listeners rated the voice samples using the categories from the Trans Women Voice Questionnaire. The transwomen rated their voices at T1-T4 with the same categories. They had formulated individual long-term goals for training. Goal attainment was rated on a 0-100 mm visual analogue scale (VAS).

**Results:** A large variability was found in how the listeners rated the voices. Voices rated female by 75% or more of the listeners were considered as being perceived female. The "cut-off", 75%, was based on how the naïve listeners had rated the cispersons´ voices. Forty-three % of the transwomen were perceived female at T3 and 32% at T4. None of the transwomen rated their own voice female at either T1 or T2. At T3 63 % rated their voice female. 21 transgender women considered their goal being attained (VAS-rating points > 60 mm). All voices perceived female by >75% had VAS-ratings above 60/100 mm. Lower ratings were found in the group being perceived female by less than 75% of the listeners.

**Conclusions:** Many transwomen rated their voice female and their goal being attained even if they were not rated as sounding female by the listeners. The intervention helped a third of the transwomen

to attain a voice that was rated female by at least 75% of the listeners. This illustrates, that gender affirming voice training benefits the transwomen in attaining their goal for training, and the need to take transwomen´s goals into account when evaluating gender affirming voice training.

**Keywords:** gender-affirming voice-training, goal-attainment, listener-ratings

## ABSTRACT 295

### Can Off-The-Shelf Virtual Acoustic Systems Be Useful In Choir Acoustics Research?

Kajornsak Kittimathaveenan, Munhum Park, Sten Ternström

Choir performances are significantly impacted by the acoustic environment, as singers' perceptions and performances are greatly influenced by both the stage acoustics and the voices of their colleagues. Conventional choir acoustics research in physical venues requires much time, engagement with singers and spaces, and efforts to collect multichannel data. Modern virtual acoustic systems are playing an increasingly important role in assisting researchers to circumvent the challenges of physical venues. This study explores and compares the potential of three off-the-shelf headphone-based virtual acoustic systems as platforms for such research: (1) SoundScape Renderer (SSR), (2) Room Acoustics for Virtual ENvironments (RAVEN), and (3) Experimental Virtual Archaeological-Acoustics (EVAA). These systems are evaluated based on plausibility, the sense of presence and the immersion within the choral settings. We investigate first how well these systems can (1) simulate a given room, (2) simulate at least 16 directional and arbitrarily positioned sound sources ('singers'), (3) give convincing real-time feedback of the own voice, (4) emulate the turning of the listener's head, and (ideally) (5) model the influence of singers' bodies on the sound propagation in and beyond the ensemble. We then discuss which of these features are actually necessary for answering some exemplar questions in choir acoustics, including the preferred self-to-other ratio, the optimal voice support from podium reflectors, and the effects of varying inter-singer spacing. The study serves as a pilot study for the upcoming work in virtual choir acoustics.

**Keywords:** Choir acoustics, virtual acoustics evaluation

## ABSTRACT 296

### Psychological and Neurobiological Profiles of Psychogenic Laryngeal Dystonia: A Case Study

Maria Dietrich, Katrin Blum, Mark Leslie Berardi, Max Christian Pensel, Christian Hoppe, Nora Kämpfer, Peggy Herrmann, Alexandra Philipsen, Götz Schade

**Objective:** Psychiatric conditions are recognized as possible predisposing factors in some patients with laryngeal dystonia (LD). The case of psychogenic LD, with such strained and strangled voice quality that it mimics organic LD, deserves new attention considering potential overlap with functional neurological disorders (FND). The objective of this case study is to characterize the psychological and neurobiological profile of a patient with psychogenic LD compared to a normophonic matched peer.

**Methods:** A 41-year-old male presented to a specialty outpatient clinic for functional voice disorders to improve his voice that has been severely dysphonic since 2015. In 2020, he received a laryngeal Botox injection with a positive effect that lasted about 9 months. The patient participated in a new round of voice therapy and a study on emotion regulation, including several questionnaires and functional MRI during the rating of affective pictures and faces. A male individual without LD and dysphonia matched on age, handedness and education completed the same tasks. The patient was scanned again after progress in voice therapy. The matched peer was scanned twice as well and corticolimbic MRI data will be compared. Results: The patient scored higher on work and social stress (TICS) and behavioral inhibition (BIS-BAS Scales) than his peer. The patient scored positive for alexithymia (TAS-20), anxiety (STAI), and social anxiety (LSAS). His affective style showed lower adjusting than his peer (ASQ). Life events (LEC-5) included a divorce and a death of a relative due to cancer. The scores on depression (BDI-II), self-esteem (RSES) and dissociative symptoms (FDS) were unremarkable in both cases. The patient presented with a psychological profile that partially overlaps with that seen in individuals with functional voice disorders (FVD-FND). For example, he felt "conflict over speaking out." As typical for FVD (and LD), phonation during laughing and singing was normal as were brief periods of phonation in short phrases. However, improvements did not last and attention direction had little effect. The effect of Botox lasted longer than expected for LD.

**Conclusions:** LD with dominant psychogenic factors will be discussed through the lens of FND using questionnaire and fMRI data.

**Keywords:** Laryngeal dystonia, dysphonia, personality, emotion regulation, MRI

## ABSTRACT 300

### Longitudinal Analysis of Anamnestic Data on the Family Context, Socio-Cultural Background and Musical Education of Prospective Vocal Students between 1980 And 2020

Dirk Mürbe, Marie Bieber, Reuben Walker, Hartmut Zabel, Mario Fleischer

**Objective:** In addition to the functional assessment of the singing voice and artistic prerequisites, biographical aspects also play a major role in the individual guidance of singers. These can have a strong influence on the artistic personality and are described by anamnestic information, for example family history, social history and information on previous musical training.

In addition, they could have an influence on academic success, success in the singing profession and, in particular, the likelihood of developing vocal disorders. The aim of this thesis is therefore the scientific investigation of data on the socio-familial context of professional singers, which have been collected in the context of their singing studies for over 4 decades. This data should now be analyzed in a retrospective analysis.

**Method:** Singing students at Dresden University of Music undergo an initial vocal pedagogical and phoniatric examination at the beginning of their studies. In addition, numerous anamnestic details on the family context, social development and previous musical training are collected.

In this study, N=553 students from the academic years 1980—2020 were included.

**Results:** The results show changes in the age of students at the beginning of their studies. These coincided with serious social changes in Germany at that time. The data show that two thirds of all students are female and only one third male, although there was no longitudinal effect. Notable results are also found for the use of nicotine and alcohol. Previous musical experience was characterized by private singing training and participation in school choir programs.

**Conclusions:** The cohort of vocal students at Dresden University of Music shows typical profiles regarding family history, social history and previous musical education. These characteristics are related to social conditions and should be adapted for the planning of study capacities and the curricular content and needs of students. In addition, the importance of a broad range of musical and vocal educational opportunities during primary and secondary education is evident for successful admission to a vocal study program.

**Keywords:** Vocal students, Longitudinal analysis, vocal education, family history, socio-cultural background

## ABSTRACT 302

### The Whispered Voice: Can It Be Learned?

Ana Martínez Arellano, Sol Ferran de la Cierva, Nicolás López de Aguileta,
David Terrasa, Beatriz del Rio, Carla Rodríguez-Zanetti, Secundino Fernandez

**Objective:** The study addresses the long-standing belief among otolaryngologists, speech therapists, and singing teachers that whispered voice represents a potential risk of vocal trauma rather than a protective mechanism. There is a disparity in how professionals and patients perceive and differentiate between "correct"or therapeutic whispered voice and "incorrect"or forced whispered voice. This research aims to delineate these types, assess their risks of vocal overexertion or trauma, and explore if a safe whispered voice technique can be taught.

**Methods/Design:** The study involved fifteen subjects without vocal disorders, analyzing main acoustic and aerodynamic parameters and conducting videoendoscopic evaluations of the pharyngolaryn-

geal phonatory dynamics. Participants were initially asked to whisper based on their intuition, followed by attempts at a "correct"whispered voice after receiving guidance.

**Results:** Whispered speech naturally lacks a fundamental frequency, showing distinct acoustic characteristics from voiced speech, including formant frequencies, speaking rate, and intensity. Incorrect, or forced whispering, involves a significant noise component, while a correct, therapeutic whisper is characterized by a smooth, almost imperceptible airflow. Most subjects initially demonstrated the incorrect, noisy whisper pattern. Training focused on minimizing perceivable airflow during phonation, aiming for a protective whisper pattern. Analyzing the acoustic and aerodynamic parameters highlighted that spontaneous whispering led to higher subglottal pressure, laryngeal resistance, acoustic intensity, and noise compared to the trained, correct whisper, indicating the potential for learning a safer whispering technique.

**Conclusions:** The study concludes that the default whispered voice employed by subjects tends towards a muscle tension dysphonia pattern, potentially leading to vocal trauma. However, it is possible to learn and adopt an atraumatic whispered voice pattern distinct in its acoustic and aerodynamic properties from spontaneous whispering. This method could be utilized safely in specific circumstances without risking vocal damage, offering a new perspective on the use of whispered speech in vocal health management.

**Keywords:** Whisper voice, aerodynamic analysis, fordec whisper voice

## ABSTRACT 303

### Comprehensive Assessment of the Vocal Health of Call Centre Personnel

Beatriz del Rio, David Terrasa, Sol Ferrán de la Cierva, David Terrasa, Ana Martínez Arellano, Carla Rodríguez-Zanetti, Secundino Fernandez

**Objective:** The aim of this work is to assess the possible relationship between voice characteristics and the presence of signs and symptoms compatible with pharyngolaryngeal reflux in the professionals of a call centre.

**Methods/Design:** A pilot study was carried out on 18 women, professionals of the Call Center of the Clínica Universidad de Navarra, to assess the phonatory pattern, voice quality and the possible presence of pharyngolaryngeal reflux. The main acoustic and aerodynamic parameters of the phonatory pattern, the anatomical and dynamic characteristics of the pharyngolarynx, the Reflux Symtom Index (RSI) and the Reflux Finding Score (RSF) and the determination of pepsin levels in saliva were analysed.

**Results:** Analysis of the results revealed that in the sample studied there was a hypofunctional pattern in 70.59% of cases and that it was significantly associated with the presence of pepsin in saliva.

**Conclusions:** It seems relevant that a hypofunctional phonatory pattern predominates in Call Centre professionals. This may be due to a functional phonation disorder that could be related to the specific environment of these professionals and some environmental factors (degree of humidification, posture, phonation time, environmental noise, etc., vocal technique, or other factors such as chronic chemical irritation from the digestive system.

We propose to analyse the possible environmental factors and intervene with medication and specific measures in those cases that present symptom and sign indices and pepsin levels in saliva suggestive of the presence of pharyngolaryngeal reflux disease in order to verify the reversion of the altered voice indicators or parameters.

**Keywords:** Dysphonia, pepsin, Call Center, pharyngolaryngolaryngeal reflux disease

## ABSTRACT 307

### Self-Assessed Vocal Health and Social Participation among Older Adults

Emma Lindström, Greta Öhlund Witbacka, Roland Rydell, Viveka Lyberg Åhlander

**Objective:** The aim is to investigate self-assessed vocal health and social participation in older adults, and whether there are any differences between voice patients and a control group in levels of social participation.

**Methods:** In total, 68 adults between 65 to 80 years participated in the study. Both individuals seeking treatment for voice problems and a control group with other medical issues were included, all recruited at the same place and during the same period of time. Participants answered a questionnaire concerning demographics, vocal health, social participation, communicative participation and general health (including hearing). Statistical analysis with Chi2-test between group differences and logistic regression analysis will be conducted in SPSS.

**Results:** Results from this study will be presented in the presentation. Some preliminary results are indicated: there were higher level of voice problems in voice patients, but a few also experienced voice problems in the control group. The prevalence of low social participation was 56.7% in the patient group with voice problems and 44.1% in the control group. The prevalence of communicative participation was slightly more affected in the group of voice patients (56.7%) compared to the control group (17.6%).

**Conclusion:** The study will investigate self-assessed vocal health and social participation in older adults. Preliminary results show that even if some older adults have not sought treatment for voice problems, problems may still arise in older adults in the control group. Social participation and communicative participation are slightly more affected in the voice treatment group. Further analysis will be conducted.

**Keywords:** vocal health, social participation, communicative participation, ageing, presbyphonia

**ABSTRACT 309**

## Pre- and Post-Surgical Phoniatric Evaluation of the Professional Singer Who Undergoes Laryngeal Microsurgery. Indications. Results and Challenges

Tatiana Botella Arias

**Methodology:** Retrospective study (1991-2024) of our case series of professional singer patients who underwent videolaryngostroboscopy in the framework of a complete phoniatric examination. We share our review and methodology of professional singers who undergo laryngeal microsurgery for benign but activity-limiting lesions. We analyze the criteria to take into account when indicating laryngeal microsurgery in a professional singer.

Teamwork with speech therapist, vocal and functional preparation and results after preoperative vocal speech therapy.

Factors to take into account for the indication of laryngeal microsurgery in professional singers. Are they different from those of patients who are not professional singers? When we can continue singing with the injury is the safest option.

Expectations of laryngeal microsurgery in a singer. Challenges of microsurgery.

We review our cases from the last 20 years. Percentage of singers undergoing microsurgery. Acquired pathologies. Congenital pathologies. Pre- and post-surgical approach. Long-term results after 2 years, 5 years and more.

**Conclusions:** We analyze the expectations of a professional singer. Are they different from those of a non-professional patient with the same injury and surgical indication. Importance of the phoniatric approach to decide the indication and need for microsurgery or not with lesions. Objective and subjective evaluation of the indication to guarantee a better vocal and artistic prognosis for the singer with dysphonia who undergoes microsurgery. Results.

**Keywords:** Phoniatric Exam, Professional singer with surgical injuries, Surgical indications, Laryngeal microsurgery. Pre- and post-surgical approach.

**ABSTRACT 311**

## "Monkey Yodels" – The Vocal Membrane Facilitates Large and Abrupt Fundamental Frequency Transitions in Non-Human Primate Vocalizations

Christian T. Herbst, Isao T. Tokuda, Takeshi Nishimura, Vicky Ossio Peña, Marcelo Levy, Sten Ternström, W. Tecumseh Fitch, Jacob C. Dunn

**Objective:** Vocal registers are a well-documented feature of human voice production. Irrespective of source-tract interactions, the major factor for vocal registers are distinct vocal fold oscillation states, also termed laryngeal mechanisms. Bifurcations between distinct oscillatory states may lead to abrupt fundamental frequency (f_o) jumps of up to 16 musical semi-tones (Miller, 2002), i.e., a factor of about 2.5. While such f_o jumps – constituting one category of so-called "nonlinear phenomena"(NLP) – have received much recent attention in animal bioacoustics, register transitions and bifurcations in laryngeal oscillation are under-researched concepts in the field of non-human mammalian vocalization. Here, we investigate whether and how New World monkeys can vocalize using different laryngeal mechanisms.

**Methods:** A total of 74 vocalizations of five animals (Ateles chamek, n=2; Sapajus apella, n=2; Cebus albifrons, n=1) were documented in vivo using electroglottography (EGG). These data were complemented by ex vivo samples of two tufted capuchin (Sapajus apella) larynges, documented with EGG and high-speed video recordings in an excised larynx setup. Additionally, abrupt f_o transitions were simulated with a low-dimensional computational model.

**Results:** The EGG signals contained abrupt f_o transitions in the range of 8 to 43 semi-tones, i.e., a maximum ratio of 3.6 for the most extreme transitions, greatly exceeding values found in humans. Within each transition, EGG waveforms suggested distinct laryngeal dynamics for the low- f_o vs. the high- f_o vocalizations. Evidence from the excised larynx preparation revealed that those transitions were causally influenced by the oscillatory state of the so-called vocal membrane, a low-mass tissue appendix on the upper surface of the primate vocal folds that was lost in human evolution. While the vocal membrane took part in the laryngeal vibration during the high- f_o oscillatory state, it remained motionless in the low- f_o state. These phenomena were corroborated by the computational model.

**Conclusions:** Our results show that non-human primates can produce f_o bifurcations, and how these may be controlled laryngeally. The vocal membrane allows non-human primates to better encode complexity in the laryngeally generated sound – in contrast to humans, who can produce complex vocal information even when using a simple voice source.

**Keywords:** non-human primates, laryngeal mechanisms, vocal membrane, fundamental frequency jumps

## ABSTRACT 315

### Describing the Human Voice: Linguistically, Musically and Gesturally

Stefanie Lorsch

Describing the human voice is a difficult task, so journalists and music critics have created a plethora of strong, sometimes extravagant, metaphors to characterize it.

Apart from professional writers, voice teachers and singers are also faced with the challenge of speaking adequately about the voice to work on the individual sound, to reduce the tiring of the voice, and at the same time promote stage-effective singing, all of which are the primary goals of professional singing classes. The widespread view among the professionals that it is impossible to speak objectively about the voice, or rather, that there are only a few codified terms available for it and the fact that those mentioned above constantly discuss the singing voice prompted me to investigate how communication is done in professional singing lessons.

Indeed, technical terms are available for the physiology and functionality of the voice, but they are hardly sufficient to capture the complexity of the voice. This is due to the fact that speaking about the sound of the voice is meant to create vocal incentives for the singer to overcome the discrepancy between inner and outer hearing and to guide him/her in experiencing this process reflectively. Which form of communication—linguistic, musical or gestural—is primarily used depends on the situation, the communication partners and the goal that is to be achieved with the pointing. Creative uses of words arise in and from new situations. Students learn new uses of words and thus new concepts, actions and behaviours. Musical and gestural pointing is used where linguistic competences diverge, misunderstandings become apparent where there are gaps in terminology and where linguistic coding would be too extensive, complicated, complex or disruptive.

Using specific examples from the analysis of press texts, interviews with students and experts and the observation of singing lessons, the presentation will reflect on the pragmatic availability and the semantic range of descriptions of vocal sound phenomena, and will outline the importance of engaging in a critical investigation of these communicative practices for vocal pedagogy, logopedy and music journalism.

**Keywords:** Human Voice, Singing Voice, Vocal Pedagogy, Logopedy, Music Journalism

## ABSTRACT 316

### Are Dysphagia And Dysarthria Correlated? Comparison of Acoustic Formant Analysis of Voice and Dysphagia Assessment in Parkinson's disease

Silvia Capobianco, Luca Bastiani, Tamanai Giusti, Stefano Berrettini, Andrea Nacci

**Objective:** Tongue impairment in Parkinson's Disease (PD) and Progressive Supranuclear Palsy (PSP) affects both swallowing (dysphagia) and speech (dysarthria), due to deficits in lingual propulsion and articulatory capacity. This study assesses the potential of acoustic voice analysis, through first (F1) and second (F2) formant extraction, to quantify these impairments, leveraging the relationship between formant frequencies and tongue movement.

**Methods:** 36 patients affected by neurodegenerative diseases (24 PD; 12 PSP) underwent acoustic voice analysis, focusing on the extraction of F1 and F2 during sustained vowel phonation, alongside clinical/fiberoptic endoscopic swallowing evaluation. Spearman's Correlation assessed the rela-

tionship between acoustic markers and standardized swallowing scores (Pooling Score, PAS, DOSS, FOISS, and ASHA-NOMS). Significant formant elements were integrated into the new Second Formant Index (SFI) using Structural Equation Modeling (SEM). The Receiver Operating Characteristic (ROC) analysis assessed SFI's predictive utility, which was tested in a non-clinical population sample of 174 healthy subjects.

**Results:** Results indicated a notable correlation between F2 values, particularly for vowels /e/ and /i/, and solid bolus swallowing capability, as measured by Pooling and PAS scores. SFI, reflecting significant formant data, demonstrated a reliable discrimination capability, with mild dysarthric patients exhibiting higher median scores (6.2; IQR 3.4-6.8) compared to those with severe (2.6; IQR 0.6-3.9; p=0.016) or moderate dysarthria (4.9; IQR 2.5-7.7; p=0.039). ROC analysis reported the potential for SFI to estimate swallowing difficulties with a cut-off of 2.4 (Se 88.90; Sp 89.00; AUC 0.922), where 4% of the healthy sample showed positive SFI values, significantly older on average (66.3 years) compared to those with negative scores (51.7 years), indicating a potential age-related decline in swallowing function.

**Conclusions:** The analysis of acoustic second formants in sustained vowel production is significantly correlated with the severity of antero-posterior tongue displacement impairments in patients with neurodegenerative diseases, providing a link between dysphagia and dysarthria. The SFI score may potentially serve as a screening tool for dysphagia risk, guiding the need for further clinical and instrumental evaluations.

**Keywords:** Dysphagia, Dysarthria, Acoustic analysis of voice, Swallowing, Screening

## ABSTRACT 318

### Male and Female Voices Show Differences in Spectral Development Over Four Years of Conservatory Training

Reuben Walker, Mario Fleischer, Johan Sundberg, Dirk Mürbe

**Objective:** The goal of this retrospective longitudinal study was to examine the spectral development of male and female voices during undergraduate conservatory training, specifically;

- High frequency to low frequency energy ratio (alpha ratio)
- Energy in the sung octave to the energy one octave above the sung octave (H1H2LTAS)
- Smoothed cepstral peak prominence (CPPs) as a predictor for breathiness

**Methods/Design:** From 2008-2018, bachelor students at the Hochschule für Musik Carl Maria von Weber Dresden recorded a series of exercises during each year of their studies under identical recording conditions.

Of the 174 students recorded during this time period, 116 (68 F, 48 M) had more than one recording session within a four-year time frame including each of the recorded samples and were thus included in the analysis. From the recorded exercises, we extracted sustained /a/ vowels at medium and high pitch and analyzed a repertoire sample in its entirety. Alpha ratio, H1H2LTAS, and CPPs were calculated for each of these audio samples.

**Results:** Alpha ratio for male singers increased over the course of study for both high sustained phonation and the repertoire sample. There was no change in alpha ratio for male medium sustained phonation or any of the female sung tasks.

H1H2LTAS for female singers increased over the course of study for high sustained phonation and the repertoire sample. There was no change in H1H2LTAS for female medium sustained phonation or any of the male sung tasks.

Male and Female CPPs increased over the course of study for high sustained phonation. There was an interaction for CPPs for gender and time in the repertoire sample. There were no changes in CPPs for male or female medium sustained phonation.

**Conclusions:** As expected, male spectral development was characterized by an increase in the ratio between acoustic energy above 1000 Hz to that below 1000 Hz. Female development was characterized by an increase in acoustic energy in the sung octave when compared with the octave above. Female increases in CPPs may relate to decreases in breathiness due to the presence of sub-normative values at the beginning of studies.

**Keywords:** longitudinal, acoustics, spectral

## ABSTRACT 319

### Vocal Cord Dysfunction: Diagnostic Context, Etiological Hypotheses and a New Therapeutic Proposal

Elena Pellis, Massimo Spadola Bisetti, Roberto Albera, Caterina Bucca, Luciana Occhi, Patrizia Peluso, Elisa Vestrini

**Background:** VCD (Vocal Cord Dysfunction) occurs as a form of temporary dyspnoea similar to asthma, but very different from it due to its spirometric characteristics and resistance to therapy with bronchodilators and oxygen. The etiology of this disorder is currently unknown. Furthermore, there is a limited amount of information available on the incidence and prevalence of VCD, and the various rates reported in the literature are most likely an underestimate.

In addiction, despite not being lethal, it still causes enormous discomfort and anxiety in people who are subjected to it.

**Objectives:** In order to identify a possible etiological factor and the related therapy, we evaluated whether the reduction in maximal mid-inspiratory flow (MIF50) induced by hyperventilation (HV) is correlated with glottic area's reduction (GA), assessed by laryngoscopy, whether MIF50 can be used as a marker of laryngeal obstruction and tried to identify a possible correlation of VCD with blood values of 25-hydroxy-vitamin D.

**Methods:** The Pneumology Service and the Phoniatric Clinic of the A.O.U. Città della Salute e della Scienza of Turin evaluated 4 subjects with suspected VCD and 3 asymptomatic subjects. After completing a test of ten questions aimed to identifying the anamnestic characteristics of the disorder, the study population was submitted to pneumological examination with spirometry, blood sampling of 25-hydroxy-vitamin D and phonological evaluation with flexible laryngostroboscopy.

**Results:** In patients with VCD the HV test triggered a significant decrease in both MIF50 and GA values. The percent change after hyperventilation of MIF50 was significantly correlated with the percentage variation of GA (R=0.517; p=0.016).

Moreover, low blood levels of 25 hydroxy vitamin D were found in the 4 cases that presented spirometric and fibrolaryngoscopic findings pathognomonic of VCD. In conclusion, the laryngoscopic examination presented the typical pictures of paradoxical adduction of the vocal cords during breathing.

**Conclusions:** In view of vitamin D low levels in blood of patients with VCD, the deficiency of this vitamin appears to be strongly correlated with this pathology.

As further confirmation, it was observed a remission of the symptoms with specific replacement therapy in all symptomatic study subjects.

## ABSTRACT 320

### Reliability, Validity and Usability of the French Quebec Version of the Cape-V: A Mixed Methods Study

Ingrid Verduyckt, Sara-Êve Renaud

Speech language pathologists (SLP) in Quebec have been using a Francophone version of the CAPE-V (Kempster et al, 2009) that was approved during a consensus meeting of the Quebec Community of Practice in Voice (Verduyckt, 2023) in 2019. While the tool is well-established clinically, its reliability and validity has not been formally studied yet. Our objective was to assess the reliability and validity of the Franco-Quebecois CAPE-V, as well as exploring how the clinicians make use of the tools in the clinic and what barrier they might encounter with it.

8 speech therapists working in the field of voice (mean years of experience=12.86; mean age =46.29; men (n=2); women (n=6)) were recruited to rate voice samples and provide their feedback regarding usability with the Franco-Quebecois CAPE-V (F-Q CAPE-V). Vowel and sentence samples were selected

from 30 speakers (n samples = 60; 15 males; 15 females) from an open-source voice bank (Walden, 2020). Twenty samples (10 v-samples and 10 s-samples) were used as test-retest to assess intra-rater reliability. After each sample, free text answers were given to comment on any difficulties noticed. Inter- and intra-rater reliability were analyzed with intra-class correlation coefficients (ICC) for the visual analogue scales (VAS) ratings and with % of agreement for the binary scales (intermittent/consistent criteria). Criterion validity was established by correlational analyses with the samples' original GRBAS and CAPE-V ratings. A qualitative content analysis of the free text answers was performed to assess usability.

Results show a high reliability for the binary scales with a mean agreement of 87% (min=73%; max=96%), and for the VAS (inter-judge ICC ranging from 0,749–0,961 (p<0,001); intra-judge ICC ranging from 0,809-0,907 (p<0,001)). Qualitative analyses show that participants sometimes feel unsure about the terminology used and whether it corresponds to their perception, especially when it comes to roughness vs fry and asthenia vs breathy. Correlational analyses are underway and will be presented.

In conclusion, preliminary results indicate the F-Q CAPE-V is reliable and valid at a group level, nevertheless single SLPs can still feel some insecurities while rating individual samples.

**Keywords:** Auditory-perceptual evaluation; CAPE-V; Dysphonia; SLP practice

## ABSTRACT 324

### The Effect Of Online Training Of Auditory Perceptual Voice Evaluation In Student Listeners: How Much Training Is Required?

Annelies Labaere, Marc De Bodt, Gwen Van Nuffelen

**Objective:** Previous research has shown that training with anchor voices leads to more accurate and consistent auditory-perceptual ratings of voice quality. Voice-TT is a recently developed multilevel online training tool for the GRBAS scale that uses validated anchor voice samples. The aim of this study is to investigate the amount of online training required to achieve a significant improvement in rating accuracy in student listeners.

**Method:** 101 First year speech and language pathology students participated in the study. All students completed the three levels of the VOICE-TT online training course in two one-hour sessions, at intervals of one to two weeks. Before the start of the training and after each training level students had to rate 8 voice samples on the 4-point GRBAS scale. A mixed models design was used to evaluate the effect of each training stage on rating accuracy. Participants also completed a questionnaire about their satisfaction with the tool.

**Results:** Students' rating accuracy improved significantly after the third training level, compared to the pretest and to post-test 1 and 2, for all GRBAS-parameters. No significant differences were found at post-test 1 and 2. Students reported high satisfaction levels in terms of content, construction, attractivity and user friendliness of the tool.

**Conclusion:** From these results it can be concluded that students can improve their auditory-perceptual voice rating using the GRBAS scale, by completing all three levels of the online training tool VOICE-TT, with a required training time of approximately two hours.

**Keywords:** Auditory perception, voice quality, training, e-learning

## ABSTRACT 330

### Investigating the Efficacy of Pairing Specific Hand Gestures to Some Laryngeal Positions

Elisabetta Rosa, Francesco Furlanis

The Estill Voice Model is a reference framework for voice knowledge developed by Jo Estill, singer and researcher, whose entire life has been driven by the will to answer to the question on voice: "How am I doing this?". Her second aim was filling the gap between voice science and voice teaching; this is why Estill Voice Training (E.V.T.) is also used by Speech and Language Therapists in the treatment of voice disorders. Pedagogically, E.V.T. is based on "Figures for the Voice", exercises for the control of individual anatomical parts of the vocal system. Each Figure is paired with specific hand gestures, that have anecdotally proven to be highly beneficial in faster learning and better retaining the Figures. But why do hand gestures embedded in E.V.T. work so efficiently in voice pedagogy and clinic? Through the analysis of specific gestures linked to two Estill Figures (False Vocal Folds retraction and Aryepiglottic Sphincter activation), we'll attempt to uncover some physiological connection between the phonatory system and these hands and upper limbs positions via investigation of current scientific literature, with an eye on ancient knowledge too.

**Keywords:** Hand gestures, voice pedagogy, voice clinic, Estill

## ABSTRACT 336

### Correlation between Speaking and Singing Acoustic Parameters and Vocal Classification In Opera Singing Students

Isabel García-López, Mª Ángeles Triana

**Background:** Vocal classification is considered an important item in singing students career. The vocal category of a singer should probably correlate with the fundamental frequency of his or her spoken voice or with other parameters of the speaking or the singing voice.

**Objective:** The objective of this research is to describe the acoustic parameters of the speaking and the singing voice in opera singing students.

**Methods:** A prospective study was made including singing students from the Escuela Superior de Canto de Madrid. Demographics including age and number of years of singing practice were registered. Voice classification was grouped in four categories: Soprano, Mezzosoprano, Tenor and Baritone. No altos or basses participated in the study. Fundamental frequency of the speaking voice was analyzed in a reading passage phonetically balanced. Singers formant was estimated on a held note with the phoneme /a/ the chosen note was Sol 4 for high-pitched voices (sopranos and tenors) and Mi 4 for mezzos and baritones. Pitch accuracy was measured comparing the singing frequency registered to the reference (Sol 4-784 Hz for sopranos and 392 Hz for tenors and Mi 659 for mezzos and 330 Hz for baritones).

**Results:** 68 singers joined the study, 39 sopranos, 8 mezzos, 14 tenors and 7 baritones. The mean age was 28 years. 27 years for sopranos, 27 for mezzos, 28 for tenors and 33 years for baritones. The fundamental frequency in speaking voice for women was 221 Hz, 224 for sopranos and 209 for mezzos. In male singers the mean F0 for speaking voice was 133 Hz, 142 Hz for tenors and 111 Hz for baritones. Mean vibrato rate was 5,5 Hz. 5,5 for sopranos, 6,3 for mezzos, 5,4 for tenors and 5,4 for baritones. Median pitch accuracy was 0,22 semitones from the reference note. 5 singers had perfect pitch (1 soprano, 1 mezzo and 3 tenors). Only three singers sung more than 1 semitone from the reference.

**Conclusions:** Voice acoustic parameters in opera singers are important in voice evaluation of this population. Some of them can be related with the voice classification.

**Keywords:** Singing voice, Voice classification, Acoustic analysis

## ABSTRACT 337

### Medical and History Findings – A Longidudinal Analysis of Date from Vocal Students between 1980 And 2020

Dirk Mürbe, Reuben Walker, Hartmut Zabel, Mario Fleischer, Marie Bieber

**Objective:** The demands and stresses of singing professions are very high, both physically and mentally, and require not only profound vocal training, but also comprehensive physical and vocal health. Therefore, the early phoniatric counseling of singing students has an influence on the success of their singing studies and in particular on the likelihood of voice disorders occurring. The aim of this study is the retrospective analysis of the vocal students' medical history and findings that have been collected over a period of 4 decades at the Hochschule für Musik Carl Maria von Weber Dresden as part of the phoniatric entrance examination.

**Method:** Every singing student who is successfully admitted to the vocal studies program at the Hochschule für Musik Carl Maria von Weber Dresden undergoes a comprehensive phoniatric examina-

tion at the beginning of his or her studies. In addition to the medical history, this investigation includes audiometry, an examination of general physical characteristics and findings in the head and neck area and in particular a detailed assessment of voice function. For the present study, n = 553 students from the academic years 1980–2020 were included in the analysis.

**Results:** The results show an expectedly positive picture of the singing students' physical and vocal conditions. There were slight changes in general body measurements such as weight and height. Characteristic findings are displayed for mutation-related voice changes. Further, there was a significant number of singers with allergies. In addition, there were changes in the conditions of the vocal folds and a slight increase in phoniatric therapy recommendations.

**Conclusions:** The analysis of the data shows the importance of early phoniatric care for singing students. This contributes to the improvement of prevention and enables early treatment of cases in which health restrictions are already present at the beginning of the singing career."

**Keywords:** Vocal students, longitudinal analysis, phoniatric examination, videolaryngostroboscopy

## ABSTRACT 341

### Are Thermal Environments In The Workplaces Of Occupational Voice Users Associated With Voice Symptoms?

Carlos Manzano, Catherine Cantor-Cutiva Eric Hunter, Carlos Aransay

**Objective:** To determine whether the working place thermal environments are associated with voice symptoms in occupational voice users.

**Methods/Design:** Observational, cross-sectional, descriptive study. The participants were occupational voice users aged between 22 and 50 years old. Participants completed a questionnaire about voice symptoms, and physical conditions in the workplaces, including temperature and airflow inside the working places.

**Results:** Thermal environment and air currents were associated with voice symptoms among singers.

**Conclusions:** The results suggest an association between the thermal environment and the occurrence of voice disorders among occupational voice users. Therefore, workplace interventions need to include the analysis of the thermal environment to promote safe working places for occupational voice use.

**Keywords:** Thermal Environments, Voice Symptoms, Occupational Voice

**ABSTRACT 346**

## The Effect of Vocal Hygiene Therapy on Voice in Muslim Religious Officials: Acoustic Analysis and Subjective Evaluation Results

Gamze Yesilli Puzella, Elif Hanbal Ibooglu

**Introduction:** Religious officials are among the professional voice users. For this reason, any problem they experience with their voices may adversely affect their professional life. This study aimed to give vocal hygiene therapy (VHT) to Muslim religious officials and to analyze the Voice Related Quality of Life Scale (VRQOL), Voice Handicap Index-10 (VHI-10), Acoustic Voice Quality Index Version 02.06 (AVQIv2), fundamental frequency (F0), jitter (%), shimmer (%), harmonic-to-noise ratio (HNR) values and to investigate the effectiveness of VHT.

**Methods:** The study included 26 male Muslim religious officials, aged 28-51, who were employed in mosques in the city of Adana, Turkey. Participants had a SHI-10 score of 5 or higher and worked six days a week. Pre- and post-therapy results were compared following video-conferencing VHT. Voice recordings were analysed using Praat software and Audio-Technica AT2005USB microphone. Sustained /a/ vowels and continuous speech were recorded in a quiet environment. Each participant had two 40-minute VHT at 2-week intervals.

**Results:** There was a statistically significant difference between the V-RQOL scores (Wilcoxon Signed Ranks Test (WSRT); Z=-2,787; p=0,005<0,01), and they decreased significantly after training. A statistically significant difference was found between the SHI-10 scores (WSRT; Z=3,64; p=0,0003<0,01). After the training, the SHI-10 scores decreased significantly. A statistically significant difference was found between the AVQIv2 scores before and after the VHT (Paired Samples t Test; t=5,608; p=0,0001<0,01), and AVQIv2 scores decreased significantly. There was no statistically significant difference between the jitter (%), shimmer (%) and HNR scores (WSRT; p=0.05).

**Conclusions:** Despite improvements in jitter, shimmer, and HNR, no statistically significant change was found. The difference in AVQIv2 scores was statistically significant. This may be because jitter, shimmer, and HNR analyses employed sustained /a/ production, while AVQIv2 used continuous speech together with /a/ phonation. The continuous speech sample may be more ecologically valid and reflect the speaker's daily voice production. Additionally, the statistically significant difference in V-RQOL and SHI-10 values indicates that voice-related quality of life improved after VHT. Based on this study's positive outcomes, it is suggested to include VHT in religious official training.

**ABSTRACT 7**

## M1, M2 and Scream

Nicolás Hormazábal

**Introduction:** one of the difficulties about working with vocal distortions is how we can teach them in a healthy way. In this workshop we will see how we can train Vocal Distortions through vocal registers and vocal qualities.

**Objectives:** The objective of this workshop to train the attendees to be able to recognize the different types of vocal distortions and be able to recognize their differences both audibly and anatomically (based on high-speed camera research evidence) and how to train distortions through Vocal registers & Vocal Qualities.

In addition to proposing a possible M4 based on a vocal distortion.

**Vocal distortions to check:** Rasp (Traditional Rasp, Over Compressed Rasp, Decompressed Rasp, M2 Rasp & Breathy Rasp), Growls, Death Growls, Screams & Grunts.

**Content:**

1. Introduction: Quick definition of Vocal Registers, Vocal Qualities, Vocal Distortions & Vocal Distortion Source (Glottic, Supraglottic & + 2 Sources)

2. Vocal Distortion Types Anatomic description with Lab footage (including High Speed Camera: Rasp (Traditional Rasp, Over Compressed Rasp, Decompressed Rasp, M2 Rasp & Breathy Rasp), Growls, Death Growls, Screams & Grunts.

3. Vocal Distortion Types Training based in Vocal Registers & Vocal Qualities: Rasp (Traditional Rasp, Over Compressed Rasp, Decompressed Rasp, M2 Rasp & Breathy Rasp), Growls, Death Growls, Screams & Grunts. (Open Class)

4. Propose a possible M4 based on the evidence of the Vocal Distortions with High Speed Camera Research

**Results:**

Learning Outcomes

1. At the end of the presentation participants will be able to recognize the physiology of vocal distortions

2. At the end of the presentation participants will be able to perform vocal distortions in a healthy way

3. At the end of the presentation participants will be able to differentiate the different types of vocal distortions

4. At the end of the presentation participants will be able to recognize the periodicity of Vocal Distortions

**Keywords:** Distortions, screams, growls, rasp

## ABSTRACT 12

### Exploring Clean Language Coaching As a Somatic Imagination Strategy For Singing Pedagogy

Jenna Brown

This workshop aims to introduce participants to the work of David Grove and his practice of Clean Language Coaching. It invites delegates to explore Clean Language strategies and their application to voice pedagogy. This new area of voice pedagogy research stems from Grove's years of psychotherapy practice, and was adopted and developed by this presenter for application in singing teaching, choral education and singing voice rehabilitation.

The way conductors, singing teachers and vocal coaches talk to their students and choirs has the power to elucidate and inform, but also to mislead and confuse. In vocal pedagogy, educator language remains heavily reliant on stock imagery, which when coupled with the tradition of master-apprentice power relationships between teacher and student can lead to inefficient and somatically unconnected vocalisation. However, recent research into imagery strategies has shown that personalising imagery to account for the somatic experiences of the singers can improve imagery efficacy. When synthesised with images that have a basis in accurate anatomical and physiological understandings of vocal pedagogy, personalised imagery can provide access to both vocally healthy technique and artistic prowess.

Through questioning traditional knowledge transfer models, Clean Language Coaching posits that in somatic activities learners already hold significant knowledge, gained through their physical and cognitive experiences. Therefore the teacher's role ought to be one of coach, enabling learners to make sense of their own experiences, and co-constructing personalised imagery. This session aims to outline the importance of co-constructed, scientifically accurate imagery in singing, and demonstrate how the core principles of Clean Language can guide singers towards understanding their own somatic experiences, in order to master autonomy over their vocal journey.

After this session, participants will have gained a range of tools for a Clean Language somatic approach to their own vocal development, as well as for use in their vocal coaching and teaching.

**Keywords:** imagery, coaching, language, somatics, pedagogy.

**ABSTRACT 15**

## Perception & Reasoning – Professionalize Your Voice Training. What Do You Hear, See, Feel And What Does That Mean To Your Voice Pedagogical Approach?

Julia Baumgardt

Increase your Hit Rate by improving your holistic perception of your client, diagnose and evaluate properly and connect the insights to your experience and knowledge. Your professional approach will gain effectiveness, you will find the best methods and avoid misunderstandings.

This workshop can be interesting for curious Vocal Coaches, Voice Trainer and Singing Teachers. It's aim is to have a positive impact on your methodical approach and to give you completely new ideas. You'll get new impulses for your professional practice as a voice Coach.

In practical exercises we train and sort our perception, place it in the context and reflect on decision-making. Above all, we work together practically in changing small and larger teams and the results are compiled in plenary sessions. The search for perceived truth always remains an open approach and keeps the curiosity high. There's nothing better than a curious teacher.

**Keywords:** Voice trainer, holistic perception, decision-making, Vocal Coaching, pedagogical reasoning

**ABSTRACT 18**

## Breathing Massage–Helpful Basics

Julia Baumgardt

This Hands-on workshop invites you to learn the basics of Breathing Massage (Schlaffhorst-Andersen) under professional guidance. You will work in teams of two based on the principle of professional contact. The training will include specific instructions to perceive the involuntary breathing rhythm, learn helpful manual techniques to release blockages, deepen breathing, connect the voice with the body and promote wellbeing. You should come in comfortable clothing that you can lie down in and breathe. Limited places for a maximum of 20 participants. Suitable for SLPs, singers and voice trainers.

**Keywords:** breathing, tactile work, wellbeing, massage, techniques

**ABSTRACT 21**

## Relational Acupuncture for Voice Professionals: Fusing Ancient Tradition with Modern Science

Caroline Van Looy, Stephen King

**Objective:** This workshop bridges the ancient practice of acupuncture (Huang 1966) with contemporary neurophysiological research (Bao and Lao 2013), offering an integrated approach for enhancing the well-being of voice professionals. The importance of this integration lies in the rich historical tradition of acupuncture, validated by modern science, and its potential to advance the field of performing arts medicine, particularly for vocal rehabilitation. As holistic care gains prominence, this workshop addresses the growing interest in holistic healthcare within the context of voice and speech therapy (King and Van Looy 2023, Yui et al 2020, Yui et al 2015 and Lee et al 2003).

**Methods/Design:** This workshop has been created from an extensive literature review of the keywords: acupuncture, acupuncture for voice, acupuncture for swallowing, acupuncture for oromyofunctional disorders, diffuse noxious inhibitory control, muscletension dysphonia and acupuncture, neurophysiological effects of acupuncture. These keywords brought out a rich history of research and folklore which has been fused to create the VOCAL protocol. To foster an interactive experience, the workshop combines theory with hands-on practice. Attendees will engage in didactic elements, case studies, discussions, and a Q&A session, while actively participating in the safe, self-guided needling of specific acupuncture points.

**Results:** Providing an introductory overview of acupuncture, this workshop encompasses the historical roots and the differentiation between dry needling, medical acupuncture, and traditional Chinese medicine (TCM) acupuncture (Bovey 2010). We will highlight the significance of the LI-4 (Yui et al 2016) and LU-11 (Zhou et al 2020) points, supported by peer-reviewed research for their efficacy in addressing voice, conditions. Practical sessions will involve self-guided, supervised needling of these points, allowing attendees to experience acupuncture's clinical application firsthand.

**Conclusions:** This workshop aims to educate voice professionals, performing arts medicine practitioners and speech therapists with a new therapeutic tool, expanding their clinical repertoire and potentially adding it as a recommended treatment. The VOCAL framework enhances the safety and patient-centeredness of acupuncture practice, with the hope of improving patient care and outcomes in the realm of performing arts medicine for voice professionals (Flock et al 2023).

**Keywords:** acupuncture, neurophysiological, voice rehabilitation, holistic, speech therapy

**ABSTRACT 27**

## Singing With Your Whole Self: An Introduction to Feldenkrais Awareness through Movement as Applied In Vocal Performance Lessons

Elizabeth Blades

**Introduction:** How does one develop an internal feel for what sounds good? How do you learn to use all of yourself when singing, and what is the relationship between the felt (kinesthetic) sense, effort, and good sound?

The intention of every committed voice teacher is to guide the student to find the freest, most beautiful, expressive sound and to develop that voice until it becomes consistently accessible.

The Feldenkrais Method is a self-discovery process using movement; its aim is to produce an individual organized to perform with minimum effort and maximum efficiency. Efficient organization is developed using the "organic" learning style of our early childhood: the way we learned to hold our head up, crawl, and so on. As such, it is an open-ended developmental learning process which, like making music, offers infinite possibilities for refinement. The movements are simple, gentle, pleasant, exploratory, and fun. They are usually repeated a number of times to clarify and enhance performance. The focus is always on the how to of the movement, not the how much, how fast, or how hard. The movement always starts where the person is now. People are asked only to perform what they can do comfortably; they are discouraged from moving outside their comfort range.

**This workshop:** During our time together, we explore fundamentals of the Feldenkrais Method, including how its originator, Moshe Feldenkrais, developed this approach and what constitutes Awareness Through Movement (ATM). This is an interactive, experiential workshop in which participants learn about the method and are led through several ATMs (some short mini-ATMS, others a portion of a full ATM).

**Workshop Description:**

1. Introduction and brief overview of the Feldenkrais Method
2. Initial focus on body, breath and voice
3. "Pre-test" before Feldenkrais Awareness Through Movement experience
4. Participants are guided through selected ATM lessons (Mini-ATMs and excerpted full lessons)
5. "Post-test" discoveries and discussion
6. If time, volunteers may receive a short ATM lesson specific to individual needs (replicating the private lesson

**Keywords:** The Feldenkrais Method, Awareness Through Movement, self-discovery process, interactive and experiential

**ABSTRACT 29**

## Performing With Your Whole Self: Integrating Body, Mind, And Emotion For Optimal Experience In Singing

Elizabeth Blades

Every committed voice teacher's intent is to guide the student to a free, beautiful sound and to develop that voice until it is consistently accessible and expressive. While vocal performance pedagogy has profited from technological advances in the area of voice science (enhanced understanding in the biomechanics and acoustics of singing), a more holistic approach – a balance of mind, body and feelings, aka "spirit"—is gaining respect and acceptance.

Much of what is now accepted as "body-mind-somatic awareness" evolved from sports psychology and medicine, particularly for elite athletes at the top of their sport, such as those in the Olympics.

Singers are also athletes, many at the "elite" level; others are in the early stage of training. Regardless, singing is our "sport" and training the mind-body connection is now recognized as an integral part of achieving excellence.

This workshop offers a brief exploration of how your mind affects your body, your body the brain, and how the whole brilliant system affects your musical performance. Representative modalities include those I have taught in courses at Shenandoah University (Winchester, Virginia, USA), at professional conferences and in my independent voice studio instruction: Meditation, Yoga, Myofascial Release, Qi Gong, Kinesthetic Imagination, Emotional Freedom Technique and, Feldenkrais Awareness Through Movement work.

**Workshop format:**

1. "Pre-test" – Walk/Vocalize. Body- movers and stretches
2. Qigong experience
3. Proprioception and Meditation
4. Feldenkrais Mini-ATM (Awarness Through Movement) lesson
5. Dalcroze-Eurythmics/Laban
6. Performance Anxiety: Emotional Freedom Technique or Feldenkrais Mini-ATM
7. Conclusive Post-test
8. Q&A

**Keywords:** body-mind-somatic awareness, sports psychology and medicine, optimal performance

## ABSTRACT 31

### The Grip on The Neck—Therapy Of Laryngeal Obstructions

Michael Helbing

"Hardly any other pulmonary-phoniatric disorder is as hotly debated as exercise-induced laryngeal obstruction. What happens: Your breath stops, your fear increases, and you can no longer make a sound. Those affected are under immense suffering and are often misdiagnosed until they finally receive the diagnosis of EILO. The fear of suffocating or having another EILO attack is omnipresent.

In voice therapy, the aim is to remove the patient's fear and eliminate the feeling of powerlessness in the face of the disorder. Emotionality must also be addressed and treated through voice therapy to ensure optimal and individual voice development. The combination of holistic breathing and voice therapy with process-oriented behavioral therapy has proven to be an effective means of counteracting this disorder in therapeutic practice.

This practical workshop will teach you about, understand, and treat the EILO diagnosis. This also means you can differentiate EILO from other disorders (e.g., asthma or spasmodic dysphonia). You will also learn the central strategies for treating this complex disorder.

**Keywords:** induced laryngeal obstruction, vocal cord dysfunction, exercise induced laryngeal obstruction

## ABSTRACT 32

### Bodywork According To the Schlaffhorst-Andersen Concept

Michael Helbing

The Schlaffhorst-Andersen concept is a holistic breathing and voice therapy. It was developed in the first half of the 20th century by Clara Schlaffhorst and Hedwig Andersen and has proven itself. It is the oldest method developed in Germany and one of the most comprehensive breathing and voice therapy treatment concepts.

In this practical workshop, you will learn the central elements of voice therapy according to the Schlaffhorst-Andersen concept. Based on the interactions between breathing, posture, movement, articulation, and voice, the methods and exercises enable an individual and flexible approach to the chosen therapy goal.

The concept's basic knowledge is developed to be explicitly applied in the numerous practical units. The course content can be included within individual and group therapy and preventative and rehabilitative projects.

**Keywords:** Schlaffhorst-Andersen, Bodywork, breathing therapy, Voice therapy

**ABSTRACT 33**

## Rehabilitation Treatment Specification System: Application To Real Life Voice Therapy

Jarrad Van Stan, Jeremy Wolfberg

**Objective:** Inadequate voice therapy descriptions have been recognized as a significant barrier to evidence-based practice, which is a common problem across rehabilitation. To address this issue, a multidisciplinary group of rehabilitation clinicians and researchers developed a theory-based framework to specify rehabilitation interventions, called the Rehabilitation Treatment Specification System (RTSS). Since the RTSS was introduced in 2018, researchers have demonstrated benefits of the RTSS framework in diverse disciplines such as psychoeducation after traumatic brain injury (TBI), pre-operative education for spinal fusion, aphasia therapy, dysphagia therapy, occupational therapy for stroke survivors, social communication after TBI, dementia treatment, and statistical methods in general. In voice therapy, experts used Delphi-based consensus methods and the RTSS to establish a list of standardly named ingredients and targets representing all of voice therapy, called the RTSS-Voice.
This workshop will provide learners with hands-on opportunities to advance their knowledge and skills using the RTSS and RTSS-Voice

**Method:** The workshop will briefly review the need for, advantages of, and the key concepts of the RTSS and RTSS-Voice. It will then transition to two hands-on activities where attendees will apply the RTSS and RTSS-Voice to different situations encountered by speech-language pathologists in routine clinical voice care. First, participants will watch short, de-identified videos of real-life voice therapy and attempt to describe the ingredients and target according to the RTSS and RTSS-Voice. Second, participants will attempt to use the RTSS and RTSS-Voiceto document example therapies from the instructors or the participants' own practice. Feedback and discussion will follow each activity based on participants' writing and examples.

**Results:** First, participants will be able to describe key concepts of the RTSS framework and RTSS-Voice standard terms. Second, they will establish skills using the framework and standard terms in real-life situations, to hopefully facilitate use in their everyday practice. Third, participants will learn multiple teaching methods to help them train and educate fellow clinicians.

**Conclusions:** Adoption of a theory-driven framework (RTSS) and standard terminology (RTSS-Voice) should help improve outcomes by ultimately identifying the active ingredients across multiple treatments, multiple researchers, multiple clinicians, and clarifying the research-to-practice gap.

**Keywords:** Voice treatment, voice disorders, rehabilitation, speech-language pathology, outcomes

## ABSTRACT 34

### Resonance Tuning Strategies for Functional Efficiency Using The Chiaroscuro Whisper

Kenneth Bozeman

Ian Howell introduced the concept of absolute spectral tone color (2016) and auditory roughness (2017) into the voice pedagogic discussion, observing that individual sine tones have an inherent tone color that is on a low to high, dark to bright, and [~u] to [~i] vowel-like continuum, and that closely clustered spectral content (harmonics ≥6fo) increasingly separate from pitch resolution, and introduce instead a high frequency percept of auditory roughness or "buzziness." Timbre is then constructed of the tone colors of those frequencies being featured by the resonances of the vocal tract plus a relative roughness component determined by the presence and intensity of higher, closely clustered spectral content. For most vowels, the tone colors being featured by the first two vocal tract resonances create the formants that combine to inform the vowel percept of the listener. One of those carries the identifying, target tone color of the intended vowel, while the other adds a complementary, modifying tone color. The percentage of these two components migrates across range and register, with the complementary tone color contribution increasing with ascending pitch and register transition. Furthermore, with efficient vocal function, auditory roughness (buzziness) migrates across range, register, and voice type, from buzzier low pitches with a shallower spectral slope to smoother high pitches with a steep spectral slope. According to Titze (2021), synergistic biological systems tend to self-organize for efficiency if attempting appropriate output targets with sufficient flexibility to explore potential solutions. An adapted, specifically-tuned whisper technique (the chiaroscuro whisper) explored within a deliberate variety of contexts while maintaining second formant pitch targets, can facilitate both effective training in auditory and somatosensory awareness of resonance tuning and skill in refining best output targets for functional efficiency (Bozeman 2021).

This workshop will explore strategies for sensing how the lower, under-, and higher, over-vowel tone colors are perceived, tuned, and varied for best function across range and acoustic register transitions, and, where appropriate, for active vowel modification.

**Keywords:** resonance tuning, formants, auditory roughness

## ABSTRACT 36

### New Concept And Role Of The Multidimensional Voice Examination For Voice Treatment Under The Scope Of Ebm

Ben Barsties v. Latoszek , Andreas Müller, Ahmed Nasr

**Objective:** The central questions for voice clinicians are the following:

1. What is the choice of my primary voice treatment for an efficient and effective result?

2. How do I evaluate the success of my voice treatment? The following workshop enables the participants to receive suggestions for solutions and structured approaches in order to initiate efficient and effective voice treatment using a quantitative multidimensional voice examination.

**Methods/Design:** A total of 34 current state-of-the-art measures are presented, all of which demonstrate sufficient validity and reliability according to EBM standards. These parameters can be divided into 5 categories: visual analysis, auditory-perceptual judgment, acoustics, aerodynamic, and self-evaluation. In order to utilize this knowledge for treatment recommendations, the new semi-automatic voice examination protocol is used to determine the severity of dysphonia, the aspects of the voice problem (voice quality vs. voice function, and physiological output), and a pre-selection of critical-sensitive intra-individual measures for treatment based on a recent collected EBM correlation-matrix among the measures.

**Results:** Hence, using the diagnostic preparation of the test-battery for dysphonia proposed here, an effective and efficient voice treatment can be initiated (with a less focus for the diagnosis of a specific organic or functional dysphonia), which is characterized by two aspects:

- The goal of clinical reasoning for the clinical voice practice should be significant improvement of the voice problem, which triggers an "avalanche effect" through targeted treatment (i.e. minimal stimulus with exponential effect). Treatment is largely based on the findings of voice examination.

- A minimum standard for voice treatment clinical reasoning is the detection of (high-ranking) top 3 intra-individual sensitive measures that best characterize the individual dysphonia.

Moreover, there are organic voice disorders which demonstrated in systematic reviews primary medical care, such as vocal fold polyps, some types of Reinke edema, spasmodic dysphonia, sulcus vocalis, vocal fold scar, laryngeal papillomatosis, and laryngeal cancer. In all other cases, the choice of methods between medical and therapeutic disciplines must be based on the individual evaluation of each patient.

**Conclusions:** The new concept for conducting a quantitative-multidimensional voice examination enables clearly structured ways of making decisions on efficient and effective".

**Keywords:** Voice examination, multidimensional voice measures, clinical reasoning, voice treatment

**ABSTRACT 38**

## Acting Through Song: A Text-Based Approach

Louisa Morgan

Many teachers, especially those running private studios, are teaching genres outside of their original specialism (LoVetri & Means Weekly, 2003; Bartlett, 2010; Edwards & Meyer, 2014; Fahey, 2021). It can be difficult for performers to unite the Musical Theatre disciplines, which should be more than a patchwork of the three disciplines, but a synergistic unification (Cuny, 2022). Singing teachers may not always feel well equipped to teach all of the performance skills required to help a student with Acting Through Song (Cuny, 2018) and all teachers should understand the performance needs of their client (Edwards & Hoch, 2018).

This workshop will present a number of teaching tools from a text-focused approach to help singing teachers from non-theatre backgrounds with their approach to Acting Through Song. The delegates will be led through a series of techniques that they test out for themselves during the session, as well as techniques that will be demonstrated for them with singers in a masterclass setting. Attention will be placed on harvesting more information from the song lyric to reveal the intention of the character and to build detail and texture.

Recognised methods such as monologuing the lyric (speaking the lyric as a monologue) (Streeton and Raymond, 2014), text analysis as poetry (Ostwald, 2005) and focus on meaningful punctuation (Moore and Bergman; 2016) will be explored. This will be followed by a new method developed by the researcher, which places emphasis on the active verbs, following in the tradition of the likes of Stanislavsky with his Method of Physical Actions and Stafford-Clark and Gaskill with Actioning (Moseley and Мозли, 2013), but created specifically for Musical Theatre singers. Practitioners have recommended paying attention to stressed or operative words (Ostwald, 2005; Melton and Tom, 2012), but how these words should be treated is rarely discussed. This workshop will present a method of working with Musical Theatre singers using operative words to help avoid generalised emotion and to keep the performance active and present.

**Keywords:** acting through song, musical theatre, Singing pedagogy, singing teaching, acting

**ABSTRACT 39**

## Choose Your Own Adventure: Student-Centered Learning In The Voice Studio Part 1

Travis Sherwood, David Sisco, Marisa Lee Naismith

The concept of student-centered teaching is not difficult to grasp. And yet, much of vocal training has evolved from the master-apprentice model, which has—for centuries—promoted and institutionalized

a binary, hierarchical methodology to teaching and learning. Rooted in the experiences of the master, the master-apprentice model requires students to value the teacher's observations of their voice over their own, often leading students to silence their artistic and technical instincts. When faced with what educator Joseph McDonald calls "a wild triangle of relations" between teacher, students, and subject," it can be challenging for voice teachers to activate a student-centered pedagogy.

In part 1 of this interactive workshop, participants will view short videos featuring historically commonplace teacher-centered methods used in different parts of a voice lesson: vocal conditioning, selecting repertoire, and coaching students on repertoire. The participants will then evaluate the ideos, identify teacher-centered actions, and engage in dialogue about how to modulate to a more student-centered pedagogy.

While a student-centered philosophy can remain steadfast across genres, participants will observe how its application may vary. Presenters Dr. Marisa Lee Naismith, Travis Sherwood, and David Sisco teach in the fields of CCM, Western classical, and musical theatre respectively. They each bring to this workshop their vast experience to further clarify how student-centered practices can be employed in different musical idioms.

Student-centered teaching is a practice, just like singing. Through the specific philosophical and practical adjustments explored in this presentation, teachers of singers may relinquish the traditional role of "master," and assume the role of mentor and co-learner — listening with an empathetic ear and responding to the needs of students while encouraging their sense of individual agency. By activating a student-centered approach, teachers may not only create more equity in the voice studio, they may also stay connected to their joy in discovering and inspiring autonomous artists.

**Keywords:** student-centered, pedagogy, teaching philosophy, autonomous artistry, master-apprentice

## ABSTRACT 42

### The Global Nasal Check-Up: The Main Path for A Precise Diagnosis In Laryngeal Inflammatory Pathology

Carlo Maurizio De Luca

**Objective:** Precision diagnosis of laryngeal and upper airway inflammation.

**Methods/Design:** The GLOBAL NASAL CHECK-UP through the use of fibroscholaryngoscopy, nasal cytology, skin prick test, olfactometry and rhinonanometry represents the GOLD STANDARD for identifying the etiology of recurrent inflammation of the larynx and ducts upper areas.

**Results:** Recurrent inflammation of the larynx and upper airways results from multidisciplinary pathologies. Correct analysis of all data leads to a precise diagnosis. The pathologies are often overlapping.

**Conclusions:** The workshop proposes a protocol with the specialist's multidisciplinary expertise. The ENT specialist must have knowledge of Allergology, Gastroenterology, Pediatrics, Pneumology, Ophthalmology and Immunology, as well as general medicine, for a precision diagnosis and therapy approach.

**Keywords:** fibroscholaryngoscopy, nasal cytology, skin prick test, olfactometry, rhinonanometry

## ABSTRACT 47

### The Art & Mechanism of Vibrato

Lisa Popeil

Vibrato, an integral skill in artistic singing, should be addressed in the voice studio not necessarily as a "natural" phenomenon but rather as a technique which can be adjusted, improved, and controlled. Most singers can learn to adjust their vibrato type and speed to suit the genre.

In this workshop. Lisa Popeil will outline the history of vibrato, physiological controllers of the mechanism, will demonstrate eight vibrato types, will explain stylistic use of straight tone and vibrato in commercial styles, as well as share tips on how to fix common vibrato problems.

**Keywords:** singing, vibrato, vocal technique, artistic voice

## ABSTRACT 48

### Soul-Training: How to Teach R&B Singing

Lisa Popeil

In this interactive workshop, Lisa offers innovative tools for teaching the challenging and extremely popular genre known as Rhythm & Blues. Participants will have the opportunity to experiment with these concepts to discover the array of unique ingredients which authenticate this truly American genre.

Topics covered will include Resonator Shaping, Black American Dialect, Rapid Dynamic Shifts, Art of Rush & Drag Rhythm, M1 vs M2 Use, and Mastering Vocal Runs.

**Keywords:** Singing, R&B, Soul, African-American Singing

**ABSTRACT 51**

## "The Power Of Your Voice: Discover And Strengthen With Heart Coherence" An Exploration Of Heart Coherence At Pevoc"

Ann Sophie Boulez

During this workshop we will explore heart coherence and its impact on the voice.

The focus is on practical applications through which participants will discover how applying heart coherence can lead to improve vocal performance and well-being.

The workshop begins with an introduction to heart coherence, where participants will gain insight into the science behind this phenomenon.

Afterwards, we look at the relationship between heart coherence and vocal function. We explain how coherent breathing affects vocal control and emotional expression.

An important aspect of the workshop is learning practical techniques for achieving a coherent state of breathing. Participants will be guided through breathing exercises and relaxation techniques aimed at balancing heart rate rhythms.

In addition, biofeedback tools will be introduced to help participants monitor and improve their own heart coherence.

Participants will learn how to integrate heart coherence into their daily voice training and therapy practice. This includes using heart coherence as a tool to reduce stress and tension, manage performance anxiety and experience a deeper connection with their voice.

During the workshop, we will zoom in on the importance of self-care of voice professionals, with a focus on the importance of maintaining a healthy balance between mind and body for optimal long-term voice performance.

Through practical exercises, participants will not only understand the science behind heart coherence, but also develop concrete strategies to apply it in their own professional practice and personal lives.

In short, this workshop provides a valuable opportunity for voice professionals to discover and strengthen the power of their voice through heart coherence.

**Keywords:** Heart coherence, voice health, breathing techniques, biofeedback, self-care

**ABSTRACT 58**

## Navigating the Broad Landscape of Contemporary Commercial Music (Ccm) Markets: Developing Healthy And Sustainable Singers Part 1

Marisa Lee Naismith

Due to the increase in public appeal and accessibility of Contemporary Commercial Music (CCM), demand for voice training across this vast territory of music styles has also increased. Problematically, for teachers working within this ever-expanding marketplace, they are often confronted with how to manage repertoire choices, especially as many students have a keen desire to concentrate specifically on repertoire which is stylistically and aesthetically appealing to them, with little understanding or regard for their technical, expressive and physical abilities and limitations.

In the absence of an authoritative guide to critical listening skills for CCM, teachers who are unfamiliar with a particular style or across a broad range of ever evolving CCM styles, they have been left to their own devices as to how to best assess and manage repertoire requests made by their students. In order for teachers to remain relevant in current music markets, they are required to develop new skill sets or modify existing ones to compensate for the changes in our teaching environment.

The purpose of this interactive workshop is to explain and demonstrate how it is possible to adapt repertoire across a broad range of CCM styles to ensure it is assessible and sustainable for the individual student. Participants will be provided a handout describing the requisite vocal characteristics across a number of CCM styles and will then be asked to use critical listening skills to assess a number of CCM vocal performances, each presenting its own unique challenges. Participants will be guided through methods of identifying areas of potential vocal issues, based on elements such as age, vocal ability, and style related effects, etc.

A toolbox of solutions will be offered, that can be applied directly in the voice studio by teachers who are currently working with CCM students or have a keen desire to explore this option in the future.

**Keywords:** CCM, Student Centred Learning, CCM Repertoire, Critical Listening, Style Parametres

**ABSTRACT 64**

## Vocal Massage, An Important Addition To Your Voice Studio

Stephen King, Jenevora Williams

**Objective:** This workshop aims to explore the potential utility of Vocal Manual Therapy (VMT) in the management of voice disorders and the promotion of vocal health, synthesizing evidence from various

studies. This practical, hands-on session will give the participants some safe and effective manual therapy interventions to begin integrating into their practice.

**Methods/Design:** A review of literature, including studies by Flock and King (2023), Kissel et al. (2023), and D'haeseleer et al. (2013), was conducted to understand the role of VMT in treating the symptoms of muscle tension dysphonia, laryngopharyngeal reflux, unilateral vocal fold paralysis, and promoting overall vocal health. Additionally, previous reviews by Mathieson (2011) and Dugan (2020) were consulted to identify the diversity of VMT methods, training backgrounds of practitioners, and challenges in standardization.

**Results:** Studies suggest that VMT holds promise in the management of voice disorders and the maintenance of vocal health. However, there is a lack of consensus and consistency in how VMT is conceptualized, defined, and implemented in practice. Previous research by Mathieson (2011) and Dugan (2020) highlights the heterogeneity in VMT methods, inadequate reporting of methodology, and a scarcity of high-quality evidence regarding effectiveness. Further investigations by Barsties v. Latoszek et al. (2023), Watts, and Hetjens (2023), and Ribeiro et al. (2018) underscore the need to better describe and compare different VMT protocols to address methodological heterogeneity and inconsistency in practice.

**Conclusions:** While VMT shows promise in managing voice disorders and promoting vocal health, there is a pressing need for standardisation and clarity in its conceptualisation and application. Understanding the similarities and differences among VMT protocols is essential for resolving issues of methodological heterogeneity and inconsistency in practice. This workshop emphasizes the importance of continued research and collaboration to establish evidence-based guidelines for the effective implementation of VMT in voice therapy practice.

**Keywords:** Vocal massage, manual therapy, evidence based, muscle tension dysphonia, vocal health

## ABSTRACT 70

### Intentional Voice Distortions: Science-Informed Practical Approaches

Mauro B. Fiuza

Intentional voice distortions (IVD) are usually auditorily perceived as dyplophonia and/or as rough/harsh vocal sounds. Although commonly associated with rock/metal music, IVD are commonly found in many other Contemporary Commercial Music (CCM) genres, traditional music, experimentalist singing, and even in certain classical singing performances. Additionally, IVD are employed by actors/actresses for acting and in voice-overs for movies, narration, and games.

Due to its broad applicability, voice practitioners and researchers have shown increasing interest in understanding and developing practical approaches for its development. Physiologically, there are

several ways for producing IVD, resulting in diverse voice qualities, determined by the vibration patterns of the engaged laryngeal and/or pharyngeal structures, in addition to combinations of vocal tract shapes and subglottal pressure levels.

IVD can be defined as: specific phonation modes that can be produced with periodic, multiperiodic or aperiodic vibrations of glottic and/or supraglottic structures. These modes lead to noisy and/or sub-harmonic spectra and to different degrees of perceived roughness, breathiness, and tension.

During this workshop, based on scientific literature on IVD, all the participants will be invited to learn how to access different vibration patterns of true vocal folds, distinct types, and degrees of vibration of the ventricular folds, and how to intentionally engage their aryepiglottic folds, arytenoid cartilages, epiglottis, and uvula, as oscillators in the vocal apparatus. They will realize how subglottic pressure levels, thus, loudness control, are important to create such sounds preserving vocal health. Participants will also perceive how the vocal tract gestures impact of perception of pitch, even for aperiodic phonation, and alter timbre, as well as how the type and degree of vocal folds adduction are crucial for characterizing IVD outcome. Finally, participants will learn strategies to combine elements in different ways, thereby increasing the artistic possibilities.

**Keywords:** voice, singing, pedagogy, distortions, rough voices

## ABSTRACT 76

### Estill Voice Training: Versatile Solutions for Vocal Challenges

Kimberly Steinhauer, Corinne Mager, Luke Steinhauer

Estill Voice Training® (EVT) is an innovative system for teaching voice developed by Jo Estill that integrates scientific evidence with the artistic study of voice. The purpose of this workshop is to demonstrate select Figures for Voice exercises and apply them to challenges encountered in the voice studio and clinic. The Figures are unique exercises that address power, source, and filter properties of voice production, and include: False Vocal Fold retraction for healthy voice production; Aryepiglottic Sphincter narrowing for twang resonance in opera, belting, & the rehabilitation of hypofunctional voice disorders; and, Torso and Head/Neck Anchor for stability and support. The presenters have over 30 years of experience integrating EVT into training and treatment of voice and will share the most common Figures that have enhanced the voice of the elite performer as well as restored the injured voice of the customer service representative. Workshop participants will have the opportunity to produce the Figures, describe the underlying anatomy and physiology, and apply them to drama, music, or voice therapy. Participants are encouraged to volunteer their voices, teaching, and/or therapy challenges during the session.

**Keywords:** voice training, voice treatment, voice motor control and learning

**ABSTRACT 77**

## Exploring Soul Voice®: A Journey Of Self-Expression And Vocal Expansion Through Embodiment

Karina Schelde, Sofia Serra

The Soul Voice® workshop aims to provide singers and vocal teachers with an experience that goes beyond technical proficiency. Participants will explore the depths of their own voices, tap into their authentic expression, and learn techniques to infuse emotion and soul into their singing and teaching.

The workshop begins with "AH" sounding and breath exercises, creating a foundation for participants to connect with their voices. Individuals are then guided through a process of self-sound expression focused on the heart, fostering a deeper connection to one's emotional core.

Participants are encouraged to identify and address areas of discomfort or pain in their bodies. Through targeted instructions, they learn to release emotional blocks using the power of their voices. The "magic" lies in feeling the emotions through sound, enabling a profound release and inner resonance.

A unique aspect of the workshop involves a practice of listening and sharing experiences, fostering a sense of community and mutual understanding. The journey progresses into a playful exploration of inner child energy through gibberish, eventually evolving into the expression of genuine emotions in gibberish language. Participants engage in partner-play, either through playful imitation or authentic emotional expression, creating a powerful duo dynamic.

The workshop culminates in a collective harmonizing experience, bringing participants together in a shared vibrational resonance and concludes with participants sharing their reflections on the transformative hour, capturing the diverse and enriching experiences of self-discovery and connection. This holistic approach to vocal sound and expression offers a unique and empowering journey for participants to explore the depths of their inner voices and connect with others in a harmonious collective expression.

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**Keywords**: Soul Voice® Method, Self-expression, Sound healing, Voice, Vibrational resonance.

**ABSTRACT 78**

## "The Female Speaker—Understanding Socialization, Benefiting From Embodiment, Developing Potential"

Birte Heckmann

"A person's voice not only serves as a means of communication, but also reflects their personality, experiences, and beliefs. Especially in the context of women and their voices, questions of societal expectations, role models, and cultural norms shape the mindset and self-confidence. The personal background has a massive influence on the way women speak.

Birte Heckmann sheds light on the complex connections between these issues and the way women assert themselves verbally.

This interactive workshop explores strategies for promoting healthy self-awareness in the context of speaking. The aim is to develop an understanding of how embodiment, mindset and self-awareness influence the way our clients speak. By identifying barriers and developing empowerment strategies, we as trainers can support women to amplify their voices and convey their messages with authenticity and persuasiveness.

**Keywords:** Female speakers, Embodiment, Socialization, Voice coaching

**ABSTRACT 79**

## Vibration:Energy = Balance:Elasticity Energetic Stretching: A New Perspective Of Resonance

Veronica Farnararo, Emanuele Sgarbi

It is possible to increase resonance (increase in harmonics, power of volume and projection) and vocal freedom (psycho-physical stability) through the vibrations of tuning forks and Tibetan bells placed in close contact with the body, in particular with the throat and plexus chakras. Solar. Is it possible to create a perceived model that remains in memory? The objective is to understand how internal vibrations are integrated with external ones and how they can help us identify/modify a risk factor and benefit from it, restoring balance and elasticity in the body-mind relationship. "Everything is energy and that is all there is." In the Workshop, the practical protocol will be proposed, which focuses on the Throat Center, communication, sound and sincerity. A Stretching that we define as Energetic to apply it to the voice instrument with the aim of broadening the resonance by reducing vocal effort and, "awakening", with the help of receptors and memory, the sensation of resonance, freedom of expression and phonation, detension or muscle activation/deactivation, through vibration. The recipient is asked to sing a song and self-evaluate, lie down

on the ground barefoot, first supine and then prone (preferably with eyes closed). "A long vibratory dance" begins where tuning forks and bells are positioned in close contact with the body and around it (you can interact with the singing). At the end of the treatment you are asked to get up and try singing again, listening/checking if any changes or changes occur. The protocol is complete with a self-assessment questionnaire. Single and group experiences are proposed to analyze the results jointly. In conclusion, the vibration rebalances the body-mind by restoring muscle tone. It could be expressed as work on the elasticity/tonicity of the muscle spindles. We also have decreased pain/stiffness and increased proprioception. A sort of postural rebalancing through action at a myofascial level, perceived by participants as "freedom" and increase in volume. "I perfectly remember concentration and physical perception thanks to which the emission and quality of the sound improved. Since then I have been able to reproduce those sensations every day with the same result" (a participant).

**Keywords:** vibration, energy, balance, elasticity, freedom

## ABSTRACT 84

### Practical Use of Mri-Based 2d And 3d Images In Vocal Education

Monika Riedler, Patrick Hoyer

**Objectives:** Associations formed through words are crucial in vocal training, and the use of images is widespread. Magnetic resonance images (MRI) of singers in action provide deep insights into the underlying mechanisms of voice production for the vocal arts. These images can also serve as a valuable tool for vocal education. However, initially, translational work is needed to assist the learning student. Vocal coaches with teaching experience can improve their didactic skills, thereby helping the voice to de-velop towards mastered flexibility and resilience.

**Methods:** In the hands-on workshop the following experiences will be shared:

- Systematic warm-up techniques for the whole body as prerequisite to application of visual stimulation (participation)
- Learning ways to adjust the vocal tract, including: o Vocal tract gymnastics with adjustments to various tongue positions using MRI videos (audience experience) o Learning to identify and vary specific parts of the vocal tract by use of visual aids (demonstration of the use of 2D and 3D material in a teaching environment and hands-on experience) o Hands-on experience of visually induced phonatory vibrational sensations
- Risks of focussing on single aspects of the singing voice and necessity of a well-balanced approach

**Results:** At the end of the workshop the participants will have understood and experienced how modern visual material can be used as additional educational tool in vocal formation.

**Conclusions:** The participants experience ways to use MRI based visual aids to be integrated as an additional tool for modern vocal education.

**Keywords:** Warm-up, Vocal Tract Adjustment, Phonatory Vibration, Visual Impact, Vodal Education

**ABSTRACT 87**

## Voice And Body: A Daily Exercise Routine For The Singer And Vocal Artist. How To Manage The Voice In Prolonged Performance

Eleonora Bruni

In the workshop, the participants will be involved in practicing the proposed exercises, which will always be demonstrated and explained in detail and in their purpose. The exercises form the daily routine of the artist who uses the voice on tour or in very frequent performances. It is also useful for voice teachers who spend many hours teaching, a task that is often underestimated. The exercises are short and aim to achieve a natural activation of the body, breath and voice, resulting in balance, elasticity and tone. This routine reduces vocal fatigue and the risk of injury. The goal is to make the technique completely natural, so that it does not interfere with the artistic intention and becomes a refined but natural knowledge. The workshop proposes exercises to be done with all participants—1) a brief introduction explaining the benefits of this approach (5 minutes)—2) a short session of recommended morning body exercises, including breathing and free airflow, grounding, and developing proprioception (10 minutes), and hydration (10 minutes)—3) a session of low-intensity vocal activation and rebalancing exercises that promote elastic vocal response across the range, release of muscle tension, and postural balance (5 minutes)—4) then a section devoted to a gentle vocal warm-up with specific exercises and vocalizations (suitable for soundcheck, rehearsal, or teaching) (10 minutes), rehearsal or teaching) (10 minutes)—5) we come to the actual pre-performance warm-up, which involves body, breath and voice work in synergy and resonance development (10 minutes)—6) we mention the role of extreme vocalization (supraglottic noises and whistles) in a fast vocal warm-up (5 minutes)—7) we do a fast vocal cool-down (5 minutes). All exercises are short, focused, done only with the body, the voice and with the help of the piano or the teacher's voice as an example. The voice is warm, ready, balanced, without the need for long warm-up sessions that risk increasing performance fatigue. The training, through small sessions throughout the day, improves intonation, timbre, tightness and the ability to handle different emissions.

**Keywords:** voice, training, performance, body, singing

## ABSTRACT 89

### Workshop: An Introduction To "The 7 Basic Elements Of Voice Training" – A Systematic Approach To Developing Vocal Technique And Understanding Its Basic Principles Through Constructive Vocal Exercises

Barbara Hoos de Jokisch, Eleanor Forbes

Franziska Martienßen-Lohmann (1887-1971), perhaps the most renowned German vocal pedagogue of the 20th century, developed a comprehensive system of vocal exercises based on the bel canto tradition and combined this empirical approach with the scientific knowledge of vocal physiology. Her concept of voice training is still valid today in the light of recent findings in scientific research. Barbara Hoos de Jokisch learned the exercises from one of Martienßen-Lohmann's last active pupils, collated and systemised them and produced a workbook with an instructive commentary, recently translated into English by Eleanor Forbes. The workbook not only presents a rich variety of effective exercises, but also promotes an overall understanding of the voice from the perspective of vocal pedagogy.

The collection of exercises covers the whole sphere of classical vocal technique in the three functional areas: breathing/energising, registration (pitch range /dynamics) and articulation/resonance. It develops the voice systematically and logically by means of the sounds of speech as well as providing focused preparation for the singing of German repertoire while developing vocal technique.

The workshop opens with a short overview in dialogue form, introducing Martienßen-Lohmann's unique concept of voice training and describing the structure and use of the workbook. In the ensuing interactive session, the participants will have the opportunity to try out selected exercises for specific technical and pedagogical objectives (including topics such as posture and breathing for singing, resonance, approach to registers, articulation – combining vowels with consonants), guided by the presenters. Using German syllables, fun phrases and sentences accompanied by symbols from the International Phonetic Alphabet and literal English translations, these exercises will give the participants an insight into the variety within the system and its contemporary relevance as well as an understanding of the holistic nature of voice training. The participants will learn practical tips and tools to encourage a creative, individual approach to the teaching of singing.

**Keywords:** pedagogy, interactive, exercises, workbook, understanding

## ABSTRACT 92

### First, Do No Harm: A Workshop Exploring The Significance Of Nocebic Language In A Rehabilitative Process

Jenevora Williams, Stephen King

**Objective:** This workshop seeks to introduce teachers and clinicians to the importance of our words by discussing, evaluating and role-playing different scenarios to gain a deepened awareness of the use of contextually appropriate language.

**Methods/Design:** This workshop will explore the nature of nocebic language from both a psychotherapeutic and healthcare professional lens (Webster et al. 2016). After an introduction and discussion regarding the mechanisms of contextual effects (placebo) and the nocebic phenomena, the participants will engage in interactive role-play. This will be a deep-dive into everything that you say or write to and about your patients, clients and students; if we look through a more critical lens, there could be a more effective alternative (Druart et al. 2023). This workshop will be relevant for all practitioners, no matter their scope of practice (Segal et al. 2018).

**Results:** This will begin to raise questions about the use of nocebic language in pedagogy and healthcare, helping practitioners navigate a more contextually appropriate phraseology for growth and healing. It will have far-reaching influence into mindset and the environment for change.

**Conclusion:** Healthcare professionals, therapists and teachers all consider themselves to be empathetic, person-centred and thoughtful practitioners. This is a chance to re-examine that perception and to challenge the very core of your inter-personal relationships, and the potential outcomes of your interactions.

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**Keywords:** Healthcare, Therapy, Pedagogy, Placebo, Language

## ABSTRACT 96

### What Next?

Susan Yarnall Monks

Over the last 10 years and particularly since 2019 the teaching of singing has adapted to the 21st century demands for quick fixes, instant effects, phone recordings, spectrograph apps, posting results and advice on social media, online music via tablets, international vocal experts on webinars, using

zoom and technologies only dreamed of a few years ago. Is the next thing AI or something we still haven't imagined? Have we opened a Pandora's box and is that a good thing?

What next? And what are the essentials we want to hold onto as we are tossed about as the hurricanes of technology blow through our studios?

50 minutes plus 5 minutes further questions. The aim is to facilitate small group/world café discussions with the aid of visual aids/post it notes, free flow of ideas and visioning before a final gathering of reflection and conclusion and questions to the Round Table Panel. A kind of Speed dating for Voice Teachers?

**Keywords:** vocal pedagogy, future, challenges

## ABSTRACT 108

### Let´s Live Zarzuela By Singing And Dressing Up As A Chulapa/Chulapo

Susana Zabaco

After a brief explanation of the history of Zarzuela, the plot of "La verbena de la Paloma" will introduce us into the traditional Madrid of the end of the 19th century and the typical Madrilenians: chulapos and chulapas with an energetic and cheerful character. Dressed like chulapas (shawls, carnations and headscarves) and chulapos (waistcoats, Madrilean caps) the participants will vocalise with Spanish warm-up exercises, clapping and stomping. The typical mordents of Spanish music will be practiced with the rhythms of seguidilla, petenera and jota. All you need to bring is a good mood and the desire to become a real chulapo/chulapa. And for those who want to go deeper into the subject, a lot of additional information about Zarzuela will be provided.

**Keywords:** Zarzuela, Bretón, La verbena de la Paloma, Seguidillas, Género chico

## ABSTRACT 113

### Move & Speak Authentically: A Laban Approach To Exploring Prosody

Jarek Sacharski

During the workshop we are going to explore the interconnectedness of different movements with the breathing patterns and prosodic patterns of human speech. We are going to focus on exploration of simple movements like throwing, punching and swinging and the relationship of these movements to different ways of using the breath and voice. The methodology is inspired by the application of Rudolf

Laban's efforts in actor training. The experience will allow participants to explore new prosodic qualities of the spoken language in an embodied way. It may also serve as a more inclusive alternative to teaching prosody in second-language acquisition.

**Plan of the workshop:** In the first part of the workshop, participants will be introduced to 3 common movements of the human body: throwing, punching and swinging. Together, we will explore the impact of these on the breath and voice. After the exploration, we will try to identify these movements in human speech: the participants will listen to four different recordings of speakers and will identify which movements and qualities they perceive in the voice of the speakers. They will choose the dominant movements and qualities by voting with the phones.

In the second part of the workshop, I will work with 2 volunteers to place this work in the context of public speaking and embodiment of a second language. The workshop will culminate with a brief discussion and questions.

**Keywords:** public speaking, laban efforts, prosody, movement

**ABSTRACT 124**

## The Do's And Don'ts Of Microphone Technique, Equalizing, Compression, Effects And All The Other Technical Shizzle

Sarah Algoet

If you and / or the singers you work with are singing other genres than classical, chances are very big you're using a microphone. Knowing how to work with it is crucial, if you want to make the most out of your vocal performance.

I dare to say that 50% of your sound is determined by the microphone you're singing through, what you do with it, and everything that happens after, like equalizing, compression, reverb, delay, what the sound engineer is doing from behind the mixer,…

So…

- Do you want to learn how to use your microphone functionally?
- Are you looking to understand the essential technicalities?
- Do you need to know how to create a sound that suits your artistic identity?
- Do you want to effectively communicate what you need to the sound engineer(s)?

Then this workshop is for you! You don't need any prior knowledge or skills. Everybody is welcome, especially if you have never ever uttered a sound through a microphone (yet).

These topics will be demonstrated ànd you will be invited to test everything out during the workshop:

Microphones & what to do with them:

- How to use your microphone functionally.
- Dynamic & Condenser Microphones: Which one is right for your voice / genre?
- Pick up patterns
- Do's & Don'ts EQ,

Compression & Effects:

- Equalizing: Create your own sound by working with the frequencies (LF, MF & HF)
- Compression: What does it do to your sound? Why do we need it?
- Reverb & Delay: What do they create? What are the possibilities?
- Do's & Don'ts

After this workshop, you will understand how to maximize and enhance your vocal performance:

- You will do justice to your voice by choosing the right microphone and knowing how to use it.
- You will have discovered the infinite possibilities of the gear you use… and the pitfalls
- You will understand how to design your personal sound.
- You will be able to communicate to the sound engineer(s) what you want and need.

**Keywords:** microphone, technique, equalizing, compression, effects

## ABSTRACT 130

### Body Awareness, Relaxation, And Stretching Exercises In A Voice Lesson

Martina Prevejšek

While voice, in a narrow sense, originates in the throat, holistically, we consider the entire body as the instrument for voice. Excessive tensions in various body parts negatively affect free voice production for speech and singing.

The workshop introduces an interactive approach to achieve a freer voice production, emphasizing awareness of the body. The goal of the workshop is to acquaint participants with exercises for stretching and relaxing body muscles applicable to teaching.

Why is this important in vocal education?

Body awareness, stretching, and relaxation exercises for various muscle groups, combined with breathing, are typically performed at the beginning of a singing lesson.

1. This enables students to calm their minds and transition mentally from prior activities to the singing lesson, enhancing focus on singing exercises and repertoire.

2. Guiding students through observing different body parts and muscle groups enhances overall body awareness.

3. Through exercises, students learn to identify excessive tensions in the vocal apparatus and body, distinguishing between relaxation and tension, which is often habituated without awareness.

4. Singing teachers should empower students with exercises for body awareness, relaxation, and stretching, which the students should regularly incorporate into their daily singing practice.

Through clear demonstrations and gradual guidance, workshop participants will actively engage in exercises for stretching and releasing posture muscles, neck muscles, shoulder girdle muscles, respiratory muscles, pelvic girdle muscles, knee and foot exercises, and articulation muscles, all while practicing conscious breathing.

The workshop encourages participants to mentally connect with their body and breath, heightening body awareness, releasing any excess tension through exercises, calming thoughts via meditation and pranayama breathing techniques, freeing the body, and thus establishing the foundation for a free voice.

About the presenter: Academic musician, Professor of singing in Music School Sevnica, Sciences of Voice Speech and Singing Specialist, Vocal Health First Aider, Pranayama Breathing and Life Awareness Instructor, Somatic Voice Work I, II, III certified, past president of DSPP–Slovenian Singing Teachers Association, MSc in Management, Founder of MBVEI–Mind Body Voice Education Institute, https://www.mbvei.com Slovenia.

**Keywords:** Body awareness, relaxation, stretching, breathing, voice lesson

## ABSTRACT 132

### The Voice Color Palette© : 4 Basic Colors For Pop Singers And Musical Theatre Performers–A Short Practical Workshop, A Playful Tool For Interpretation

Raffaella Misiti

The VOICE COLOR PALETTE© is a short practical workshop focusing on vocal interpretation in Pop and Musical Theatre from a playful but no less analytical point of view. As children, we naturally perceive the sound of a voice from an emotional view, even before being lexical or

semantic. VCP© examines some "simple" sounds connected to primary emotions that can help any actor or singer acquire a useful instrument to get in touch with the essence of a character or with the demands of a Director. VCP© is a palette of 4 BASIC voice colors, observed in their simplicity but with the aim of learning how to easily mix them, in order to convey all the shades necessary for a good interpretation. As in a vocal prism, the performer will be able to select the color that most describes and defines the aspects of the character to which he must give voice. The VCP© is a vocal game suitable for group work or individuals; it starts from a very simple melody sung with some selected sounds (english phonemes are useful for different onsets) and singers will be asked, while listening, to provide for each sound a series of feedbacks: 1) adjectives and/or emotional suggestions (clear/dark, strong/weak, positive/negative); 2) hypothetical dramaturgical role of this voice (antagonist, protagonist, villain); 3) reference (it is generally helpful to take examples from Disney Musicals); 4) technical analysis (onsets, vocal folds mass, subgloctic pressure, laryngeal height, resonance); 5) real color choice (red, yellow, blue, green, black…). The purpose of the VCP© is to bring the voice back to its role of emotional and creative stimulus, to let the sound being dressed with the word while maintaining its essence to grant the actor the privilege of defining a unique point of view. The basic sounds of the VCP© are: OW for CHEST color, HI for MOUTH color, HEY for NOSE color and YOU for HEAD color. This panel is practical and requires no entry level (anyone interested can partecipate); it is also a useful tool for teachers working with younger students.

**Keywords:** interpretation, color, workshop, voice, musical

**ABSTRACT 133**

## How To Get A Powerful Voice? Light Scream, Ventriloquist, Whistle And Other Exercises To Find An Energetic And Safe Delivery

Erika Biavati

Using an energetic voice can be dangerous without good technique. This workshop will engage participants in exercises that help the body work at its best to achieve a powerful voice, but in a safe way.

Erika Biavati is a professor at the BSMT in Bologna (Italy) and works daily with young people studying to become musical performers. Author of the book "MIX & BELT—EMISSIONS IN COMPARISON", she has been developing vocal exercises for many years that can improve vocal performance, especially when a powerful voice is required.

Awareness of the functioning of the larynx and the involvement of the rest of the body in vocal emission are the basis of the training proposed in the workshop, nothing is left to chance and each exercise is described in detail. The proposed exercises begin with the correct respiratory balance, with special attention to the dosage of subglottic air pressure; then the focus is on the larynx, to train the different vibrational mechanisms and to manage the passage; finally the focus shifts to the resonant cavity, to improve proprioception and resonant implementation.

Laryngeal whistle, "ventriloquist" and "light scream" are some of the many exercises that will be proposed and gradually performed under the supervision of the teacher. By the end of the session, it will be easier and safer to achieve a powerful voice, but you will be surprised to find that even the most delicate and subtle sounds will benefit from a significant improvement.

**Keywords:** voice energy, belt, mix, soft scream, ventriloquist

## ABSTRACT 146

### Semi-Occluded Vocal Tract Exercises (Sovte): So Many Options, How Do You Choose?

Gertie Van den Driessche, Chiers Carole

SOVT-exercises are popular within voice training. There is an arsenal of choices: straw phonation, tongue and lip trills, hand-over-mouth, lax vox,... Various models are described in literature to classify those exercises (e.g.: Titze, 2006; Rosenberg, 2016; Maxfield, 2014). These help the voice therapist to make choices about which exercise suits which client. In this way you obtain a customized individual training program. We briefly present a theoretical framework, which serves as a guideline for the practical part of the workshop.

We present a number of cases in which SOVTE played an important role in voice training. For each case we first describe a short anamnesis and a problem statement. We interactively take the audience through the process of clinical decision making. Which exercise is chosen for a particular client and what factors determine that choice? Do the public's findings match with how the effective exercise process was conducted? Finally, we try out some SOVT-exercises.

**Keywords:** SOVTE classification, case study, voice therapy

## ABSTRACT 149

### Masterclass: Romantic Art Song

Jale Papila

In this masterclass, the participants can experience the magic of the "small art form of LIED" in its unique symbiosis between poetry and sound.

With the participating singers of this masterclass, Jale will work on a colourful musical embodiment of texts of typical romantic songs of this era, which includes composers such as Schubert, Schumann, Brahms, Mahler, Strauss, Debussy, Fauré, Grieg, Tchaikovsky, Rachmaninov and many more.

The essential tools of Lied singing, which are necessary for a credible interpretation, are dealt with intensively: We look at the various dialogue levels, immerse ourselves in an intensive interpretation of the characters, work on very good and appropriate articulation as well as vocal flexibility and dynamics.

Active participants should send a message to papila@mevoc.de by 1 August 2024 stating which songs they would like to sing.

**Keywords:** Romantic Art Song, Lied, articulation, vocal flexibility and dynamics, symbiosis of poetry and sound.

## ABSTRACT 155

### Voice Moves The World And Movement Moves The Voice—A Brief Insight Into The Laban-Malmgren Technique And How It Can Be Used For Improving Singers´ Technical And Musical Proficiency

Bo rosenkull

There seems to be general agreement that voice, movement, gestures and body form a tightly-knit whole. Movements improve the stance of the singer and can be a way to achieve a balanced instrument and, accordingly, the breathing and singing. This, in turn, could create a good breeding ground for freer musical expression.

In this multiple method qualitative research, involving self-study, participatory action research and interpretive description, I have investigated how didactic strategies based on the Laban-Malmgren Technique (LMT) can be used to develop singers' technical and musical proficiency.

The LMT is a method used to train actors. The ideas on which the training is based are a coalescence of ideas that derive from the works of Rudolf Laban (1879—1958), William Carpenter (n.d.—1954), Yat Malmgren (1916—2002), Konstantin Stanislavski (1863—1953) and Carl Jung (1875—1961).

Fourteen singers at four different tertiary institutions in Sweden and South Africa participated in this study. The different parts of the LMT that were investigated were the three-dimensional planes, working actions, externalised drives, shadow moves, degrees of intensity, inner attitudes and Malmgren's ten questions.

The research results have shown that the LMT can enable a voice pedagogue to develop the technical as well as the musical proficiency and expressiveness of singers significantly. The participants' vocal development showed how the use of such strategies contributed to, for example, reducing unhealthy muscular tension, improving their posture, establishing a breathing process conducive to singing, the embodiment of sound, onset of tone, legato singing, phrasing, register equalisation, vibrant timbre, rich resonance, secure intonation and a controlled vibrato. The use of the didactic strategies based on the LMT also contributed to the participants' improved understanding, internalisation and depiction of the characters in the songs.

In this interactive workshop, we will, among other things, examine how phonation and phrasing are changed by movements in horizontal, vertical and sagittal planes connected to different vowel sounds. In addition, we will in practical exercises delve into how the various motion factors (weight, space, time and flow) that together make up the eight different working actions, might affect singing technique and musical expression.

**Keywords:** Laban-Malmgren, singing-technique, voice pedagogy

## ABSTRACT 167

### Demonstration Of The Essential Warm-Up For The Mature Female Voice In Classical Choral Singing

Rebecca Moseley-Morgan

**Objective:** age-related changes to the mature female voice can include calcification and ossification of the vocal tract which affects the elasticity of the resonator causing changes to vocal timbre. Also, the vocal folds may become atrophied, bowed or suffer swelling all of which effect their ability to close along the glottis causing a creaky, breathy or hoarse voice.

Based on the main findings from the author's doctoral research on the longevity and functionality of the mature female voice, completed in January 2024, and her work for the past 30 years with older voices, it is essential that the mature singer always warms-up her voice before singing. It is also important that the warm-up targets the voice components most likely to be affected by age-related changes. The warm-up should commence at very low effort levels and gradually increase in intensity to ensure that the singer is always working with minimum effort and maximum intensity.

**Method:** The author proposes to do a live demonstration of her recommended warm-up with explanations of her methods. She will ask for volunteers to help demonstrate the warm-up or ask the entire audience to take part. The warm-up includes sirens, lip trills, breath work, SOVTs, exercises for tongue root tension, constriction, blend across the registers and position of vowels. This is all condensed into a 15-minute warm-up. The author takes a very pragmatic approach to working with the mature singer. If she asked them to do hours of regular work, they would not do it regularly. Research shows that the little and often approach is best. Therefore, she tries to incorporate as many desirable outcomes as possible into each exercise, but the total warm-up should last for no more than 15 minutes. This warm-up is the first part of an emerging pedagogy specifically for the mature voice based on the finding of the author's thesis on the subject.

**Keywords:** vocal warm-up, mature voice

**ABSTRACT 168**

## Performing In Both Worlds: Cross-Training In Musical Theater Techniques For Classical Singers

Luciano Simões Silva, Juliana Franco

Nowadays, with the increasing popularity of musical theater on stages all around the world, there is a rising necessity for both students and professional singers to adapt to this new environment where productions of opera share the spotlight with musical theater productions. Cross-training is not only a way for classical singers to prepare for this reality, but also a proven way to promote optimal performance levels and mitigate against possible vocal injuries in singers, who are indeed "vocal athletes." The concepts of "hybrid singer," developed by LeBorgne and Rosenberg, and "cross-training," matured by Saunders-Barton and Spivey, are used here as the philosophical and technical basis for cross-training in voice pedagogy.

The objective of this workshop is to show through active learning how classically trained singers can explore musical theater repertoire and quickly adjust to the techniques frequently used in this genre.

Initially, we will focus on presenting our cross-training pedagogy, exemplifying with pivotal works where bridges can be built between these two genres. Following we will present vocal examples from male and female voices (ourselves) and work with audience participants on how to adapt from classical singing to belt, from head-mix to chest-mix and from round to dark to bright.

In the second half of the workshop, there will be a focus on exercises and practical guidelines on how to approach this repertoire. Style tips will be given in tandem with technique and practical exercises. The expected results include a better understanding of cross-training methodologies for classical and musical theater singing, mastering the navigation of technical and stylistic variances between genres. By the end of the workshop, participants will possess practical tools to effectively meet the demands of musical theater repertoire, thus improving their overall performance quality and reducing the risk of vocal injury.

Cross-training offers classical singers valuable opportunities to expand their skill set and thrive. Embracing these principles enables singers to cultivate and develop the flexibility and adaptability required in classical and musical theater settings. This workshop provides a comprehensive outline for integrating cross-training techniques into their vocal practice, enabling confident and versatile performances in diverse musical contexts.

**Keywords:** Musical theater, classical voice, voice pedagogy, crossover, cross-training

**ABSTRACT 178**

## Spectral Analysis For Performance Magic: Messa Di Voce & Beyond

Corinne Mager

The objective of this interactive workshop for speaking and singing is to expand upon the introductory principles, physiology, anatomy and exercises practiced in our PEVOC 14 workshop, EVT® solutions for Artistic Choices. Attendees will practice more solutions for advanced artistic choices such as the messa di voce. Through Estill Voice Training® exercises and the use of spectral analysis with Estill Voiceprint Plus™, the powerful combination of kinesthetic perception, visual feedback, and hearing will be explored. Along with strategies to create confident & informed artistic choices that lead to performance magic on stage, attendees will leave this workshop with many more solutions for common voice problems & patient/client goals, such as breath management & support, dynamic choices, pitch stability & range, clarity, and passaggio control.

**Keywords:** Artistry, Spectrogram, Dynamics, Power, Voice

**ABSTRACT 185**

## Remastering the Classics To Biohacking. Incorporating Breathing And Movement Techniques Workshop

Similar Anca

**Rationale:** The science of voice for theatre, primarily developed in the 20th century, has integrated several breathing practices and methods from the domain of singing. In this workshop, we will cover a range of breathing techniques from classical singing schools, thoughtfully adapted for theatrical performance. This includes incorporating movement, movement patterns, and myofascial releases. As the spoken voice in theatre requires less glottal pressure but more elasticity due to the dynamic nature of performing bodies, these adapted techniques ensure actors are audible in theatre spaces while moving and speaking.

**Strategy:** In this workshop, we delve into a curated assortment of practical breathing exercises, originally stemming from the Italian, German, English, and French singing schools. These techniques have been innovatively adapted and intertwined with movement techniques derived from dancing, yoga or myofascial maneuvers. Participants will engage in an very active and immersive experience, discovering the synergistic development of breathing, movement and vocalization. This highly interactive session extends classical singing and Contemporary Commercial Music (CCM) breathing methods to the realm of acting, emphasizing the seamless integration of breath and movement.

**Outcomes:** This workshop establishes a direct connection with the performing actors and their vocal presence on stage. Recognizing that the audibility of spoken voice is intricately linked to breath control, and considering the contemporary demands of movement in acting, we have synergized classical breathing techniques with kinetic expressions. We will showcase a variety of practical exercises, proven effective in training vocal endurance in theatrical 'speaking athletes'.

**Conclusions:** Remastering the Classics' is an engaging, hands-on workshop focusing on breathing techniques that have evolved from the 17th century singing practices to the modern paradigms of breathwork in the 21st century. It encompasses avant-garde breathing methods employed by biohackers, exploring their potential applications in theatre, performing arts, and vocal instruction. While some of these extreme techniques may be novel to traditional practices, they open new vistas in the exploration of voice and performance.

**Keywords:** singing, breathing techniques, movement, biohacking, actors training

## ABSTRACT 190

### Visualizing Voice Pedagogy: The Impact Of 2d & 3d Mri Studies On Teaching Different Singing Styles

Stefanie Rummel

Linking voice research with voice pedagogy can support the process of teaching voice. With the help of the research results of the 2D and 3D MRI study at the Institute of Musicians Medicine, Freiburg further insights will be theoretically and practically given in this workshop. Six different Voice Qualities (VQ) deriving from Estill Voice Training and their variations which are used in contemporary commercial music as well as in classically western style of singing: (Speech, Falsetto, Sob, Twang, Opera, Belting) -will be looked at. 2D and 3D MRI Voice research can support voice pedagogy to enhance understanding the vocal production more profoundly. For example, it may help shaping the vocal tract (VT) more consciously or facilitate better control and health for singers, actors, speakers, and speech therapists through insights into anatomical and acoustic aspects of different vocal styles. A link will be created between voice pedagogy and the talks: Rummel et al.: Concordance in vocal tract configuration of different singers for 6 voice qualities & Stritt et al.: Efficiency considerations of vocal tract acoustics of different voice qualities with four trained singers This study involved four highly qualified EVT® singers (2♂, 2♀) performing sustained phonation on vowel [a:], across 6 VQ on ♀415Hz / ♂207Hz whilst VT–3D MRI recording. Despite the limitations in sample size, the uniformity of vocal tract configuration reproduction across six voice qualities in four individuals highlights the potential for conscious training in shaping vocal tract anatomy. In this master class research about 6 different singing styles will help to understand which and how areas of the sound production and vocal tract configuration can be trained. Participants are invited to try out different voice qualities and reflect the changes with the help of anatomical observations, acoustics and visual feedback through spectrogram recordings. At the same time participants can see through the visualization of 3D and 3D MRI imaging how the changes look like anatomically.

They will see and feel how the neutral, hour glass and megaphone shaped vocal tracts will be looked at theoretically and practically. We have a deeper look on how the vocal tract length.

**Keywords:** Voice qualities. Estill Voice Training—Singing research

## ABSTRACT 193

### An Open Source Dual-Microphone Voice Mapping / Voice Profiling System

Peter Pabon

Voice Profiler, a commercial VRP-recording system developed earlier by the author, utilized a special dual microphone headset linked to a dedicated SPL-calibrated audio interface. This particular hardware setup, made it possible to do an automatic selection of the singer sound source only. This made the application flexible and less critical on the recording environment. Moreover, with the continuous cross-comparison of the microphone signals, changes in microphone placement and unexpected sources of noise that may emerge, could be exposed on the fly. This helped securing the recording process and to maintain an absolute SPL calibration.

An open source version which will be presented, that inherits mostly all options earlier available in Voice Profiler, but now the use of standard audio interfaces and microphones is an option too. The software runs on different operating systems, using standard PC hardware or inexpensive single board computers. It can be used for basic interactive VRP, SRP, or Contour recording, and has the options for fo/SPL based mapping of additional (spectral) metrics. It is also possible to use this system merely for audio acquisition when targeting for SPL-calibrated sound recordings.

In this workshop, we will shortly demonstrate the system, running on a single board computer, as well on a windows PC and MAC. We will spend some time on recording a SRP and VRP to demonstrate some of the visualizing options available, and shortly discuss the interfaces to other systems and software. The expectation is to give possible users an impression and some answer on questions like:

- What is needed to get a running system, can I assemble it myself?
- How much knowhow is needed to use the system and to interpret the results?
- How difficult is it to set and maintain the SPL calibration when standard hardware is used?

Despite the technical focus, questions on the recording method, on the Interpretation of the resulting maps, questions on the clinical use of the method or application in the singing studio are more than welcome too.

**ABSTRACT 200**

## The Application And Added Value Of Laryngeal Manual Therapy In Singing Lessons

Teun Michiels, Annelies Labaere

Physiological components of speaking and singing can be negatively affected by tension in the systems of respiration, phonation and resonance. As research has shown that the musculoskeletal system has a big impact on voice production, it comes as no surprise that musculoskeletal tension reduction can be of great value in singing lessons and singing training. Especially manual facilitation of the larynx and its surroundings can offer an additional benefit for the singer, both on the mechanical and the proprioceptive level. During the manual facilitation, the singer further develops his skill set, adding an extra level of experience to it and enabling him to improve his vocal performance and sound quality.

Teun Michiels (voice pedagogue) and Annelies Labaere (speech pathologist) work together in this masterclass to establish a complete assessment and a tailored adjustment of the efficiency of the singing technique, in relation to muscle use, tension and relaxation.

Active participants will experience a singing masterclass in which the artistic and scientific expertise of the singing teacher is combined with a paramedical assessment by the speech pathologist, including manual laryngeal therapy during singing. By the structure of the masterclass, both active and passive participants will perceive the impact of manual laryngeal therapy, whether it is by feeling it (active) or by hearing the acoustical difference (passive). Active participants will sing a song of their own choice, providing sheet music, from any genre."

**Keywords:** singing lessons, laryngeal manual therapy, holistic approach, singing technique, musculoskeletal tension

**ABSTRACT 207**

## La Dispositione Di Gorgia, A Pedagogical Approach To 16th And 17th-Century Ornamentation And Vocal Agility

Nathalie Henrich Bernardoni, Robert Expert, Nathalie Henrich Bernardoni, Tiago Simas Freire

The richness of musical ornamentation in the 16th and 17th centuries is well documented, revealing a considerable distance between ordinary musical notation and refinement of expected sound result. The elegance, mastery and precision of vocal ornamentation generally refers to the concept of dispositione di gorgia, a technique of singing widely used to articulate agile vocalizations. Based on breath (sul fiato) and glottal control, it is hardly ever taught today, as it is considered risky if poorly mastered.

In order to better understand and teach this musical quality and singing ability, a major artistic research project studied a corpus of Italian didactic works from 1593 to 1626. A clear didactic objective was to exercise this dispositione, which remains in the shadows of pedagogical and musical research and practice. Through the conceptual, morphological and technical definition of the dispositione di gorgia, we have tamed its precise vocabulary and technical aspects. A pedagogical material that will contribute to its teaching today was created.

This workshop presents the results and practical applications of this artistic research. It is aimed in particular at singers and voice teachers wishing to familiarize themselves with the techniques of ornamentation and vocal agility used in Renaissance and Baroque music, and also for the teaching and practice of virtuosity in the 18th and 19th centuries. Those interested in a better understanding of laryngeal foundations of vocal agility and ornamentation in classical singing will also find interesting and up-to-date answers, supported by acoustic, electroglottographic and endoscopic analysis of expert vocal productions.

**Keywords:** ornament, glottis, vocal agility, singing, classical

**ABSTRACT 213**

## Sitting On Hips Joints, Effect On Singers And Voice Production And How To Counteract It, Tools And Exercises. For A Biomechanical Integration Of Voice Production

Lucia Cossu

Singing career is a demanding one on many aspects, minimising the tolls of lifestyle impact can be crucial. One overlooked aspect is the impact of joints biomechanics on voice production: 1. As a disfavourable element directly impacting technique, development and stamina, well sustained by the joint by joint approach and biomechanical research and practices correlated (in its direct translation for voice production my presentation at PEVoC14 2022, on YouTube) 2. The other way around is also true, meaning that we can contribute to voice improvement, maintenance and longevity by using the biomechanical correlations of joints work and actions. Joints present some kind of hierarchy of importance that vary according to frame applied: developmental, biomechanical or fascial. The hips joint is specially high positioned in all those frames: it is the joint to be properly developed to get to upright posture (and maintain it), it is a central, complex and very specific system to all postural activities of the body, it is at the crossline of fascial and skeleton/skeletal muscles system with an anatomical cohabitation of both (a study from 2020 has assessed the presence of smooth muscle as skeletal muscle in the same muscle of pelvic floor, posing so a more nuanced view of interactions and control of muscle actions). It is well recognised the adverse role of prolonged sitting on hips and lumbar segment on muscles functionality, its effects migrating to the lumbar segment in the form of mobilisation of it. Also sitting in usual chairs interfere with the ligaments of the sacro-lumbar segment of the spine, and as found by Solomonov the lack of proper agonist/antagonist coactivation is a common consequence of ligament deviation from

proper norm.In this workshop you will find the rationale and biomechanics reasons of having a special interest in hips joint, what modern biomechanics has as golden practice to deal with it and how to apply and adapt it into the voice studio or speech therapy office in easily strategies both during the sessions and in the lifestyle. It is the practical version of my Poster on the subject at TVF Symposium 2023 -Philly.

**Keywords:** hips and voice, biomechanics in voice, hips joint

## ABSTRACT 214

### How To Sing The Pop-Rock Repertoire While Mastering Mixed Voice: Between Practice And Science

Nathalie Henrich Bernardoni, Antonio Di Corcia

Given in duo, this workshop presents the fruits of a collaborative work between a singing teacher and professional singer practicing the mixed voice in modern pop-rock singing and a scientist and amateur singer specialized on singing voice analysis, under the expert eye of Italian ENT doctor Franco Fussi. An immersion is offered in the practice of two vocal emissions involved in modern singing: standard mixed voice a soft emission typically used for singing pop, and extreme mixed voice, a louder emission for singing hard rock, soul, and belting for musical theatre. These vocal emissions will be demonstrated live, and the participants will be guided on singing selected pop-rock songs in mixed voice. Some physiological, acoustical and articulatory aspects related to these ways of singing will be illustrated and discussed. Special focuses will be made on the laryngeal mechanisms used for singing, on specific vocal-tract adjustments required for producing target voice qualities, on controlled supra-laryngeal constrictions, and on velopharyngeal port opening. Warming-up and correctives exercises will be proposed, based on lip trills, tongue trills, and singing with selected syllables and controlled degrees of nasality.

**Keywords:** mixed voice, singing, modern, voice quality, loudness

## ABSTRACT 222

### Sovtraining: A Multidisciplinary Approach To Vocal Tract Semi-Occlusion For Voice Training

Marco Fantini, Vittoria Carlino, Claudio Fabro

**Background and Objective:** Semi Occluded Vocal Tract (SOVT) postures can be obtained and performed through many exercises and devices, with different effects on voice. The rationale and theoretical underpinnings for SOVT postures have been described by Titze. Today, semi-occluded vocal

tract exercises are widely used in the fields of voice therapy and didactics, aiming at improving vocal economy and efficiency. Semi occlusions promote an increase in vocal tract impedance, resulting in changes in the inertive reactance, with favorable effects on voice production. According to impedance and electroglottographic features, SOVT exercises have been classified in steady and fluctuating. Furthermore, different devices (such as straws, tubes and masks) can be used to boost semi occlusions and to obtain different goals.

SOVTraining is a multi-disciplinary project focusing on voice training and didactics based on semi-occluded vocal tract postures. The aim of the project is not only to show how to perform semi occlusions, but also to teach how to choose between different semi-occlusions according to the needs.

**Methods/Design:** In this workshop a Singing Teacher, a Speech Therapist and an Otolaryngologist will put together their knowledge about semi-occlusions to give the audience – through an interactive and hands-on experience – some useful tips and tricks to "SOVTrain" their voice and to use some semi-occlusions in their everyday practice, according to their needs. Through an interactive presentation, group practice and individual practice, the attendees will experience the different features and effects of some SOVT exercises. In particular, a focus will be given on the new Semi-Occluded Ventilation Mask techniques.

Results and Conclusions: This workshop will give the audience some useful indications and strategies about how to choose between the different semi-occluded postures, according to the performer's goals and needs. Participants will leave the workshop with specific strategies to help them warm-up and to use several SOVT exercises in voice training.

**Keywords:** SOVTraining, voice, SOVT, training

## ABSTRACT 229

### Hearing A Vocal Impairment: Secrets For Listening To The Voice

James Thomas

**Objective:** The participant is invited to make an accurate provisional diagnosis of vocal impairment by listening to the human voice.

**Methods:** Audio examples of vocal impairments will be correlated with visual endoscopic findings in order to train the examiner's ear. Two major vocal impairments of air leak (or white noise) and roughness (or diplophonia) can be perceived and matched to visible impairments on laryngeal stroboscopy. Additional vocal impairments of onset delay, pitch breaks and phonatory stops are correlated with visual findings as well. A formal vocal capabilities battery of testing is described. After covering these basics of listening, case studies are played and participants encouraged to describe what they expect to see on endoscopy.

**Results:** This workshop includes elements of medical and speech language pathology. Voice teachers, speech language pathologists, and phoniatrists should leave the workshop, more confident in their ability to hear and describe how vocal cords are impaired.

**Keywords:** vocal impairment, hoarseness

## ABSTRACT 235

### Words Production And Tone Production In High Range Voices, A Separate Functions Training

Lucia Cossu

In high skilled repertoire singers or simply high pitched emissions the words production and the tone production are an element of great difficulty in some precise segments and absolutely central for mezzosoprano, tenors and soprano voices. The not easy task of solving this is a weakness often precluding a more satisfactory career or even the categorisation of the true voice. We know in literature from great singers or practices that it is an element of controversy as to be trained or avoided completely being the possibility of a bad use of those. Recent techniques have put an accent on the above vocal folds structure training, surpassing the traditional veto in act in this region; still they do not include all the answers for these kind of singers. I propose a separation of the tone production and of the words production so to be able to develop exactly the point lacking (respecting the specific structure of the individual, but not maintaining the limitations). What we know now by biology and neurology is the asymmetry of the two systems, being one favorised and able of exceeding the other for biological survival hierarchy, from the modern biomechanics the interactions of the general musculoskeletal system into the vocal tract give added insight to the question on both a practical and model level. The clarified vision given by of those adds insight for safe practice beyond the well know preaching in high tone emissions (opera voices or belting) of never work directly in the vocal tract. In here a practice that contains rational strategies to find, develop with the respect of tissues and muscles adaptations, strategies in the reverse and maintenance of the flexibility and mobility so to maintain and add and not forcing with just muscular force the gains. A biomechanical and belcanto bridged way of rationally and artistically develop beyond some limitations or weaknesses often found unsolvable for years.

**Keywords:** biomechanics, medium high tessitura, opera voices, biology based,

## ABSTRACT 238

### Pure Sound Vs. Rough Sensation: Sorting The Sensations Of The Sung Tone

Chadley Walter Ballantyne

This workshop explores the interplay of touch and hearing in vocal training, aiming to enhance teaching methods by understanding how we perceive sound and vibration. Teaching directives for singing often draw upon common experiences of vibration throughout the body. The interplay between dark and bright tones, or the contrast of low and high-frequency energy, shapes our understanding of a sung note's style, vocal function, and quality. By linking vibrotactile awareness research with the sensations commonly associated with singing, we can enhance our understanding of these experiences.

**Objective:** The objective of this workshop is to enhance vocal teaching methods by understanding how we perceive sound and vibration, with a specific focus on the interplay between the senses of touch and hearing in vocal training.

**Methods/Design:** This workshop involves interactive demonstrations where participants will use tools such as balloons, tuning forks, and contact speakers. These tools will help explore tactile awareness of sound, experience bone-conducted sound, and discern which frequencies can be felt while singing versus those that are only audible. This approach is aimed at linking vibrotactile awareness research with the sensations commonly experienced in singing.

**Results:** The expected results include a better understanding of the contrast between dark and bright tones, and the recognition that we can feel low frequencies better than we can hear them. Low frequencies tend to sound pure but feel rough, while high frequencies sound rough but are imperceptible as touch above 1000 Hz. Participants will sort the sensations of the sung tone based on these experiences.

**Conclusions:** Participants will leave with an enhanced understanding of the limitations and mechanisms of vibrotactile perception. This will allow participants to differentiate between the components of sound that can be felt and those that are beyond the vibrotactile threshold. The workshop will also explore the implications for vocal function, singing techniques, and the sorting of sensations in applied voice instruction, aiming to inform and improve instructions and directives in the voice studio.

**Keywords:** vibrotactile, perception, pedagogy, acoustics, discovery

## ABSTRACT 241

### Antagonism In Voice Training: Muscle Pairs, Range Of Motion, And Contrasting Sounds

Chadley Ballantyne, Alyson Culbertson

"Antagonism" in the applied voice studio describes the relationships between the opposing groups of muscles responsible for creating ranges of motion in the voice. Many aspects of vocal technique are difficult to isolate and address due to the complexity of the vocal instrument. Directives that draw on the biomechanics of the body enable singers to explore the cause-and-effect relationships between movements and vocal outcomes.

**Objective:** To demonstrate and explore teaching directives based on range of motion and contrasting sounds that can improve movement patterns and facilitate the sorting of sensations. This framework encourages the exploration of contrasting positions, movements, pressure, and vibration throughout the singing instrument.

**Methods/Design:** The workshop will present a series of vocal exercises, demonstrating the roles of muscle pairs and groups in registration, breath control, levels of adduction, resonance, and articulation. Employing a hands-on approach, it will engage participants in exercises based on range of motion, allowing them to experience the direct impact of physical movements on vocal output. Detailed guidance on functional exercises and progressive sequencing methods aimed at improving these movements will be provided.

**Results:** The hands-on exercises are intended to refine movement patterns and clarify sensory experiences. They promote an understanding of how contrasting positions and movement affect the voice. This approach helps singers to identify and abandon unproductive vocal habits, leading to more consistent and desirable singing outcomes across varied styles.

**Conclusions:** The experiential workshop is designed to foster a collaborative and exploratory learning atmosphere, empowering singers with an independent and informed technique. By integrating ranges of motion of the vocal instrument with practice, the workshop sets out to broaden singers' expressive capabilities. Its intent is to offer actionable insights, facilitate practical application, and encourage dialogue on teaching methodologies that teaching strategies that focus on the key muscular relationships crucial to vocal artistry. The ultimate goal is to enable singers to unlock a wider array of timbral and emotional expressions in their singing by incorporating movement into their practice.

**Keywords:** range of motion, voice pedagogy, contrasting sounds

## ABSTRACT 252

### The Use Of Rough Vocal Effects In Singing – How To Train Noises Such As Distortions, Grunts, Growls, Screams, And Many Others In A Healthy Manner

Mathias Aaen, Cathrine Sadolin

This workshop will give a brief introduction to the CVT approach to vocal effects, provide participants with auditory examples from contemporary music, as well as tricks for participants to get a chance to try out the effects in their own voice and get familiarised with tips and tricks for how to work with these advanced singing techniques in a healthy and sustainable way that do not harm the voice. The pedagogical tricks will be supplemented with research findings from across previously published studies to demonstrate the laryngeal setups and acoustics.

Many genres and styles of music make use of intentional rough sounding vocal effects. While they may sound hoarse or harmful, they can be produced healthily and sustainable if performed with correct technique. In Complete Vocal Technique rough vocal effects are classified according to physiological activity, the audible sound, specific ways of teaching, and recommendations for use. Some effects typically used are:

- Distortion (e.g. Janis Joplin in Piece of my heart or Metallica in Enter Sandman)
- Growl (e.g. Stevie Wonder in Living for the City or Christina Aguilera in Fighter)
- Grunt (e.g. Arch Enemy in My Apocalypse or Tom Waits in Hoist that Rag)
- Rattle (e.g. Jennifer Holiday in I Am Changing or Jeff Buckley in Grace)
- Creak and Creaking (e.g. Pink Floyd in One of My Turns or Pink in The One that Got Away)
- Screams (e.g. James Brown in Brother Rapp or Halestorm in I Miss the Misery)

Previously published studies using endoscopic assessments, EGG-investigations, acoustic analyses, and panel-assessments demonstrate the consistent recognition, vocal sustainability, as well as inter-and intra-participant reliability of these vocal effects in studied cohorts of professional singers. All the rough-sounding vocal effects can be learned, trained, combined, and performed in a healthy manner when controlled using specific vocal tract configurations added to healthy phonation types. Complete Vocal Technique has been pioneering pedagogy and research work within this area of teaching and singing for more than 30 years, with multiple publications in research outlets such as Journal of Voice and in books/apps in 10 languages.

**Keywords:** Rough Vocal Effects, Heavy Metal, Rock, Pop, Complete Vocal Technique

## ABSTRACT 254

### Vocal Care Method: From Mix Voice To Mental Techniques

Danila Satragno, Ylenia Baldo

Theoretical and practical session for an artistic voice.

The voice: an identity card.

The global vision of a three-dimensional voice: voice-body, voice-mind, voice -soul.

The power of the mind and the quick integration techniques to manage emotions.

The wellness of the vocal chords: the care and the listening of the body.

Proprioceptive training in autonomy.

Training in alpha waves.

From sound-thought to phonation.

Creating with mental techniques.

Exercises of Body-Emotion and brain gym.

Perception and in-depth analysis of the vocal mechanisms and study of the mix: m1 in mix 2 e m2 in mix 1.

Practice test of the five steps of the study: breathing, warming up, training, repertoire, cooling down.

Improvisation and creation in real time.

**Keywords:** Vocal Care, mix voice, mental tecnique, Body-Emotion, Voice Control

## ABSTRACT 259

### Medicine Meets Art. Use Of Laryngoscopy As Pedagogical Tool In Developement Of Opera Song Students

Hilde Haraldsen Sveen, Petrine Veierød Solli, Elisabeth Beisland, Ola Drange Røksund, Magnus Hilland, Maria Vollsæter, Ellingsen Photographer

**Background:** Increasing numbers of singing teachers have combined traditional pedagogical tools with visual feedback showing promising results on biomechanical behavior. Flexible laryngoscopy is a medical procedure involving the insertion of a flexible camera via the nose, providing a direct real-time view of the larynx and its surroundings. Laryngoscopy is becoming more commonly employed by voice therapists during training sessions focused on articulation and breathing techniques. Aims. The workshop aims to demonstrate the learning outcome of visual access to the singer's instrument using a laryngoscope and to explore laryngeal function, laryngeal movements and muscular responses in combination with specific singing exercises attempting to produce the optimal sound quality.

**Methods:** During the dynamic transnasal videolaryngoscopy (TVL) exercise session, optionally the singer can receive a small dose of local anesthetic nasal spray (Lidocaine® 4%) in one nostril. Then, the laryngoscope is gently inserted through this nostril and into the nasopharynx, where it is positioned to obtain an adequate view of the pharynx and larynx and fixed in the correct position by a specially constructed headband. The laryngoscope video records the pharynx and larynx while the study subject uses their voice in exercises aimed to stabilize the airflow through the larynx, thereby improving the quality of voice and sound production.

**Plan for the workshop:**

5. min. The laryngoscope will be introduced and fixated in the singer by our ENT specialist MD Magnus Hilland.

3. min. The ENT physician will describe the anatomical structures visualized by the laryngoscope.

20.min. The participants will experience real-time visual monitoring of the larynx in a workshop with our vocal song Professor Hilde Haraldsen Sveen. The musical material in use will consist of selected singing technique exercises such as scales and intervals, as well as opera performance material (songs and arias). Throughout the session, the audience will be able to ask questions at appropriate intervals between the exercises.

22.min. It will be possible for participants in the workshop to try out any exercises they may have on our singer. Alternatively, one or two participants may be allowed to undergo laryngoscopy and perform their own exercises.

**Keywords:** laryngoscope, pedagogic tool, opera students, voice, exercises

## ABSTRACT 260

### Musical Theatre Sound For Middle Eastern Voices

Kathleen Bell, Nardine Reda

**Objective:** To explore together the similarities and differences in musical theatre singing for singers whose from the Middle East/North Africa Region.

**Design:** This workshop will be experiential in nature. Together we will explore the different phonemes between Arabic and English. MENA region music theatre performers and American educator and vocologist Dr. Kathleen Bell will discuss their journey at Sharjah Performing Arts Academy in the UAE, which has the first Musical Theatre BA training program in the region. We will explore the intricacies of language, culture, innate vocal quality and accent when MENA region singers explore the predominantly Western Musical Theatre Cannon. They will also discuss the multiple modalities in their training such as Estill, Vocal Function exercises, and resonant voice training. The workshop presenters will also introduce Arabic musical theatre including both their experience singing an Arabic version of Les Miserables in Cairo as well as El Leila el Kebira, a musical theatre piece originally written in Arabic. Participants will experiences differences between the musical scale and the Arabic Maqamat incorporated in Arabic musical theatre.

**Results:** Together we will develop a framework for global musical theatre voice pedagogy. This kind of work has applications to anyone working in voice pedagogy training with singers outside of the UK, US, and Australia, where the language spoken is other than English.

**Conclusion:** Participants will investigate the complexities of voice pedagogy training with Arabic musical theatre singers with applications both in the western musical theatre cannon and the emerging Arabic musical theatre market. This mindset can then be applied to other global music theatre training.

**Keywords:** musical theatre, voice pedagogy, Arabic singing, vocal awareness

## ABSTRACT 271

### The Voice Range Profile: Tricks And Secrets

Malte Kob, Giovanna Baracca

**Objective:** The voice range profile (VRP) is an established acoustic measure, recommended by the European Laryngological Society and the Union of European Phoniatricians, to assess the voice, also in artists. It measures the voice capacity (vocal dynamic range as a function of fundamental frequency) and it is influenced by age, sex, educational and artistic path, voice health, recording conditions, instructor and expressive ability during the recording itself. It represents a useful examination for clinicians, researchers and pedagogists through documentation of the most important parameters of the speaking and singing voice. The resulting VRP plots provide valuable information on the athletic peculiarities and limitations of the artistic voice. Some VRP methods also offer simultaneous display of timbre, singing formants and voice quality parameters.

It must be taken into consideration that the large number of analysis options also produce a lack of standardization in the recording conditions, and there is still a need to share a VRP protocol among clinicians, scientist and pedagogists.

**Methods:** We will record voice range profiles with simultaneous analysis of voice instability, breathiness, roughness, and singing formant in artists performing different styles of singing. The VRP recordings will be realized using a commercial program (lingWAVES Voice Diagnostic Center) and with an alternative set-up allowing for a simultaneous analysis of the recorded voice signals.

We will perform VRP recordings and voice analysis in volunteers, discussing with the audience the recording process, the VRP results and their interpretation.

**Results:** The interactive nature of the workshop allows to relate the VRP parameters to the perceived characteristics of the subjects' voices, e.g. during register transitions.

**Conclusions:** VRP is a useful tool in clinical examinations as well as in research and pedagogy of the singing voice, revealing various aspects of professional singing voice use.

**Keywords:** Voice Range Profile, acoustic analysis, voice assessment

**ABSTRACT 273**

## Biomechanical Assessment Of Voice In Head-Neck Postures And Perceptual Interpretation Of Vocal Signal Alterations: Perspectives In Vocal Rehabilitation And Habilitation

Andrea Bianchino, Lavinia Fiorani, Elisa Costanzo, Anna Lisa Malena, Lorenza Cufari

**Objective:** Head-neck postures profoundly influence the parameters of lateralization, rotation, elevation, depression, and compression of the vocal tract and its intrinsic structures, including the true vocal folds. The workshop aims to explore and experiment the biomechanical effects and impacts of head-neck postures on the larynx and vocal tract through recorded endoscopic demonstrations of the exercises.

**Methods:** The biomechanical tests assessing laryngeal functional status and anatomy are divided into tests with simple maneuvers, such as head extension, flexion, and rotation, and combined maneuvers of rotation and flexion, rotation and extension, in order to evaluate different biomechanical compartments of the glottic plane. These tests involve postural constraints of the head-neck coupled with phonation in specific mechanisms and predetermined parameters such as vowels, frequency, intensity, timbre, duration, and vibratory mechanism, to assess vocal fold symmetry, Edge-to-edge closure quality, tensioning, vibration of the true vocal fold cover, laryngeal elevation, body-cover decoupling, etc.

**Conclusions:** The interpretation of the perceptual framework resulting from the tests is evaluated based on parameters of breathiness, roughness, instability, break, gap, whistle, asthenicity, tremor, diplophonia, etc. The proposed tests are sensitive and specific in both habilitative and rehabilitative contexts, serving to assess the health of the instrument and draw conclusions regarding the morpho-functional status of the vocal folds, as well as prognostic indices of disease. The workshop includes practical evaluation exercises with the participants. " Keywords: head-neck postures, voice evaluation, voice rehabilitation, voice assessment, acoustic measures.

**ABSTRACT 280**

## Fashion In Voices

Elizabeth Ebbink

Fashion in voices Do voices change according to fashion? Yes. We might think that the way we speak is a biological given, but it is extremely social. Gender, country, status are well known to define way of speech. But also fashion. If we observe television speaking voices since forty years ago we see that the four vocal dimensions volume, pitch, timbre and tempo have changed. I will show clips of well known voices from actors, politicians and commercials. The trends I describe are: From factual to personal,

attractiveness is more important than expertise. Patrician accents were the rule, but through the years become less frequent, working class accents are Heard more. Regional accents come into fashion and go out of fashion. The male voice seems to rise and become more breathy, the female voice tends to sink. Vocal fry is getting more and more common. People in their twenties tend to speak much more low and monotonous then their parents. The female voice shows a reflection of the image we have of women. After not being heard for 5000 years it is still a challenge for women to find an effective voice. In the 1950s women are heard with childrens voices, baby voices. In the 1970s we hear the breathy sexy voice, wich now still is the dominant female role model. A relatively new trend is the very low and very monotonous factual female voice in business. Another new trend is the sharp loud female voice in politics.

**Keywords:** psychology, public speaking, media, gender, class

## ABSTRACT 283

### Unlocking Your Vocal Potential With The Power Of Straw Phonation And Its Diameters

Alberto ter Doest

**Voice training with Straw:** Straw exercises, also known as semi-occluded vocal tract exercises (SOVT), have been utilized for decades by vocal coaches and speech therapists. The concept behind these exercises is to partially obstruct the airflow while producing sound, which helps to balance the air pressure against the vocal folds and alleviate strain on the voice. Using a straw as a tool, singers can focus on creating a controlled, steady airflow and establishing a stable vocal foundation. In this workshop I will present, demonstrate and teach the various possibilities of how to use different diameters in Straws for speaking, singing and voice care. I will bring several diameters Straws for participants to use and I will present as well the evidence-based science behind the different straw exercises and show research videos we have made with different SOVT devices like Lax Vox® and Straw. The use of Straws with different diameters have proven to be highly effective in voice training.

**In Speech:** to achieve a more complete closure of the vocal folds, which encourages a balanced sound and more dynamics in Mode 1, a richer fuller Chest voice.

**In Singing:** to develop singing with a low phonation threshold, a comfortable sub glottal pressure, a free voice and open throat, easier transitions from Mode 1 to Mode 2 and a clearer sound through the whole range. For a better resonance due to vocal tract narrowing to optimize sound projection. And to find an easier Mode 1.5 to strengthen a higher Belt range or a strong Mixed Voice.

**Vocal health:** Straw exercises also contribute to vocal health by stretching and decompressing the vocal folds. By utilizing straw techniques, individuals can promote proper vocal hygiene and prevent vocal pathologies. Integrating these straw exercises into daily practice sessions can significantly enhance vo-

cal technique and agility to achieve a clearer voice (less breathy), more range, more loudness without pressure, more freedom, more brilliance (singers formant, twang), greater vocal control, precision, and expressive capabilities. Alberto ter Doest Singer/Voice Coach/Writer of the Universal Voice Guide Founder of The Universal Voice Institute Amsterdam Research Consultant for Lax Vox® Institute.

**Keywords:** straw voice training efficient maximising

## ABSTRACT 284

### The Use of Vpa for the Training of Singing Voice Perception: A Possible Path to Evidence-Based Assessment Strategies for Vocal Pedagogy

Joana Mariz

In this workshop we seek to address an evidence-based and hands-on routine for the assessment of the singing voice, using the Voice Profile Analysis (VPA) as the chief tool.

The VPA is a phonetically grounded instrument for the perceptual assessment of voice quality, which proposes a descriptive system that correlates perception with articulatory and acoustic levels of analysis. The model was designed by John Laver and collaborators and encompasses visual and aural evaluation of vocal tract configurations, vocal fold adjustments and muscular tension. Different configurations and adjustments are described in terms of their relation to a standard reference, the neutral setting.

During the workshop, we will practice how to use the VPA, with the help of some volunteers voices, and correlate what we perceive with a number of technical aspects of singing in general and different singing styles in particular.

Our final goal is to enhance the participants abilities to listen more objectively and precisely for strategies and unconscious faults found in the realm of singing.

**Keywords:** vocal pedagogy, singing, voice quality perception, VPA, phonetics

## ABSTRACT 292

### Intensive Integrated Speech Therapy For Pediatric Dysphonia

Anna Lisa Malena, Cufari Lorenza, Andrea Bianchino, Lavinia Fiorani, Sara Ciuffolotti, Elisa Costanzo

**Objective:** Vocal nodules represent one of the main aetiologies of paediatric dysphonia. [1] The global prevalence of dysphonia among school-age children ranges between 6% and 23%. [2]

Identifying the most effective treatment approach poses a major challenge in speech therapy, focusing not only on selecting the most functional exercises, but also on parental adherence to treatment, patient compliance, and generalization of learning outside the therapeutic setting.

**Methods:** We propose an innovative approach to address these challenges based on intensive treatment, during the pre-voice mutation stage. The model revolves around assessment, therapy using a physiological approach, individually tailored protocols, and generalization of learning. The treatment comprises an initial individual assessment session, shared with parents, a 5-day intensive group therapy of 7 hours each day, and individual follow-up sessions spaced 1-2 weeks apart. The therapy is carried out with exercises within the child's relational and communicative setting, in a group, thereby reducing the disparities between the therapeutic and daily environments. Biomechanical exercises are presented in a ludic manner with active therapist involvement.

We propose an experiential approach with participants in various stages of the model, particularly using laughter exercises to break down communication barriers among participants and exercises aimed at reducing vocal effort (based on reducing subglottic pressure and fold-fold impact stress, minimizing laryngeal constriction, and optimizing resonance management). There are moments of sharing individual sensations perceived during the exercise.

**Conclusions:** The intensive mode enhances parental adherence to the therapeutic plan by eliminating appointments, promoting autonomous practice, and significantly reducing the daily management burden for parents, allowing them to focus more on providing emotional support and actively engaging in their child's healing journey. Additionally, the proposed approach not only induces biomechanical changes through physiological exercises but also generalizes learning from the outset, making therapy a joyful and enjoyable experience in a supportive and collaborative environment that enhances overall communication. All stages of the therapeutic model are fully experienced during the workshop.

**Keywords:** pediatric dysphonia, intensive speech therapy, vocal nodules, voice disorders, childhood dysphonia

## ABSTRACT 294

### Practical Guide for Making Acoustic Measurements of a Room Destined To Develop Voice Research

Glòria Vila Aymerich

The ideal circumstances for extracting acoustic measurements from voice intended for research purposes occur in anechoic chambers, but it is not always possible to access to this type of environments (whether for economic or logistical reasons) nor it is necessarily the best option, as they are uncomfortable for the subject participating in the study and alter their auditory self-perception.

In most cases, voice measurements will have to be taken in the environment that is within reach and that is comfortable for the participant.

At this point, to make sure that the room where the research will be carried out meets certain acoustic requirements, a study must be done to find out how the acoustics could alter the collected voice samples and deal with any setbacks that may arise. Many voice research projects omit this step, do not observe all the necessary acoustic parameters, and take them into account inaccurately.

The purpose of this presentation is, on one hand, to ascertain the lack of uniformity and precision in the expression of the acoustic measurements of the rooms where many voice researches take place through a review of the literature. On the other hand, through the knowledge acquired from specialized literature and the advice of different professionals, the most relevant acoustic measures (room description, background noise, reverberation and critical distance) to consider for voice research and the procedures and equipment to obtain them will be explained, as well as the international and national standards to be taken into account throughout all the procedure. Measurements will be taken and interpreted live in the room where the activity takes place, different software options will be given and an accurate protocol to follow and the appropriate settings for the measuring instruments will be explained.

Thus, the objective of the workshop is to demystify the process of obtaining acoustic measurements and offer researchers some basic guidelines to follow to take and interpret the results, emphasizing the importance of the room acoustics in voice research and demonstrating that everyone can undertake this aspect in their own research project.

**Keywords:** Acoustic measurements, voice research, background noise level, reverberation, critical distance

## ABSTRACT 297

### Kinemission—The Significance of Half-Inverted and Inverted Positions In Freeing The Speaking And Singing Voice

Izabela Jezowska

The workshop is based on the authorial method of voice release through movement named KinEmission (which refers both to speech and singing), produced in collaboration with a physiotherapist. Numerous exercises with active participants will prove that the movement significantly affects the voice.

One of the most important elements of work in this conception are accessories: rubber expanders, fit-balls, weights, and a novelty: Aerial-Yoga hammocks.

Many positions of traditional yoga work excellent in voice training, but effects of antigravity yoga are even more spectacular. This applies especially in inverted positions, because gravity helps to the respiratory (appoggio) or to muscle relaxation.

I am a certified trainer of Aerial-Yoga and for 9 years I use its exercises in working with students of acting. In my presentation I'll show pictures of exercises using hammocks.

Every cycle of exercises should consist of three parts:

I. Adaptive (initial) part

II. Fundamental part

III. Relaxing part

After a short warm-up, I will present a series of semi-inverted and inverted positions performed by myself and by active participants.

While performing the exercises, the participant will emit voices in fragments of texts or songs. Therefore, active participants are asked to prepare a poem, prose or song (operatic aria).

Ideally, actors, pop singers and opera singers would take part in the workshop, but practically the exercises are good for anyone who uses the voice professionally.

Finally, a relaxation sample based on the Alexander Technique in an Aerial Yoga hammock will be presented.

**Number of active participants:** Maximum 5. Loose sports outfit required, active participants will be able to try hanging on scarve.

**Results:** Significant improvement in vocal conditions thanks to the use of gravity and stimulation of the resonators.

**Conclusions:** Half-inverted and inverted positions have a positive effect on the release of the spoken and sung voice.

The form of the workshop requires the ability to hang my Aerial Yoga hammock on a railing and the room height to be at least 3 meters. A keyboard is welcome to be provided.

**Keywords:** KinEmission, singing, voice, Aerial-Yoga, inverted

## ABSTRACT 298

### Biomedical Engineering Applied To Voice Disorders: Therapeutical Interaction By Means Of Electromagnetic Radiation

Félix Fanjul-Vélez, Alfonso Borragán-Torre, José Luis Arce-Diego

Technological approaches to vocal disorders diagnosis and therapeutics are nowadays essential in clinical praxis. Complex endoscopic systems, miniaturized surgical tools or surgical ablation systems

are widely employed. Biomedical engineering contributes to the design, development and implementation of technological devices for voice pathologies diagnosis and treatment. Although most of these techniques are fully established, in the particular case of vocal therapy there are novel technological approaches that are still barely applied. The use of electromagnetic radiation in vocal cords and larynx pathologies is promising. The interaction of this radiation and biological tissues in charge of phonation can provoke beneficial effects, from tumoral tissue removal to inflammation reduction. As vocal capacities are highly related with social interaction, even the alleviation of light but highly impeding disfunctions can have a great impact on daily activities. The appearance of ablation, thermal and/or catalytic effects on vocal tissues depends on particular parameters of electromagnetic radiation. Treatment planning is then critical in order to adjust and personalize radiation parameters according to the desired effect on the patient. In this work we analyze electromagnetic radiation applied to vocal tissues treatment, including surgical approaches. The technologies employed are described, together with the effects on biological tissues, and the fundamental parameters are highlighted. Treatment planning platforms are presented in order to be able to establish a personalized treatment to the pathology in a predictive manner. The proposed treatment approaches are applied to particular examples of vocal pathologies, such as polyps removal or sulcus vocalis.

**Keywords:** Electromagnetic radiation, vocal cords, thermotherapy, inflammation, surgical removal

## ABSTRACT 305

### Posturography and Voice

Andrea Nacci, Silvia Capobianco

Research consistently finds that optimal postural function is essential for enhancing vocal performance. This connection is particularly disrupted by altered muscle tone, for example resulting in functional dysphonia linked to abnormal extralaryngeal muscle activity. However, it remains unclear whether these extralaryngeal tensions are a cause or effect of inadequate laryngeal function. Postural alterations significantly contribute to the development and persistence of functional dysphonia, creating a vicious cycle of coexisting and mutually reinforcing abnormal extralaryngeal tensions and laryngeal dysfunction.

Historical research on the posture-voice relationship has largely been descriptive, focusing on body posture during rest, phonation, and the impact of external devices like microphones on vocal emission. This approach laid the groundwork for understanding the anatomical and functional correlations between posture and phonation but had limitations, particularly in its failure to consider the biomechanical perspective and the integration of sensory inputs coming from the visuo-oculomotor, vestibulo-cochlear and proprioceptive systems, which are crucial for a comprehensive understanding of this phenomenon.

The advent of stabilometric platforms in recent years has addressed these limitations by offering a computerized posture analysis. This technology enables the detection of subtle postural deviations, even in individuals without primary balance disorders, facilitating the study of the reflexive compo-

nents of posture, especially the VestibuloSpinal Reflex (VSR), through static stabilometry. Moreover, this method assesses the significance of various sensory inputs (visual, vestibular, and proprioceptive) in maintaining posture.

This report will describe the anatomical and neurophysiological foundations of the posture-voice relationship, examining how the cervical spine, cranio-cervical alignments, malocclusions, and temporomandibular joints interact with the laryngeal system. It will presents findings from posturographic assessments of patients with both functional and organic dysphonia, pre and post various treatments, and a posturographic study on singers highlighting several exemplary clinical cases, underscoring the intricate connection between posture and vocal function.

**Keywords:** Posture, stabilometry, posturography, functional dysphonia, singers

## ABSTRACT 310

### Vocal Tract Stimulation Exercises For Resonance Development

Elisa Costanzo, Andrea Bianchino, Lavinia Fiorani, Sara Ciuffolotti, Lorenza Cufari, Anna Lisa Malena

**Objective:** Semi-occluded vocal tract exercises are frequently employed to achieve an instantaneous impact on the acoustic output. These are applied in both therapy and vocal training to enhance glottic function and resonance. We present alternative practical protocols concerning noisy inspiratory exercises, with the aim of promptly enhancing the vocal signal by increasing energy across all harmonics of the spectrum.

**Methods:** The training approach outlined includes exercises involving "grunting" and inspiratory /k/ with and without accompanying phonation, with the goal of enhancing sensitivity, perception, and the ability to maintain the vocal tract position experienced during the practice. They are performed on tonal scales of conjunct intervals to memorize the position in relation to the emitted frequency. The exercises target the soft palate area and the retropharynx, coupled with mobilization of the tongue and jaw, as well as activation and deactivation of the postural muscle component. Special emphasis is placed on sustaining the position during expiration. The practice is completed by comparing pre- and post-training performances, executing a sustained vowel, an ascending and descending glissando, and a short sung phrase with participants sharing their perceptual experience.

**Results and conclusions:** Endoscopic results reveal evident engagement of the nasopharyngeal region, including mobilization of the velopharyngeal sphincter, the middle and upper constrictors area, and the dorsum of the tongue. This practice facilitates proprioception, mobilization of superficial tissues, and muscular management of the vocal tract. The experience gathered in the clinical-observational study subjectively indicates: increased ease in reaching higher notes, heightened

tonicity and adductory function of the true vocal folds (although not directly targeted), improved vocal fold closure when ascending in pitch, more rounded vowels, decreased engagement of the false vocal folds, enhanced laryngeal sphincteric action, a perceptibly more resonant voice, increased vocal lightness, a sensation of expanded space, and reduced perception of subglottic pressure. From a physiological rationale analysis, it emerges that during ascending pitch, specific muscle contraction of the middle-upper constrictors and elevator-tensor palatini can be achieved. This skillset can be useful to increase the pharyngeal space; moreover, they could be applied in both theatrical and non-theatrical singing, as well as in spoken voice.

**Keywords:** vocal tract, soft palate, pharyngeal constrictors, resonance, inspiratory exercises

## ABSTRACT 312

### Teaching Strategies For Vocal Tract Configuration: Proposals To Enhance Selective Resonance Development

Lavinia Fiorani, Alfonso Borragán Torre, Andrea Bianchino, Elisa Costanzo, Anna Lisa Malena, Lorenza Cufari, Sara Ciuffolotti

**Objective:** In vocal pedagogy and in scientific research, various biomechanical strategies related to the vocal tract have been identified, which can be employed to influence energy concentration within the acoustic spectrum. The workshop aims to illustrate biomechanical techniques aimed at altering the energy of formants F3-F4-F5 through manipulation of the vocal tract configuration.

**Methods:** Exercises focus on the perimetral reduction action of the laryngeal vestibule, the degree of tension of the pharyngeal mucosa, the regulation of the contractility of the middle and upper pharyngeal constrictor muscles, as well as the lower pharyngeal constrictor muscles with subsequent impact on the piriform sinuses. Modes to modify the vallecular spaces, manage the palatopharyngeal muscle district both in synergy and antagonism with other mechanisms, and understand the effect of the tongue on sound penetration are also explored. The workshop provides hands-on exercises and demonstrates the corresponding endoscopic and electroacoustic aspects of various vocal tract configurations.

**Results:** The evidence presented stems from observational experience in flexible and rigid rhino/laryngoscopy, qualitative spectrography analysis, and perceptual evaluation by both teacher and student. The applications of technical protocols appear to be functional for the effectiveness and efficiency of both spoken and sung voice, increasing energy concentration on the formant band 2000/4000 Hz.

**Keywords:** twang, vocal tract, formants, vocal pedagogy, resonance development

## ABSTRACT 314

### Characterizing Dysarthria In Neurodegenerative Patients By Acoustic Formant Analysis Of Voice

Andrea Nacci, Tamanai Giusti, Silvia Capobianco, Luca Bastiani

**Objectives:** Characterization of the first (F1) and second (F2) formants in vowels represents a reliable method to describe articulatory abilities. In patients affected by neurodegeneration tongue movement range is reduced, with subsequent increase in F1 and simultaneous decrease in F2. To describe this phenomenon two parameters can be used: Vowel Space Area (VSA) and Formant Centralization Ratio (FCR). In this workshop participants will learn on how to acoustically characterize dysarthria by means of VSA and FCR, and to explore the role of these parameters as biomarkers of neurodegeneration, testing them live on dysarthric patients provided and voluntary healthy participants.

**Preliminary study methos:** 91 patients affected by neurodegenerative diseases and 174 non-dysarthric control subjects, 265 in total, underwent voice analysis with formant characterization of the vowels /a/, /e/, /i/, /u/. By computing F1 and F2 for the vowel sounds /a/, /i/, /u/ triangular VSA (tVSA) was created, by adding the vowel /e/ quadrangular VSA (qVSA) was obtained.

**Preliminary study results:** Both tVSA and qVSA were shown to decrease significantly ($p<0.0001$) in dysarthric patients compared to non-dysarthric subjects, while FCR was demonstrated to increase ($p<0.0001$). These changes correlated positively with dysarthria progression as described clinically by the Radboud Dysarthria Assessment (RDA), especially for the vowels /e/, /i/ and /u/. Both VSA and FCR statistically differed ($p<0.001$) between controls and mildly dysarthric subjects, demonstrating their early alteration in disease onset.

**Conclusions:** It is possible to suggest that characterization of F1 and F2 may be useful as an early biomarker of dysarthria and neurodegeneration and a possible biomarker of disease progression."

**Keywords:** Dysarthria, Acoustic analysis of voice, Formants, Neurodegeneration, Vowel Space Area

## ABSTRACT 317

### How To Think? Unlocking The Analytical Approaches And The Cognitive Strategies For Voice Practitioner

Giovanna Ferrara, Andrea Bianchino, Anna Lisa Malena, Lorenza Cufari, Elisa Costanzo, Lavinia Fiorani

**Objective:** present a cognitive approch to support vocal performance. Participants will be invited to identify a problem that is currently hindering their professional progression. A work plan will allow

them to analyze and stratify the problem. They will be able to clearly see which areas require greater focus and which require a different contribution of resources, both internal and external. The aim is to identify at what level a substantial change needs to be made to achieve the desired result.

**Methods:** The demands placed on the nervous system by making music are unique and provide a rich multisensory and motor experience for the musician. As confirmed by neuroimaging studies, music production depends on a strong coupling of perception and action mediated by sensory, motor, and multimodal integration regions distributed throughout the brain" (e.g., Schlaug et al., 2010, Zatorre et al. 2007). Naturally, because of this complexity, the artist finds himself facing various problems that can impact on the performance. For example "musical performance anxiety (MPA) occurs when musicians appear in front of an audience and plays an important role in the careers of professional musicians (Burin et al., 2017) In contrast to this state of anxiety we find the state of flow. Flow is a state of consciousness in which people are completely focused on enjoyable activities. The flow corresponds to a positive experience and is connected to maximum performance, often of a creative nature (Michele Biasutti, 2017). Accessing this state and overcoming performance anxiety includes "different approaches based on awareness, physiological/physical therapies, cognitive/behavioral therapies, prescribed medications, music therapy and psychotherapy. (Zhukov K., 2019).We will focus on the cognitive approach through Rober Dilts' six logical levels of thought which provides a valid tool that allows the artist to extricate himself from the complexity of the tasks and identify at which level a specific problem is generated (Hančević Horvat N et al., 2021).

**Results and conclusions:** Analyzing vocal performance issues through logical levels of thought offers practical insights for artists. By understanding the complexities of performance and accessing a state of flow, artists can enhance their skills and creativity."

**Keywords:** cognitive approach, vocal performance, performance anxiety, vocal pedagogy

## ABSTRACT 328

### Regenerative Treatment Of Vocal Fold Scars By Microfat And Nanofat

Giovanna Cantarella, Annaclara Ciabatta, Ludovica Battilocchi

**Objective:** Aim of this workshop is to describe in a interactive discussion how we treat vocal fold sulci and scars from a surgical and rehabilitative point of view.

**Methods:** The authors will give practical information about autologous fat processing to obtain, process and inject microfat and nanofat to improve vocal fold viscoelastic properties. The rehabilitation program performed before and after phonosurgery will be described.

**Results:** Clinical cases will be presented and discussed. The obtained results will be shown in videos.

**Conclusions:** This workshop will discuss principles of treatment of vocal fold scars and sulci by microfat and nanofat technique with the regenerative purpose to improve vocal fold mass and pliability. The achievable results and possible causes of failure will be discussed.

**Keywords:** sulcus glottidis, vocal fold scar, microfat, nanofat, regeneration

## ABSTRACT 333

### Practicing Four Types Of Intentional Voice Distortions For Contemporary Music: Growl, Grunt, Overdrive And Creaky

Fernando Zimmermann

**Objective:** Participants will learn how to safely access the necessary laryngeal mechanisms to produce four types of Intentional Voice Distortions (IVD) and how to apply it to a song. IVD are rough effects performed in a pure noisy sound or added along with the voice. It has been used by singers in many contemporary styles, from musical theater to pop, but became widely known in rock'n roll style. Such vocal effects have been judged as detrimental for the voice, but past studies have demonstrated that if performed with a proper technique it can be produced with no harm for the voice. This workshop follows up the author's recent study, which has mapped the main mechanisms involved in IVD production and the main strategies applied by experts around the world.

**Methods/Design:** This hands-on workshop will provide each participant with instructions and practical exercises on how to access four types of IVD: Growl, Grunt, Overdrive and Creaky. This will be made through the use of simple stimuli, including a range of vocal tract movements, imitations and other sounds that humans do on a daily basis. Such stimuli can be applied by the participants themselves as well as replicated with their voice students or clients.

**Results and Conclusions:** Participants leave the workshop with valuable tools to study IVD in a safe way, as well as apply with their students and clients. A handout will be given with pictures, schemes and descriptions of the exercises.

**Keywords:** voice pedagogy, voice distortions, rough effects

## ABSTRACT 334

### Motor Learning and Vocal Pedagogy: Practical Implications On Goal-Setting, Communication And Exercises In The Voice Lesson

Fernando Zimmermann

**Objective:** Participants will learn the principles of Motor Learning Theories and how they impact voice teaching. Motor Learning Theories (MLT) is a field of knowledge that may aid singing teachers in providing proper training for skilled vocal performance (Bergan, 2010). However, despite being an essential subject for voice pedagogy, studies that relate motor learning (ML) and voice, especially singing, are scarce (Helding, 2015; Helding, 2016; Nix, 2019). MLT impacts the organization of practice (Schmidt and Wrisberg, 2000), which is the key ingredient for acquiring, improving, and maintaining vocal skills (Helding, 2010a; Nix, 2017). This workshop follows up the author's recent study, which has reviewed a wide range of articles and books on MLT and mapped the main practical implications for Voice Teachers.

**Methods/Design:** This hands-on workshop will provide each participant the chance to reflect about their own practice regarding goal-setting, instructions and feedback provision, and exercises organization in voice lessons. This will be made after a brief presentation of the topic and guided by a reflective questionnaire, which will be provided by the presenter.

**Results and Conclusions:** Participants will leave the workshop with a structured framework to set goals for their students, communicate effectively, and provide vocal exercises that resonate with MLT.

**Keywords:** voice pedagogy, goal setting, motor learning, vocal exercises, instructions and feedback

## ABSTRACT 335

### Breathing Dynamics for Singers: Between Pelvic Floor And Support

Carles Expósito, Iratxe Mugire

Knowing the anatomy and the physiology of the body allows to be more objective during singing.In this workshop, we are going to explore which are the different abdominal muscles who can be involved to produce the voice when singing. I start from the point of view that a physical therapist must be included into a voice habilitation/rehabilitation team, and the different techniques used for this workshop come from our environment.

**Objectives:**

- To detect the different abdominal muscles who can participate in the voice.
- To differentiate the contraction and the activity of them during the singing voice production.
- To improve the abdominal proprioception during the singing function.
- To differentiate what happens on the rib cage and the abdominal cavity: APPOGGIO VS SOSTEGNO.
- To explore pelvic floor contraction.

**Methodology:** Using different exercises to develop proprioception and body awareness, we are going to link abdominal muscles during the voice production. Different tools can be used to improve this sensations to awake: theraband, soft balls, etc. So using US images, exercises and tools we are going to develop from a practical way this mystical thing called support.

**Keywords:** Pelvic floor, Proprioception, Respiratory dynamics , Breaths upport, Singing

## ABSTRACT 340

### Inspiratory Vocal Fry: Anatomical And Physiological Aspects And Application In Speech Therapy, Vocal Pedagogy And Singing

Nico Paolo Paolillo, Elisabetta Rosa

**Objective:** since 2009 we have been using Inspiratory Vocal Fry (IVF) in voice treatment and singing pedagogy to improve vocal folds elasticity and muscle relaxation, to facilitate both vocal warm-up and cool-down. No client or student has ever had any negative side effect, but we noticed that some people couldn't perform easily and correctly the exercise. Hence, in this workshop our aim is to explain the anatomical and physiological features of IVF, how we suggest its use and last but not least to teach some facilitating exercises to help those who find some difficulty in this particular kind of inspiratory phonation. In 2018 we concluded a pilot study whose aim was to highlight anatomical and physiological characteristics of IVF, to assess its effects on spoken and singing voice, to confirm the usefulness in speech therapy and vocal pedagogy. In scientific literature there was no previous specific study on this topic.

**Methods:** 32 healthy subjects (17 male and 15 female) underwent videolaryngostroboscopy to assess the degree of false vocal folds adduction, pharyngeal wall contraction and degree of vocal folds stretching in different types of phonations: expiratory and inspiratory phonation, Expiratory Vocal Fry (EVF) and IVF. All these parameters were evaluated by a group of 3 speech therapists and 1 phoniatrician not belonging to the research group. In addition, for each subject an electroglottography (EGG) was performed for all the types of phonations previously mentioned, highlighting Contact Quotient (CQ) and Closing/Closed Quotient (CCQ). 3 subjects underwent electromyography for a preliminary study on muscles activation in IVF.

**Results:** false vocal folds adduction was significantly reduced in IVF compared to EVF, such as for pharyngeal wall contraction; on the contrary, vocal folds stretching was significantly higher in IVF. Electroglottographic CQ was significantly higher in IVF compared to EVF and the other types of honations. We obtained similar results considering CCQ, as IVF values for this parameter were significantly higher compared to EVF and expiratory phonation.

According to our results, IVF is characterized by higher elastic tension due to a reduced hypertonic contraction of TA muscle and a higher contraction of CT muscle. Electroglottographic results showed a wider vibratory cycle with an improved massaging effect on vocal folds mucosa.

**Conclusion:** IVF is an excellent exercise to reduce muscular hypertonic tension and to facilitate mucosal elasticity. It has no negative side effects and can be applied in speech therapy approach to dysfunctional and organic dysphonia, post-surgical treatment, in voice pedagogy and into singing practice.

## ABSTRACT 345

### Breathing Massage In Vivo

Julia Baumgardt

Would you like to learn an effective and new tool to work on your clients' breathing, to deepen or regulate it?

This workshop will give you practical and helpful insights in the technique of breathing-massage. It's designed for voice trainers and therapists and has nothing to do with counting breathing phases or do some extreme breathing techniques.

You will understand the theoretical background of breathing as the interface between the nervous systems, learn the basics of this method in vivo, train your own perception, trigger deep breathing and the caudal tracheal pull, work on extending phonation, thoracic mobilization and get ideas on how you can use it for regulating processes.

Learn three massage techniques that you can use immediately in your work with singers, speakers or people with stage fright or stress symptoms.

Julia Baumgardt is a highly experienced certified breathing, speech and voice teacher, head of studies at the Schlaffhorst-Andersen School in Germany. She has been successfully training people throughout Europe for over 25 years, coaching singers and speakers, giving seminars and lectures in various languages.

## ABSTRACT 347

### Let´S Live Zarzuela By Singing, Dancing And Dressing Up As A Chulapa/ Chulapo To Perform The Seguidillas From Bretón "La Verbena De La Paloma"

Susana Zabaco

Enjoy Zarzuela by singing, dancing and dressing up as a chulapa/chulapo to perform the seguidillas from Bretón's "La verbena de la Paloma", one of the most emblematic pieces of the género chi-

co& Accompanied by Mario Lerena on the piano, we will sing the score SATTB with the Spanish text pronounced correctly, and a simple choreography dressed in shawls, carnations and headscarves for the chulapas and waistcoats, Madrilean caps and churros cones for the chulapos.

Not gifted dancers are very welcome!

**Keywords:** Zarzuela, Bretón, La verbena de la Paloma, Seguidillas, Género chico

**ABSTRACT 348**

## Choose Your Own Adventure: Student-Centered Learning In The Voice Studio Part 2

Travis Sherwood, David Sisco, Marisa Lee Naismith

The concept of student-centered teaching is not difficult to grasp. And yet, much of vocal training has evolved from the master-apprentice model, which has—for centuries—promoted and institutionalized a binary, hierarchical methodology to teaching and learning. Rooted in the experiences of the master, the master-apprentice model requires students to value the teacher's observations of their voice over their own, often leading students to silence their artistic and technical instincts. When faced with what educator Joseph McDonald calls "a wild triangle of relations" between teacher, students, and subject," it can be challenging for voice teachers to activate a student-centered pedagogy.

Throughout part 2 of this workshop, teachers will be given specific prompts to reflect on their own studio practices and how they might ground their teaching in an inherently flexible philosophy as opposed to a one-size-fits-all methodology. They will also receive resources, such as handouts nd recommended reading.

While a student-centered philosophy can remain steadfast across genres, participants will observe how its application may vary. Presenters Dr. Marisa Lee Naismith, Travis Sherwood, and David Sisco teach in the fields of CCM, Western classical, and musical theatre respectively. They each bring to this workshop their vast experience to further clarify how student-centered practices can be employed in different musical idioms.

Student-centered teaching is a practice, just like singing. Through the specific philosophical and practical adjustments explored in this presentation, teachers of singers may relinquish the traditional role of "master," and assume the role of mentor and co-learner — listening with an empathetic ear and responding to the needs of students while encouraging their sense of individual agency. By activating a student-centered approach, teachers may not only create more equity in the voice studio, they may also stay connected to their joy in discovering and inspiring autonomous artists.

**Keywords:** student-centered, pedagogy, teaching philosophy, autonomous artistry, master-apprentice

**ABSTRACT 349**

## Navigating The Broad Landscape Of Contemporary Commercial Music (Ccm) Markets: Developing Healthy And Sustainable Singers Part 2

Marisa Lee Naismith

Due to the increase in public appeal and accessibility of Contemporary Commercial Music (CCM), demand for voice training across this vast territory of music styles has also increased. Problematically, for teachers working within this ever-expanding marketplace, they are often confronted with how to manage repertoire choices, especially as many students have a keen desire to concentrate specifically on repertoire which is stylistically and aesthetically appealing to them, with little understanding or regard for their technical, expressive and physical abilities and limitations.

In the absence of an authoritative guide to critical listening skills for CCM, teachers who are unfamiliar with a particular style or across a broad range of ever evolving CCM styles, they have been left to their own devices as to how to best assess and manage repertoire requests made by their students. In order for teachers to remain relevant in current music markets, they are required to develop new skill sets or modify existing ones to compensate for the changes in our teaching environment.

Part 2 of the workshop is to explain and demonstrate how it is possible to adapt repertoire across a broad range of CCM styles to ensure it is assessible and sustainable for the individual student. Participants will be guided through methods of identifying areas of potential vocal issues, based on elements such as age, vocal ability, and style related effects, etc.

A toolbox of solutions will be offered, that can be applied directly in the voice studio by teachers who are currently working with CCM students or have a keen desire to explore this option in the future.

**Keywords:** CCM, Student Centred Learning, CCM Repertoire, Critical Listening, Style Parametres

**ABSTRACT 350**

## Connecting People Though Music Part 1

Craig Lees 0

**ABSTRACT 351**

## Connecting People Though Music Part 2

Craig Lees 0

**ABSTRACT 352**

## The Voice And Its Relationship With The Immunological And Psychological Enviroment

Ana Muglietta

**ABSTRACT 13**

## The Professionalisation of Singing Voice Rehabilitation Specialists

Jenna Brown

This paper employs materialist feminist standpoint theory to investigate the question, 'Should Singing Voice Rehabilitation Specialists Professionalise?' Singing Voice rehabilitation specialists are part of a diversifying healthcare landscape in the United Kingdom and stand at the intersection between clinical practice and voice pedagogy. There are increasing numbers of voice teachers advertising voice rehabilitation services, despite a lack of accredited training programmes for the practice. This can lead to divergent standards of care and practice and has sparked debate over whether singing teachers should be extending their scope of practice in this way. Specific concerns have arisen over ethical boundaries of an extended scope of practice. Whilst safeguarding concerns are legitimate, so is the research-based and anecdotal evidence for the importance of the role. In the interests of safeguarding and promoting best practice, this paper argues that ethical standards and professional practices must be prioritised for development to ensure continued support of injured singers.

Professionalisation is a feminist issue, with historical socio-political biases and discriminations that continue to influence our institutions and social structures. To explore the professionalisation of singing voice rehabilitation specialists in this wider socio-political context, this paper is grounded in Feminist Intersectional research ethics. Knowledge offered in this paper is socially co-constructed and partial, including the researchers standpoint as participant, rather than "disembodied reporter". Methods include a literature review, which forms part of data collection and analysis, feminist interviewing, and reflective journalling. These provide thematically analysed data, which is interpreted via the dual feminist lenses of Capitalism and patriarchy. Findings suggest that professionalisation of singing voice rehabilitation specialists is desirable, but that it should be carefully considered within wider institutional and socio-political ideologies and structures of Medicine and Education.

**Keywords:** Voice Rehabilitation, Professionalisation, Ethics, Feminism

**ABSTRACT 28**

## May the Ease Be With You: Taming Tension and Performance Anxiety with Feldenkrais "Awareness through Movement"

Elizabeth Blades

A dynamic performance requires a fine balance between excited energy and calm control. Performance anxiety generally manifests itself as tension because we feel over-matched, under-prepared or somehow threatened by the situation. We instinctively try harder and only succeed in increasing the

tension in areas that are already too tight. Such a vicious cycle causes the performer to focus on his or her short-comings and only on what is "wrong" rather than the bigger picture of what is "right".

For the performer, being "in the flow" is a heady sensation, one of such freedom and ease that it is almost as if someone else was singing. All too often, however, this elevation to the "flow state" is elusive, inaccessible, blocked and impeded by barriers which range from the psychological to the physical. One of the biggest culprits is "negative" physical tension. Problems arise when tension is excessive, misplaced, or insufficient, causing extra effort and blockage.

Named after its discoverer, Moshe Feldenkrais, the Feldenkrais Method is a self-discovery process using movement. Its aim is to produce an individual organized to perform with minimum effort and maximum efficiency. The movements are simple, gentle, exploratory, and fun; they are usually repeated a number of times to clarify and enhance performance.

The Feldenkrais Method is one approach which can help a performer to focus appropriate attention to physical cues via kinesthetic awareness, thereby offsetting negative attention or feelings of inadequacy. It can alleviate or even eradicate such negative tension, thereby enhancing "ease of flow". This workshop is designed to lead participants through "modular" Feldenkrais work, thus helping calm the nervous system without loss of performance energy.

**Complete Workshop Description:**

1. A brief introduction to the Feldenkrais Method.
2. "Pre-test": short group vocal warmup and individual tension identification: participants are guided through a series of brief, simple warm-ups. Identify tension, fears. Select Feldenkrais ATM lessons to elicit changes.
3. Post-test for all; volunteer(s) receive Feldenkrais work specific to "blocked" or impeded areas.
4. Q&A.

**Keywords:** Feldenkrais Awarness Through Movement, Tension, Performance Anxiety, Calming the nervous system

## ABSTRACT 65

### Case Study: Individual Online Singing Class in a Parkinson's Patient. Methodology for the Improvement Of Vocal, Musical And Emotional Parameters

Isabel Villagar

Parkinson's is a degenerative disease that currently has no cure. The approaches in many of the treatments are focused on improving the quality of life of patients (Mandel (1992), Benedetto, et al (2009),

Bentz (2009), Shih et al (2012), Harrison et al (2017), Young Han et al (2018), Baird et al (2018), Stegenmöller et al (2021), Kand and More (2022)).

There are previous studies of the impact of singing on emotional state (Young Han et al (2018), Baird et al (2018), Stegenmöller et al (2021)), on gait (Harrison et al (2017)) and vocal quality (Kand and More (2022)). The limitations of these studies were found in that it was not possible to determine what effects were caused by the singing itself or by the group action and socialization (emotional state), in the duration of the experiments (adherence of vocal practice) and in the type of repertoire that was addressed (collective singing).

This is a case study of a 56-year-old woman who was diagnosed with the disease at 50 and was treated with rasagiline to delay the onset of dysphagia, who does not have vocal pathologies and who has been recommended to attend individual singing classes.

The case don´t present the limitations of previous studies. The student has been attending singing classes regularly for 18 months (and continues to this day). Weekly classes last half an hour and are done online. The set of vocal exercises and their sequencing are described: semi-occluded exercises, simple vocalizations, messa di voce, etc. and a repertoire adapted to the tastes and vocal possibilities of the student at each moment have been used.

This case demonstrates that individualized assistance, focused on the student's musical tastes and sustained over time, has beneficial effects on the voice both in the improvement of vocal parameters (respiratory control, improvement of phono-respiratory coordination, access and manage to high register, improvement of vocal dynamics, improvement of intonation, etc.) and in emotional states as reported by the student herself.

**Keywords:** Parkinson disease, singing lessons, SOVT, singing parameter

## ABSTRACT 80

### Comparison of Acoustic Voice Quality Analysis in Three Groups of Voice Patients

Elina Kankare, Anne-Maria Laukkanen

**Objective:** The acoustic voice quality analysis is used alongside perceptual evaluation in phoniatric clinics as an objective non-invasive method to evaluate patients voice quality. Over the past few years, numerous studies have reported the validity of the Acoustic Voice Quality Index (AVQI) and the Acoustic Breathiness Index (ABI) to detect overall voice quality and breathiness in patients' voices. A recent study with a new clinical acoustic tool, the VOXplot software found that the best acoustic voice quality parameters for distinguishing hoarseness from breathiness are the harmonic-to-noise ratio (HNR), the pitch perturbation quotient (PPQ5), the smoothed cepstral

peak prominence (CPPS) and the glottal-to-noise excitation ratio (GNE). In the present study we test the ability of seven VOXplot parameters to distinguish functional dysphonia, laryngeal dystonia, and vocal fold paralysis.

**Methods:** Participants in the study were 73 speakers with dysphonia (19 males, 54 females, mean age 55 years, SD 15, range 19-84), 26 patients with functional dysphonia, 24 with laryngeal dystonia and 23 with vocal fold paralysis. Recordings of a standard text reading and sustained [a:] vowel were made using a head-mounted microphone. Acoustic analyses were performed with the VOXplot 2.0.1 software using 31 syllables from the beginning of the text reading and three seconds from the middle of the sustained vowel. The parameters used in this study were AVQI, ABI, the HNR, the PPQ5, the CPPS, the GNE and additionally the voice breaks, because the laryngeal dystonia group was included in the study. The Mann-Whitney U test was used to compare the results between the groups.

**Results:** The results of the functional voice disorder group were the closest to normative results and the results of the vocal cord paralysis group were the most abnormal with six out of seven parameters. The laryngeal dystonia group had the most abnormal results with the parameter of voice breaks. PPQ5, HNR, voice breaks and AVQI differentiated the groups functional dysphonia and laryngeal dystonia. The parameters CPPS, HNR and GNE best differentiated the vocal fold paralysis group from the two other groups.

**Conclusion:** The selected parameters well distinguished the dysphonia groups from each other.

**Keywords:** acoustic analysis, VOXplot, dysphonia, breathiness, hoarseness

## ABSTRACT 81

### Spectroacoustic Comparison of the Alaryngeal Voice Among Bilingual Subjects With Voice Prosthesis After Total Laryngectomy

Pina Frau, Carla Ingelido

Alaryngeal voices pose multiple challenges, both clinically and in terms of rehabilitation, as the aim of the therapy is not only to give the patient a new voice but to restore new communicative effectiveness following total laryngectomy. Vocal analysis of these voices remains relatively unexplored, lacking standardization of parameters related to audibility, intelligibility, and deviations, which are currently calibrated exclusively for laryngeal voices. Among the available options, the voice prosthesis stands as the most widely used method globally for post-laryngectomy voice restoration. Our work focuses on analyzing the voice produced through this device.

The study considered 30 bilingual patients, fluent in both Italian and Sardinian languages, who used effortlessy a voice prosthesis for at least one year. Vocal samplings were conducted using software PRAAT for spectroacoustic analysis. Spectrograms were evaluated according to Yanagihara's criteria.

Maximum Phonation Time (MPT) was assessed. Additionally, the patients completed a self-perception questionnaire on vocal characteristics in the two examined languages, rating their vocal output for ease of use, quality, and duration on a Likert scale. Results indicate better management of pneumophonic coordination with a better MPT, improved formant balance, especially concerning F2, and greater fundamental frequency stability in Sardinian compared to Italian. From self-assessment, patients reported higher ease of using the dialect, despite daily use of Italian, highlighting increased spontaneity and reduced need for self-regulation of volume and vocal quality.

**Conclusions:** Despite the wide variability in phonetic and resonant characteristics of the analyzed dialects, the data support the hypothesis of greater ease of use and better vocal quality in the Sardinian language compared to Italian, probably according to age and cultural context of the partecipants, although the latter remains the predominant language in speech therapy following voice prosthesis placement. The study emphasised the importance of expanding spectroacoustic data collection related to patient language preferences for what concerns prevalent language, backgrounds and habits, in order to more accurately calibrate rehabilitative treatment to the speaker's needs and obtain standardized data on alaryngeal voices in spectroacoustic analysis, currently based solely on laryngeal voices.

**Keywords:** alaryngeal voice, total laryngectomy, bilinguism, spectrogram

## ABSTRACT 85

### Dysphonia Rate and Causes In Vocally Trained Children

Ruta Pribuisiene, Kipras Pribuisis, Virgilijus Ulozas

**Objectives:** To evaluate dysphonia rate and causes in vocally trained children.

**Methods:** 115 vocally trained children (56 girls and 59 boys) from four Music Schools were included into the study. The mean age was 12.7 (SD 2.2) years, with no difference between girls and boys (p>0.05). After screening with Lithuanian version of Glottal Function Index (GFI-LT) dysphonia was suspected when GFI-LT score was >3.0 points. Video laryngostroboscopy, auditory-perceptual voice evaluation, acoustic voice analysis and maximum phonation time measurement were performed to specify diagnosis. The degree of singing activity and vocal training type (KLASAK) were evaluated. Correlation between GFI-LT and degree of KLASAK was evaluated to assess the impact of vocal training on dysphonia rate.

**Results:** 28 (10.6%) vocal trained children did not pass the screening. The mean GFI-LT scores was 2.4±3.1 points. After laryngeal examination, dysphonia has confirmed in 5.2 % of children. Voice mutation (43.2 %) was the most common cause ($p<0.05$).

Statistically significant correlations were found both between GFI-LT scores and duration of attendance of Music School ($r=0.39$, $p<0.001$) and between dysphonia rate and voice load (KLASAK) ($r=0.34$, $p<0.001$).

**Conclusions:** The voice training during mutation should be extremely careful and individual. Glottal Function Index in combination with VLS should help otolaryngologists in suspicion and early diagnostics of possible voice disorders."

**Keywords:** dysphonia, children, glottal function index

## ABSTRACT 88

### Convolutional Neural Network-Based Vocal Cord Tumor Classification Technique For Home-Based Self-Prescreening Purpose

Eui-Suk Sung

**Objective:** In this study, we proposed a deep learning technique that can simultaneously detect suspicious positions of benign vocal cord tumors in laparoscopic images and classify the types of tumors into cysts, granulomas, leukoplakia, nodules and polyps. This technique is useful for simplified home-based self-prescreening purposes to detect the generation of tumors around the vocal cord early in the benign stage.

**Design:** Retrospective study.

**Methods:** We acquired 2183 laryngoscopic images (349 from the healthy group and 1834 from the benign group) from the Picture Archiving and Communication System of Pusan National University Yangsan Hospital after IRB approval. A trained otolaryngologist acquired, classified, and labeled the imaging data. All acquired images were unidentified before the model application. The images in the benign group were further divided into the following five subgroups: cysts, 242 images; granulomas, 386 images; leukoplakia, 291 images; nodules, 256 images; and polyps, 657 images. The acquired images were then divided into training, validation, and test data sets at a 3:1:1 ratio.

**Results:** We implemented four convolutional neural network (CNN) models (two Mask R-CNNs, Yolo V4, and a single-shot detector) that were trained, validated and tested using 2183 laryngoscopic images. The experimental results demonstrated that among the four applied models, Yolo V4 showed the highest F1-score for all tumor types (0.7664, cyst; 0.9875, granuloma; 0.8214, leukoplakia; 0.8119, nodule; and 0.8271, polyp). The model with the lowest false-negative rate was different for each tumor type (Yolo V4 for cysts/granulomas and Mask R-CNN for leukoplakia/nodules/polyps). In addition, the embedded-operated Yolo V4 model showed an approximately equivalent F1-score (0.8529) to that of the computer-operated Yolo-4 model (0.8683).

**Conclusions:** Based on these results, we conclude that the proposed deep-learning-based home screening techniques have the potential to aid in the early detection of tumors around the vocal cord and can improve the long-term survival of patients with vocal cord tumors.

**Keywords:** larynx, tumor, cancer, artificial intelligence

**ABSTRACT 100**

# A Methodological Approach for Establishing Shared Reference Anchors For The Auditory-Perceptual Evaluation Of Vocal Quality Attributes—Breathiness

Neus Calaf, David Garcia-Quintana

Auditory-perceptual voice assessment, fundamental in the clinical diagnosis of voice disorders, faces a major challenge due to poor inter-rater and intra-rater agreement, which limits the validity of the assessments The establishment of shared reference anchors for the different vocal quality attributes would provide an objective yardstick against which assessments can be gauged, limiting subjectivity, and thereby facilitating comparability between evaluators.

**Objective:** The objective of this study is to explore the effectiveness of sensory evaluation methods in assessing breathiness in normalized voice samples, to establish a robust methodological approach for the future development of consensus anchors for the auditory-perceptual evaluation of other vocal quality attributes such as roughness and strain.

**Method:** We processed 150 sustained [a] vowel samples from the Perceptual Voice Qualities Database, standardizing them to a duration of 1.5 s and an intensity of 70 dB. The samples were then organized into six collections according to their fundamental frequency. Normalization in duration, pitch, and loudness, aimed to facilitate the rater's focus on the assessment of breathiness. Twelve expert speech-language pathologists were divided into three groups, with each group tasked with evaluating two distinct voice collections. A Two-Alternative Forced Choice experiment was used to rank the voices from the lowest to the highest breathiness. Subsequently, the severity of breathiness in each ranked sample was rated from 0 to 100 using a series of Visual Analogue Scales.

**Results:** Our findings demonstrate the validity of our experimental approach with the vocal attribute of breathiness. Analysis using the Intraclass Correlation Coefficient (ICC) reveals an excellent agreement in how raters ranked a series of 25 voices from least to most affected. Furthermore, there was good agreement among raters regarding the specific numeric scores assigned on a 0-100 Visual Analog Scale (VAS). These results allow us to propose reliable consensus anchors that may serve as shared references for the clinical evaluation of the severity of breathiness.

**Conclusions:** Our work will be replicated in the future to provide similar reference anchors for the evaluation of roughness and strain.

**Keywords:** Ulozas Voice quality, Auditory-perceptual evaluation of voice, Breathiness, Sensory evaluation, Voice disorders

**ABSTRACT 110**

## Phonetic Grounding of Vocal Skills Development Courses Focused On Public Speaking, Stage Speech and Singing at Czech Universities

Adléta Hanžlová, Jan Volín

Phonetic knowledge can usefully inform vocal skills development. However, many voice professionals in the Czech Republic do not come from a phonetic-based education. The purpose of this study, therefore, was to examine literature used in university courses focused on vocal skills development in three fields – public speaking, stage speech and singing – as to their phonetic grounding. The aim was to establish the main themes in university courses and evaluate to which extent the methods presented are informed by phonetic knowledge in five operational domains – fundamental frequency, sound spectrum, amplitude, temporal characteristics and articulation.

Twenty publications (6–7 in each field) were chosen from university curricula. Based on recurring themes across the publications, a set of categories was identified for each of the fields examined, into which the publications' contents were sorted. Relevant categories were then assessed in terms of awareness of the phonetic domains (above). Publications of all fields referenced phonetics, however, the extent to which the domains were presented varied.

Public speaking publications focused mainly on elocution and orthoepy, thus drawing mainly on knowledge of the phonetic articulatory domain. Other domains were referenced in sections focused on intonation ($f_0$), loudness (amplitude), rhythm and speech tempo (t) and voice resonance (spectrum). However, the publications showed varying degrees of knowledge in these domains, some of them only acknowledging all prosodic properties jointly as "voice modulation".

Publications on stage speech paid attention to the articulatory domain along with other topics such as voice resonance and timbre (spectrum), intonation and pitch ($f_0$) speech tempo and rhythm (t) or loudness (amplitude). Interestingly, about half of the publications were prevalently focused on elocution, while others focused mainly on the other topics mentioned, one omitting the articulatory domain entirely.

Singing publications addressed phonetic domains in various topics such as articulation, voice range ($f_0$), voice resonance (spectrum) or dynamics (amplitude). Temporal characteristics were discussed only very scarcely. Many topics and subtopics (e.g. voice registers) focused on multiple phonetic domains at once. Discussion of the spectral domain was more prevalent than in the other two fields, and most publications showed a satisfactory phonetic knowledge base."

**Keywords:** vocal skills, public speaking, singing voice, stage speech, phonetic domains

**ABSTRACT 118**

## Screen11: Validating A Screening Instrument For Voice Disorders In Accordance With The Cosmin Framework

Sofia Holmqvist-Jämsén, Daniel Fellman, Greta Öhlund Wistbacka, Jonna Kuuskoski, Miia Ruuskanen, Alma Zenger Zenger, Jemima Rantanen, Susanna Simberg

**Background:** Although numerous patient-reported outcome measures have been developed and validated to quantify the impact of voice problems on different aspects of life, to our knowledge no screening instrument exists that specifically captures voice disorders in a retrospective fashion. The items in Screen11 have during the last decades been used to establish the prevalence of voice problems in both general and occupation-specific populations in the Nordic countries. However, the instrument has not been validated. The aim of the present study was to examine the psychometric properties and diagnostic validity of a retrospective voice screening method, Screen11, according to the COSMIN framework for health-related, patient-reported outcome measures.

**Method:** The voice patient group (n = 54) in this study comprised of patients from the Turku University Central Hospital phoniatric outpatient clinic seeking help for their voice problems. For these voice patients, we recruited voice-healthy controls (n = 61) who matched in terms of gender, age, and occupation. The participants responded to the Screen11 questionnaire along with the VHI and the VAPP.

**Results:** The results of the initial exploratory factor analysis showed that all the Screen11 items loaded on a common underlying latent factor. Furthermore, Screen11 had high internal consistency ( = .93) and correlated sufficiently with other voice questionnaires.

**Conclusion:** The results indicate that Screen11, which screens for possible voice disorders at an early stage, was successfully validated. With respect to its diagnostic validity, the Screen11 sum score is preferable.

**Keywords:** Screen11, Screening, Validation, Voice disorders, cosmin

**ABSTRACT 129**

## Working With Singers with Hypermobility Spectrum Disorders, Hypermobile Ehlers-Danlos Syndrome, and Postural Orthostatic Tachycardia Syndrome

Joanne Bozeman

In recent years there has been increased attention and awareness regarding Hypermobility Spectrum Disorders (HSD), Hypermobile Ehlers-Danlos Syndrome (hEDS), and Postural Orthostatic Tachycardia Syndrome (POTS). A Welsh study found that hEDS and HSD affect one in 500 patients (Demmler et

al., 2019), and are more common among musicians (Shiebani-Rad et al, 2013) and dancers (Skwiot et al., 2019) than in the general population. In one study, up to 74.6% of those diagnosed with HSD/hEDS experienced voice difficulties, which may include dysphonia, vocal fatigue, lowered voice intensity and increased risk to and slower healing of connective tissues. (Jeffery et al., 2021). Many patients with HSD and hEDS either have symptoms of or have been diagnosed with POTS, a form of dysautonomia. It is estimated that up to 40% of HSD/hEDS patients meet diagnostic criteria for POTS (Mayo Clinic, 2021 and numbers may be increasing as POTS is now included as a possible sequela of COVID-19 (Mallick et al., 2023). Symptoms of POTS include dizziness, brain fog, shortness of breath, and difficulty standing. Voice practitioners will likely work with students/clients who are uniquely affected by a range of symptoms related to one or both of these diagnoses. The poster is not intended to convey a single study. Given PEVoC's interdisciplinary status, its objective is to raise awareness of these complex conditions among voice professionals, including teachers, conductors, singers, voice researchers and clinicians. To assist voice professionals who encounter singers with these diagnoses, curated information will include related studies and other educational sources, typical symptoms, and potential effects on voice and performance. Singers with these conditions may be challenged in the contexts of rehearsal and performance, thus, potential accommodations and consideration of the stigma around these "invisible" diagnoses will be discussed. Those who interact with the poster will gain increased understanding of HSD, hEDS and POTS, as well as insight regarding appropriate, supportive practices for singers. Provided with this interdisciplinary knowledge, voice professionals who work closely with affected singers and clients will be informed and able to assist them in developing individualized strategies for voice and performance challenges.

**Keywords:** hypermobility, hEDS, POTS, pedagogy

## ABSTRACT 138

### Approaches to the Treatment of Pathological Mutation

Kateryna Kurenova

In phoniatric practice, there are cases of pathological mutation, when the formation of the normal voice of an adult does not occur on its own Goal. Investigate the role of voice therapy in pathological mutation.

**Materials and methods:** 27 young men from 15 to 30 years old, who did not have a normal mutation, were examined before and after phonopedic correction. Video laryngoscopy, video laryngostroboscopy, high-speed video recording of the larynx (R.Wolf, Germany), a complex of phonopedic exercises.

**Results:** Complaints Pronounced voice dysfunction, which arose against the background of puberty, psychological discomfort, withdrawal, reluctance to attend educational institutions, disturbed contacts with the environment. General examination: the larynx has grown to the size of an adult, secondary sexual characteristics are fully formed, and the establishment of a normal natural adult voice has not

occurred. The term of impaired voice function lasted from 6 months up to 15 years. Virtually no connection of the chest resonator during voice control, falsetto sound delivery mechanism. The larynx has not descended to the level of an adult and the external muscles are under tension. Instrumental examinations. Hypertonus of the vestibular part of the larynx with the formation of a pseudofold mechanism of voice formation, the amplitude of vibratory oscillations of the vocal folds is reduced, in some cases to complete absence, dyscoordination of vibratory oscillations.

**Phonopedia:** The applied set of exercises, which allowed lowering the larynx to the level of an adult, eliminated the hypertonus of the vestibular folds, the pseudofold mechanism of voice formation. It is mandatory to connect a chest resonator, which is practically absent in such patients. Connecting the chest resonator is carried out with the help of exercises with the head tilted slightly forward. This contributes to the involvement of the entire mass of vocal folds in the process of voice production and the elimination of the falsetto mechanism of voice production. When conducting a study of the vocal apparatus with the help of high-speed video recording, after treatment, normal laryngeal motility indicators are registered in all patients. The voice of all patients was completely restored.

**Conclusion:** In the case.

**Keywords:** mutation dyspphonia, phonopedia, voice therapy

## ABSTRACT 144

### "Shout Out The Window!"—A Setup for Acoustic and Electroglottographic Analysis Of Shouting Voice Trainings

Lara Höffner, Anna Wessel, Sven Grawunder

**Objective:** Shouting is part of everyday life for many speech-intensive professions such as actors, singers, teachers and sports coaches. Nevertheless, there is little research into this voice practice (e.g. Lagier et al. 2017, Traunmüller & Eriksson 2000), hence specific measurements need to be adjusted for such extreme vocal performances. Therefore the objectives of this study are at least twofold, namely aiming at data of shouting voices in realistic training sessions and exploring robust parameters in acoustic and electroglottographic signal analysis. In this way it can be examined what kind of experimental set-up and analysis pipeline can be effectively used for generating a shouting voice reference corpus.

**Methods:** Measurements were conducted using sound level meter and calibrated microphone (Svec & Granqvist 2018), placed at a controlled distance from 13 healthy students of speech science. The task included a text passage in modal (reading) voice and in three shouted sequences, with voice exercises in between. The text was created by means of short utterances of suitable context, and a selection of different syllabic onsets (/h-/, /v-/, /ʔ-/) in combination with German vowel phonemes. After applying forced alignment of the text (WebMaus LMU Munich), individual vowels from different words (n=287)

were targeted using a customised PRAAT script and analysed for intensity, fundamental frequency (f0) and quasi contact quotient (QCQ; Herbst 2019), closing quotient and band energy difference (BED: 0 to 2 kHz vs 2 kHz-4kHz; Bele 2005). Statistical tests comprise ANOVA on a group level (speech/shout), linear mixed effects modeling for including individuals as fixed factors with random slopes.

**Results:** As expected, we find significant differences between the modal and shouting voice in all the analysed parameters on a group level and individually. Compared to the modal voice, the intensity, f0, QCQ increase, next to a BED decrease, the letter indicating towards a more prominent speaker's formant, in the shouting voice. Large vertical laryngeal movement is observed to obstruct especially phonological glottal onsets.

**Conclusions:** The present experimental setup demonstrates a viable approach of including voice analysis into shouting voice trainings, allowing to reference and compare individual voice profiles.

**Keywords:** voice training, shouting voice, electroglottography, acoustic analysis

## ABSTRACT 161

### Development of a Voice Treatment Protocol for Unilateral Vocal Fold Paralyses When Surgery Is Not Indicated

Ditte Søbæk Johansen, Martha B. Larsen, Ina Bjørneboe, Anne Bingen-Jakobsen

**Background:** Surgical options for unilateral vocal fold paralysis (UVFP), including medialization of the vocal folds, are used more frequently and earlier after the onset of the paralysis. However, there is still a group with UVFP who are not candidates for surgery for various reasons. For this group, voice therapy provided by speech-language pathologists (SLPs) becomes even more crucial for their possibilities to achieve the best possible voice function and to overcome the consequences of a voice problem.

**Objective:** Our aim is to establish an effective treatment protocol for UVFP patients for whom surgical options are not indicated. The challenge was to qualify and contextualizing treatment options and come to a consensus on a treatment plan in a voice therapy team with diverse perspectives and experience.

**Methods:** 4 SLPs with different levels of experience (1, 3, 17 & 25 years) met for 4 consensus-building meetings. A treatment protocol was made based on reading of articles and 7 case studies divided into 4 women and 3 men with UVFP aged 39-70 years.

**Results:** In the treatment protocol, the following elements appear Information about the impact of the voice in UVFP and coping, vocal hygiene, positioning and respiration, voice exercises (e.g. phonation in a tube and chanting), voice amplifier testing, and continuously carry-over exercises.

**Conclusions:** On the basis of consensus meetings the voice therapy intervention in UVFP, where surgical options is not performed, is mapped and described in a treatment protocol. The treatment protocol is currently under testing, with conclusions pending results.

**Keywords:** Unilateral vocal fold paralysis, Voice treatment protocol, Voice therapy, Concensus-building meetings.

## ABSTRACT 164

### Demonstration of Using Acoustic Software to Monitor Changes to the Mature Voice

Rebecca Moseley-Morgan Moseley-Morgan

**Objective:** Based on the main findings from the author's doctoral research on the longevity and functionality of the mature female voice, completed in January 2024, there is a need to monitor changes to the voice objectively over time. The traditional student-teacher model of the teacher listening and giving subjective feedback and the student responding based on that feedback can be misunderstood. There is also evidence in the literature that visual feedback can be more readily understood than verbal feedback. The author has explored using acoustic software to identify features of vocal output, such as inharmonic noise or mode of phonation, and grade these features on a scale of 1-3. The main aim was to develop a scale similar to GRBAS or the Voice Handicap Index used by Speech and Language Therapists, for the use of singing teachers and singers. The ability to recognize vocal change as soon as possible would allow the teacher to target the change with appropriate vocal exercise. Findings from the thesis indicate that some areas of vocal deterioration can be improved, as ageing is not a clearly defined pathway which occurs to all singers in a linear, patterned way.

**Method:** The author proposes to do a live demonstration of using acoustic software. She would ask for volunteers to help demonstrate how a voice can be assessed using this method. She would demonstrate how the software could identify the following:

- Mode of phonation
- Onset
- Harmonics
- Position & strength of formants
- Harmonic to noise ratio
- Intensity
- Singer's formant cluster

From the results she would demonstrate how to target any areas of concern with appropriate vocal exercises.

In the future the author hopes that this method will become a recognized system for assessing the mature voice which will be of use to singing teachers. This would help them monitor and assess changes to the mature voice over time and improve or maintain the longevity of the voice.

**Keywords:** Acoustic software, Vocal assessment

## ABSTRACT 165

### Monitoring Resonance Changes in The Mature Female Voice With Acoustic Software

Rebecca Moseley-Morgan

**Objective:** Menopause, loss of elastic and collagenous fibres and loss of smoothness at the edge of the vocal folds, may cause changes in vocal timbre and vocal fold vibration. It is important to monitor these changes over time in order to use effective teaching methods to mitigate these changes. Perceptual acoustic changes can be perceived with the aid of acoustic software. The author has explored the possibility of scoring these changes in order create a robust and objective way of monitoring the voice.

**Method:** A group of singers and a group of non-singers were asked to vocalise on a vowel chain of 5 Italian vowels. These were recorded in Voce Vista Pro. The power spectrum, the spectrograph and the vibrato track were used to assess the components of the voice which were considered to be attributes of good tone and resonance, resulting from a well-produced vibration from the voice source producing many strong harmonics. The software allowed for assessment and scoring of the following acoustic features:

- Mode of phonation.
- Vocal intensity.
- The position and strength of the formants.
- Evidence of a singer's formant cluster.
- Does the position of the first and second formant of the [i] and [ɑ] vowels indicate a convergent vocal tract.
- Is there consistent vibrancy across the formants on all five vowels.
- Is there evidence of non-harmonic noise in the spectrogram.

**Results:** The professional singers all had the highest scores. All results were extremely variable with no obvious pattern of improvement or deterioration over time. The scores tallied with the subjective judgement of experts indicating that this method of scoring resonance was robust and had validity.

**Conclusions:** Technical proficiency is a factor in maintaining good tone. Age-related changes do not cause deterioration of tone. This system has the potential to become an excellent method for taking baseline measurements of vocal tone, similar to the GRBAS system and can monitor vocal change over time.

**Keywords:** timbre, assessment, vocal change, mature

## ABSTRACT 170

### Application of Avqi in Spanish and Catalan Child Population: Preliminary Results

Josep Vila-Rovira, Paola Carmona-Colomina, Andrea Sellés-Vidal, Clara Puig-Herreros

**Objective:** The aim of our research is to study the use of AVQI in the Spanish and Catalan child population and provide reference values.

**Method:** This is a prospective observational study with a sample of 81 children (43 boys and 38 girls) aged between 5 and 11 years. The children produced three vocal productions: sustained vowel, reading two sentences from the CAPE-V and counting up to 12. Recordings were made in low-noise environments using quality digital recorders and evaluated with the G parameter of the CAPE-V by four speech therapists specialized in voice disorders.

**Results:** The Pearson correlation was measured between the average score of the CAPE-V and values obtained with AVQI in the four samples of sustained vowel and speech (sentences and counting in Catalan and Spanish). All correlations are statistically significant with a p-value < 0.001. AVQI-Spa-Sent:0.721; AVQI-Cat-Sent:0.639; AVQI-Spa-Count:0.801; AVQI-Cat-Count:0.639.

The mean scores obtained in the group of children with dysphonia were significantly different from those of children with normal voice: Student's t-Spa-Sent:-6.334; Student's t-Cat-Sent:-4.171; Student's t-Spa-Count:-3.852; Student's t-Cat-Count:-4,918 (p-value < 0.001).

The diagnostic capacity of the tests was demonstrated with ROC curves and the Area Under the Curve (AUC / 95% C.I.) and determining cutoff values [cutoff]: AVQI-Spa-Sent:0.843 / 0.668-1.000 [3.9]; AVQI-Cat-Sent:0.901 / 0.761-1.000 [3.4]; AVQI-Spa-Count:0.843 / 0.678-1.000 [3.6]; AVQI-Cat-Count:0.934 / ,806-1,000 [3.5].

**Conclusion:** Reading difficulties were observed in younger children, with scattered scores, but the data allow considering AVQI as a sensitive tool for the objective measurement of dysphonia in children.

**Keywords:** Children voice, Dysphonia, Acoustic evaluation, Multiparametric voice assessment, Diagnostic accuracy

## ABSTRACT 184

### "Cada Tanto Muero, Pero Hoy No": The Singing Experience as an Inventive Attitude Regarding the Life Histories of People in Involuntary Immigration Situation

Andressa Dias Arndt

This qualitative intervention research intended to verify if musical group experiences, lived within Music Therapy, contributed to the emancipatory process of the participants. Eleven Music Therapy meetings were held, with eight people in involuntary immigration or refugee situations, all being from Venezuela although it wasn't an inclusion criteria. We were inspired by Jacques Rancière's Method of Equality, and we have made a thematic analysis of the information built during the process. We argue that Music Therapy can contribute to the emancipatory process of the people in involuntary immigration or refugee situations if it resists a stultifying logic to promote creative spaces so the people's voice can find in the music elements and parameters a possible contour to testify their lives and report the suffering felt by them. The Music Therapy meetings were constituted as a caring space as well as a space of listening to these voices. This research indicated that the singing voice could mediate emancipatory and elaboration of mourning processes. Despite their singular histories, all the participants had in common the process of pain elaboration caused by someone/something lost. One of the participants said she couldn't speak in her first meeting, just cry and sing. The singing experience was shaped as a space of verifying these voices' power, that when sung, were strong and well projected, with a good airflow, with modal/chest voice (M1) and some vibratos. When they sang, it was possible to listen to their pain report caused by the forced immigration experience. However, on the other hand, it was possible to listen to their desire to put their lives in movement, an inventive attitude regarding their histories, mediated by the singing experience. We consider that human beings have the capability of self-invention, and the possibility to establish tensions in the field of living, and the singing voice made it possible to restart and claim: "cada tanto muero, pero hoy no"!

**Keywords:** Music Therapy, Immigrants, Emancipation, Singing

## ABSTRACT 201

### Personality Traits in Singers Performing Various Music Styles and With Different Singing Status

Ewelina Sielska-Badurek

**Objectives:** Objective was to find personality traits in singers performing various music styles and with different singing status.

**Methods:** The study consisted of 87 singers (66 females, 21 males; mean age: 25.5±8.2 years; 40 students, 22 professionals and 25 amateurs; 38 classical singers, 42 contemporary commercial music (CCM) singers; 55 solo singers and 22 choral singers). Participants filled in the NEO-FFI questionnaire and Demographic Information Form.

**Results:** Median values compared to the Polish general population, suggest that solo, CCM, student and professional singers have a high level of Conscientiousness. Those who sing in a choir, classical music, amateurs and students have relatively high level of Agreeableness. High level of Extraversion is observed among CCM singers and students. Students score higher on Extraversion then professionals ($p<0.001$). Professionals score higher on Extraversion then amateurs ($p<0.01$). Professionals less frequently than amateurs and students score high on Agreeableness ($p<0.001$). High scores on Conscientiousness are significantly higher among professionals and students compared to amateurs ($p<0.001$ in both cases). Solo singers have higher level of Conscientiousness ($p<0.001$) and Openness ($p<0.001$) and lower Neuroticism ($p<0.01$) than choral singers. Classical singers more often than CCM singers score low on Openness ($p<0.01$) and high on Agreeableness ($p<0.01$).

**Conclusions:** Classical singers have lower level of openness and higher level of agreeableness than CCM singers. Neuroticism is higher among choir than solo singers and conscientiousness is higher among solo than choir singers. Amateurs had the highest level of neuroticism and the lowest level of conscientiousness as compared with professional singers and students.

**Keywords:** singers, singing, personality, music styles

## ABSTRACT 206

## Rösthjälpen – A Swedish Voice App to Support Patients with Voice Disorders

Karin Huss

**Objective:** Patients receiving voice therapy report difficulties in remembering how to train correctly with their breathing and voice exercises between sessions with the Speech Language Pathologist (SLP). Subsequently, this innovative project aimed to (1) develop an App to facilitate voice training for patients by giving them electronic access to individually created exercise programs that the SLP could then easily adapt and edit on a digital platform, and (2) to preliminarily investigate patients' perceptions of voice training with the App at home.

**Methods/Design:**

1. App design: Technical development has been carried out by a contracted company in close collaboration with a voice specialist SLP, at Danderyd´s hospital, Stockholm, Sweden, and the

hospital´s Innovation Department. Audio files were recorded by the SLP. An external consultant made illustrations. The exercises in Rösthjälpen are easy to repeat and contains exercises such as abdominal breathing, resonant voice, flow phonation as well as tube phonation and exercises adapted to ease transfer and generalizing of new vocal behaviour.

2. Patients' perceptions of the App were investigated in a pilot survey. Fourteen patients (10 females, 4 males) were consecutively recruited to answer a short questionnaire that collected quantitative binary (yes/no) data with follow-up qualitative, open-ended questions to further ascertain the patients' opinion and feedback.

**Results:**

1. The App contains 42 pre-recorded exercises, which can be combined into various individually adapted training programs. The patients access their programs via an individual code. The App has so far been used by an estimated seventy patients at the Speech-Language Clinic.

2. The pilot survey evaluation of the App (n=14) indicated that the App made it easier to carry out individual voice therapy at home. The majority (n= 13) stated that they exercised with the App several times a week and (n=12) answered that they wished to continue with their exercise program via the App even after the therapy sessions with the SLP has been ended.

**Conclusions:** The App Rösthjälpen (in Swedish) is available via all App Stores and is reported by patients to be useful. Future research to further investigate user-feedback and voice-training impact is recommended and underway.

**Keywords:** Voice App, Innovation, Speech Language Therapy, Voice training

## ABSTRACT 215

### A Review of the Benefits Of Singing

Bruna Francisco Martins, Emily Cooper, Dana L. C. Greaves

**Objective:** The poster provides an overview on the topic of group singing and health and spotlights the Singing in Balance network: a group of researchers and organisations based in the UK looking at the effects of choir participation on well-being and health. The aim of this research is to summarize and publicize the knowledge produced by this collaboration to help better inform current practices and promote further discussion around this topic.

**Methods:** The three researchers involved in this project have individually explored the existing literature on this topic then discussed their findings and critiques with each other to infer the results and implications. The studies examined were found in various online databases and the library databases of the University of Leeds, the University of Sheffield, and the University of York.

**Results:** Research has found that singing can have various benefits on one's physical health, mental health, and wellbeing. Regarding physical health, many studies have focused on health conditions such as cancer, chronic pain, and Parkinson's in which the results found improved breathing, posture, and muscle tension with singing interventions. Emerging studies also identify benefits to individuals struggling with mental health issues such as anxiety, depression, PTSD, and dementia such as improved self-regulation, sense of purpose, and personal expression. Singing may additionally improve life satisfaction, self-efficacy, and positive emotions and in group settings as it can provide a sense of belonging, self-identity, group identity, and cohesion as well as facilitate the 'ice breaker' effect.

**Conclusions:** There is a wide range of benefits that come from singing on both individual and collective levels and promoting the use of singing for health interventions is arguably one of the most accessible forms of arts interventions. As singing interventions focus on elements such as breathing and community building, virtually anyone can join within the right context and with the desire and resources to. By presenting the Singing in Balance network we too are creating another level of accessibility by encouraging open discussion and collaboration within this field.

**Keywords:** singing, choir, health, wellbeing, music psychology

## ABSTRACT 221

### Management Of Pharyngeal Residue With The Tpep® One Device in Patients with Parkinson 's disease And Dysphagia: A Case Report

Marta Musso Musso, Jacopo Colombini, Fiammetta Fanari, Dario Strangis

**Backgound:** Respiratory training, through increased expiratory load, influences increased activity, strength and bradykinesia of the pharyngeal musculature with a decrease in pharyngeal residue, particularly of solid consistency. Current respiratory training techniques are dominated by training of the expiratory muscles, but it has been suggested that combined training of the inspiratory and expiratory muscles can improve airway safety in swallowing.

The "I/E mode" programme, delivered with the TPEP® ONE device, guides the patient to perform slow and deep exhalations and inhalations. This is possible by promoting recruitment of the lung periphery and active work of the inspiratory and expiratory muscles, using visual feedback and inspiratory and expiratory resistance.

**Investigation's objective:** Explore the effectiveness of simultaneous inspiratory and expiratory training with the TPEP® ONE device—"I/E mode" (Medical Product Research srl—Legano, Italy) in order to improve pharyngeal residue management and self-perception of swallowing difficulties in a patient with PD and dysphagia.

**Methods:** The selected patient is 82 years old and has been diagnosed with PD for 25 years.

- Fiberoptic Endoscopic Evaluation of Swallowing (FEES)
- Presence and extent of residue: Yale Pharyngeal Residue Severity Rating Scale (YPRSRS)
- Self-assessment of swallowing difficulties: Radboud Oral Motor Inventory for Parkinsons's disease (ROMP)
- 11-week training: 5 seconds inhaling and 5 seconds exhaling, 5 minutes, 5 times a day

**Results:** ROMP – Swallowing = 21/35 (Initial) > 9/35 (Final)

YPRSRS (Initial > Final)

- IDDSI 0 (thin) = III V – III S > I V – I S
- IDDSI 3 (liquidised/moderately thick) = III V – III S > I V – I S
- IDDSI 7 (regular) = III V – III S > I V – I S

*I = none, II = trace, III = mild

*V = valleculae, S = pyriform sinuses

**Conclusions:** The data obtained show an improvement in pharyngeal clearance due to the reduction of residue in the valleculae and pyriform sinuses and a reduction in the patient's perceived swallowing difficulties. Future studies on larger samples and with control group are needed.

**Keywords:** dysphagia, parkinson's disease, respiratory training, TPEP® ONE

## ABSTRACT 227

### Voice Anxiety Judgments Are Mediated By F0 and Vocal Tract Length

Felix Schaeffler

**Background:** When hearing a voice, we tend to make assumptions about the speaker of the voice. These include extra-linguistic aspects like age and gender, and para-linguistic aspects like mood or personality, and studies suggest that these attributions are quick, reliable and have real-life consequences by shaping social behaviour.

Gender has received considerable attention in this context. The human voice is substantially re-shaped during puberty, and laryngeal growth as well as descent differences cause lower F0 as well as lower formants in adult male speakers, on average.

**Objective:** In a series of papers, Krahé and colleagues (2020, 2021) have investigated F0 correlates of gendered voice attributions. Both male and female voices were judged on a series of stereotyped

gender traits, using the Positive-Negative Sex-Role Inventory (PN-SRI) scale. F0 manipulations showed that lowering F0 in both male and female voices increases the perception of masculine traits and decreases the perception of feminine traits. Across genders, these effects were not linear (a 111Hz male voice received higher femininity ratings than a 165Hz female voice), but this non-linearity could be confounded by the use of different voices across studies. To better understand the role of vocal tract length as a source of this non-linearity in judgement, we created manipulations of a semantically neutral utterance from a single male voice.

**Method:** Manipulations were performed with Praat and ranged from 79 to 252 Hz for F0, and 3 vocal tract lengths (typically male, neutral and typically female). Twenty participants rated all stimuli in randomized order for anxiety (one of the negative femininity traits in the PN-SRI) on a five point Likert scale, replicating the method used by Krahé and colleagues.

**Results:** Results showed that both F0 and vocal tract length affected anxiety judgments and also showed a significant interaction between these two factors, suggesting that the effect of vocal tract size depends on F0. With higher F0 values, shorter vocal tract sizes (associated with higher formants) evoke lower anxiety judgements.

**Conclusion:** We see practical implications of our findings, for example in transgender voice therapy, where formant changes could mediate trait attributions caused by changes in F0.

**Keywords:** Voice attribution, fundamental frequency, vocal tract size, anxiety

## ABSTRACT 277

### What Is Glottal Whistle? Exploring Extremely High Fundamental Frequencies in Human Vocal Production

Angela Wingerath, Sven Grawunder

Glottal whistle (GW) has been described as a vocal production with very high fundamental frequencies which occur naturally only under extreme conditions.

It is exerted in the context of vocal performances, either as a peculiar demonstration of vocal range or as one of many extreme phonations in the repertoire of so-called multiphonics in avantgarde music. Individual performers are observed to achieve f0-heights of above 1.5kHz and at least up to 6.5kHz, using egressive as well as ingressive airstreams. GW is assumed to be distinct from the whistle (or flageolet) register (M3), whereas its actual production mechanism so far remains to be unclear. Therefore a vortex mechanism vis-a-vis an extension of the glottal modes (M3 to M4) had been previously proposed. In a previous study, at least for one subject, electroglottographic and acoustic data under air vs. heliox gas conditions seemed to support a glottal mode. This presentation attempts to explore and test these proposals further from an articulatory perspective via laryngoscopy. Endoscopic data from three new additional subjects reveal laryngeal configurations at the individual level with in part

high degrees of vestibular constriction of a high-positioned larynx. These data start allowing for a grouping of articulatory maneuvers at the laryngeal entrance level. In addition, the acoustic behaviour in all subjects is explored with respect to the intensity of these productions.

**Keywords:** vocal registers, glottal mechanisms, voice quality

## ABSTRACT 278

### Vibrato And Its Training Forms. Our Protocol

Maria Luisa Mozota Núñez, José Ramón Mozota Núñez

**Objetive:** Quisck study of vibrato and its training.

**Introduction:** Vibrato is rhythmic modulation (systematic cyclic variation of a parameter) of frequency and/or amplitude of the singer's or speaker's voice. It is what transmits the feeling in a melody or in a phrase. The trill is different, it has greater Hertzian variation and it is more artificial and forced. The variability of tones is much greater than in vibrato, which always remains as close as possible to the base note.

**Material and Methods:** We present our protocol for the study of vibrato in a basic ENT consultation.

**Results:** We present our basic protocol to easily and quickly detect the most important parameter for a harmonious and correct voice in the ent consultation. anamnesis, ent exploration: fibrolaryngoscopy: shows the movement of the different anatomical parts. narrow band spectrograms show the contour of the fundamental frequency (fo) in a phrase or in a sustained tone to analyze: prosody and vibrato.

**Treatment:** Vocal warm-up, to control resonating organs and relaxation exercises. Breathing exercises, voice modulation.

**Conclusion:** Although for voice analysis parameters such as signal/noise ratio, jitter, shimmer, are the most studied, for a basic and quick ENT or speech therapy consultation, vibrato could be the most affected and the one that summarizes and indicates the result of a good voice.

**Keywords:** Vibrato, rhythmic modulation, voice, resonating organs, voice analysis

## ABSTRACT 279

### Singing In Children with Type I Asd (Mild, Sd Asperger)

Maria Luisa Mozota Nuñez, Jose Ramón Mozota Núñez

**Introduction:** Absolute pitch, represents the ability to identify a musical tone without an established reference. It has a prevalence in the population of less than 1% and has been related to being more common in autism.

**Objetive:** to provide information from a medical point of view about musical communication, musical auditory abilities and taste for music AND the psychoneurological (creativity) and auditory abilities related to music of children with Autism Spectrum Disorder Type I.

material and methods: We included the history of seven children between 3 and 9 years who have a diagnosis of ASD and we present three cases among those who have grade I and who have normal hearing, ascertained in the otorhinolaryngology consultation. On ear examination, they should all have an intact eardrum and in tone audiometry: normal thresholds. Exploration of the oropharynx and nasal passages was normal. If brainstem auditory evoked potentials are performed, there are no interaural differences and normal thresholds. METHODS: Databases: list of children with ASD referred by the neuropediatrics service,—Review the clinical history and extract the data, fill out the model form, prepare tables, review the bibliography and collect the results.

**Results:** We present the characteristics of three children with mild ASD (type I, Asperger's Sd) that are related to musical ear, which are temporal-spatial orientation, taste and ease in drawing, creativity and musical ear.

**Conclusion:** The three children liked to sing and sang well. They preferred well-known songs with a marked rhythm. The three children with mild ASD were very different when it came to approaching music and did not coincide in creative abilities, three-dimensional orientation, or taste and ability for drawing and perspective.

**Keywords:** Absolute pitch, musical communication, ability musical, singing in autism

## ABSTRACT 290

### The Voice Of The Tenor: Memory Of His Larynxs

María Luisa Mozota Núñez, José Ramón Mozota Núñez

**Objective:** Review the dynamic anatomy of the larynx in men with tenor tessitura.

**Introduction:** Tenor comes from Latin and means "to have or hold for a long time" a high-pitched voice. They are the high voices in men's registers that carry the melody in the solo.

**Material and Methods:** We perform an anatomical review of the man's larynx using ultrasound and a computerized review for voice evaluation. We present the results, comparing with that of the tenor Julián Gayarre and other tenors.

**Results/Discussion:** Anatomically, they have short vocal cords with powerful muscles and a large lung capacity. Functionally, the respiratory murmur is lengthened. The larynx of tenor Julián Gayarre is preserved in the Roncal museum, it was asymmetrical with strong musculature.

**Conclusion:** The dynamic anatomy of the tenor larynx combined with the acoustic functional study are useful tools. There are functional differences that can be improved with training and feeling.

**Keywords:** Tenor larynx, tenor voice, tenor anatomy

## ABSTRACT 291

### Laryngeal Ultrasound For Voice Study

María Luisa Mozota Núñez, José Ramón Mozota Núñez, Manuel Jesús Mozota Núñez

**Objectives:** to present ultrasound as a complementary method of exploring the deep anatomy of the voice.

**Introduction:** Ultrasound has been proposed for dynamic anatomical study of the larynx. It is especially important in diseases such as vocal cord paralysis and injuries in the area and in healthy larynxes to control the movements of the muscles in tenors and sopranos. Material and methods.

**Results:** Ultrasound images and results of vocal movements of healthy larynxes are presented.

**Discussion:** the main limitation of ultrasound inheritance is calcification of the thyroid cartilage. There are better results in children, women and young people. The advantage is that it is a non-invasive test and does not radiate.

**Conclusions:** Ultrasound is proposed as an economical, easy, fast and harmless method that is essential in a voice laboratory.

**Keywords:** Laryngeal Ultrasound, voice study, ultrasound for voice

## ABSTRACT 306

### Hydration Magic: Moist Gauze and Its Effect on Dysphonic Voices

Andrea Nacci, Lara Moretto, Silvia Capobianco, Tamanai Giusti, Stefano Berrettini, Luca Bastiani

**Introduction:** The study aims to investigate the effects of vocal fold hydration through nasal breathing using moist gauze in dysphonic subjects. Previous studies on vocal hydration have primarily focused

on euphonic subjects. Thus, examining its effects on pathological voices is essential to better define its role, particularly in supporting speech therapy.

**Methods:** Eighteen subjects were enrolled (14 females, 4 males; mean age = 42 ± 14.6 years), with 12 (66.7%) reporting professional voice use. Diagnoses included functional dysphonia in 15 subjects (83.3%), with 4 having vocal fold nodules (22.2%), vocal fold edema in 4 subjects (22.2%), and laryngopharyngeal reflux disease in 6 subjects (33.3%). Evaluations were conducted before and after 10 minutes of vocal hydration via nasal breathing with moist gauze. The protocol included perceptive grading of dysphonia using the GRBAS scale by three blinded raters, and voice analysis using spectrogram, phonetogram for frequency range, and the Multi-Dimensional Voice Profile (MDVP) by KayPentax Computerized Speech Lab (CSL) 4500B.

**Results:** The GRBAS scale perceptive evaluation yielded an intraclass correlation coefficient (ICC) ranging from moderate to substantial among raters, with no statistically significant differences between pre- and post-hydration evaluations. On the contrary, instrumental acoustic analysis revealed significant reductions post-hydration in jitter (p=0.048), shimmer (p=0.046), and vAm (p=0.009). Most MDVP parameters showed improvement when considering delta changes from pre- to post-hydration as independent variables. Qualitative evaluation of the spectrogram and phonetogram indicated an improvement in harmonic texture (50% of cases) and noise reduction (39% of cases) in the spectrogram, and increased vocal frequency range (50% of cases) in the phonetogram after hydration.

**Conclusions:** Vocal fold hydration using moist gauze has an immediate positive effect on vocal function in subjects with functional and organic dysphonia. This improvement includes enhanced vocal stability and range, reduced noise, and decreased air leakage, though it may not always be perceptibly noticeable. It is a quick, cost-effective method that can be adopted by dysphonic subjects and serves as a useful aid in speech therapy rehabilitation

**Keywords:** hydration, voice, acoustic analysis, dysphonia

**ABSTRACT 308**

## On The Development of A Mechatronic Avatar Capable Of Articulating Speech And Singing

Nathalie Henrich Bernardoni, Sylvain Arnaud, Mounib Tlaidi, Lucie Bailly

In the framework of a collaborative research project that aims to understand, reproduce and analyze voice in healthy and pathological cases using virtual and robotic avatars, we present the latest advances on the development of a mechatronic testbed named “Pinocchio”. Reproducing in vitro the dynamic movement of speech articulators, such as jaw, tongue, velum and larynx, together with phonation, remains a challenge. Design efforts were focused on three aspects: how to breath, how to phonate, how to articulate.

Air supply is controlled through a valve opening linearly related to airflow rate at the device inlet, a settling chamber stabilizing upstream jet, and a long tube leading from the chamber to the laryngeal model.

Phonation is controlled by acting on a flexible laryngeal envelope and 1:1 replica of vocal-folds replica through lateral compression and longitudinal stretching. Depending on the choice of folds geometry and material tensile stiffness, self-oscillations generate a voice source covering a pitch range from less than 110 Hz to more than 220 Hz.

Adduction and abduction articulatory movements are implemented within the larynx. Two primary articulatory movements are implemented within a replica of the vocal-tract: mandibular motion and shaping of the oral cavity with the movement of tongue body and apex. F1-F2 vocalic space produced by movements of jaw and tongue was measured. At this early stage of his life, Pinocchio is able to produce vowels in the surrounding of an [a], with F1 between 500 and 700Hz and F2 between 1000 and 2000Hz.

**Keywords:** testbed, robot, in vitro, phonation, articulation

## Voice And Culture: Broadening Horizons

Mara Behlau

Culture can be defined as *"the collective programming of the mind distinguishing the members of one group or category of people from others"*[1]. Culture is a strong marker in the voice, and the voice identifies a person as an in-group member.

Comprehending a culture helps us have an orientation for understanding and navigating the world. Different cultures show different communication attitudes. Due to globalization, the voice specialist must have an open mind to face the Tchallenges of treating patients from cultures, nationalities, language groups, and regions of a country. Cultures and nationalities are distributed in a *continuum* of direct and indirect communication. Low-context cultures, such as Switzerland, Germany, and Sweden, are less relational and more individualist. Therefore, communication is more direct and explicit, with detailed instructions, documentation (e-mail), and superficial bonds. On the contrary, individuals with high context cultures, such as Spain, the Middle East, and Japan, are more relational and collectivist, with more indirect and implicit communication, inferred messages, the value of who speaks, face-to-face interactions, and calls are deeper bonds.

Multiculturalism is a reality almost anywhere in the world, and the voice specialist needs to be prepared to deal with persons of different cultures. In this presentation, I will explore aspects of clinical assessment considering cultures, such as the way that language impacts the voice and the process of perceptual auditory judgment, the need to have a cultural database for auditory perceptual and acoustic analysis, and how self-assessment protocols can be used since it is the dimension with the highest multicultural appeal.  Avoid judging cultures you do not know and ask what is expected in a particular culture and society on the use of voice and communication is the minimal requirement.

The immediate and needed goal is to expand cultural sensitivity and competence when providing clinical service. The 1st step for cultural sensitivity is accepting differences without insisting your culture is better or that everyone should do it in a specific way. An open mind and search from different perspectives is a good starting point.

**Keywords:** voice, culture, assessment, protocols

1. Hofstede G, Hofstede GJ and  Minkov M. (2010) - **Cultures and Organizations: Software of the Mind. 3rd Ed.** New York: McGraw-Hill USA.

## FibroEndoscopic PhonoSurgery

Patricia Corriols, Jacopo Colombini, Marco Fantini, Marcus Hess, James Thomas

In-office procedures are becoming increasingly popular in daily ENT practice due to the benefits they offer to patients and the healthcare system. Their safety and tolerability have been well-documented, and as high-resolution procedures, they can expedite the treatment of pathologies by reducing the time associated with surgical waiting lists. They also provide an alternative option, particularly for patients for whom the risks of general anesthesia are high.

In recent years, the quality of imaging endoscopes used in outpatient clinics has improved exponentially. This advancement has enabled a wide range of laryngeal endoscopic procedures, from diagnostic to therapeutic, to be performed in an office setting. Almost all structural laryngeal pathologies—such as polyps, nodules, papillomatosis, cysts, Reinke's edema, vascular dilation and scars or stenosis—can be effectively treated in the office under local anesthesia. Additionally, other conditions such as laryngeal dystonia or defects in glottic closure (e.g., presbyphonia, vocal fold paralysis) can also be addressed in-office using injection techniques.

The aim of this roundtable is to highlight the benefits of performing in-office flexible endoscopic procedures (FEPS). This will be achieved by demonstrating the proper setup and local anesthesia techniques, showing the different tools used for that issue (microforceps or scissors, laser fibers, needles) and by illustrating the management of various types of laryngeal lesions through real case studies presented by experts.

**Keywords:** in office, phonosurgery, larynx, laser, local anesthesia

## Toward a cause-effect theory of human voice production: forward and inverse problems

Zhaoyan Zhang

One focus of my research in the past few years has been to establish a cause-effect understanding of human voice production that links physiology (vocal fold geometry, stiffness, adduction, and lung pressure) and voice outcomes. I am interested in understanding how changes to the vocal system affect the produced voice, and when voice changes, what physiological changes cause the voice change. Without a cause-effect understanding, we have to rely on experience to answer these questions. Some people are more experienced than others and will be better able to help patients or train speakers. However, experience does not always provide answers, and it is difficult to teach experience. A causal theory of voice production is essential if we want to move on from art to science.

Ideally, we would like to establish this cause-effect theory in humans. However, this is challenging, due to difficulty in reliably controlling and measuring vocal fold geometry and stiffness in humans, and to co-variations among vocal fold geometry, stiffness, and pressure. Because of these challenges,

we turned to computational modelling, which allows us to change one control at a time and observe its effect on voice production, thus establishing cause-effect relations. In this talk, I will summarize the main cause-effect relationships observed from a series of large-scale computational studies. I will focus on physiological control of the glottal closure pattern, spectral shape of the voice source, vocal fold contact pressure, and the effect of source-filter interaction on the voice source.

In the second part of the talk, I will describe our recent effort to combine this causal understanding with machine learning methods, to the end of solving the inverse problem (determining the cause of voice changes). The goal is to develop a framework that integrates different clinical measures, including acoustic, aerodynamic, and/or video-endoscopic data, and estimates the physiological state of the speaker (vocal fold geometry, stiffness, adduction, and subglottal pressure) during both sustained and running speech, toward clinical and other voice applications.

**Keywords:** Cause-effect theory; voice science; vocal control; voice therapy; inverse problem

## Practices teachers find effective or challenging in distance education for voice

Jaana Tyrmi

The Voice Lab workshop offers a unique opportunity to explore the evolving landscape of online voice coaching, with a focus on asynchronous methods. As we›ve gained considerable experience in remote instruction, it›s time to examine the specific approaches required when face-to-face interaction isn't possible.

Asynchronous remote voice coaching demands careful consideration of pedagogical methods. We need to design and implement strategies that meet individual needs and promote active learning in this digital environment. Recent experiences have shown the viability and effectiveness of distance learning approaches, opening new possibilities for voice education.

This workshop encourages participants to share their expertise, fostering collaborative learning and problem-solving. By exchanging insights on pedagogical methods, technological tools, and innovative approaches, we aim to enhance the effectiveness of remote voice coaching.

Looking to the future, developments in remote coaching could pave the way for broader applications in health technology. This has the potential to significantly increase access to voice coaching, particularly for individuals in remote areas where traditional in-person instruction may be challenging to obtain.

Join us in this collaborative effort to define the core of remote voice education. Your insights and experiences are invaluable as we work together to identify and prioritize the most important aspects of online voice coaching. Let's discover how we can best serve our learners, clients, and patients, advancing our teaching and practice in this digital age, potentially transforming the accessibility of voice coaching for many.

## Intelligibility of texts sung by choirs

Kananovich

Beethoven's Ode to joy sung by a classical choir, Stand by me sung by a gospel choir on the occasion of a Royal wedding or a national anthem sung by a stadium full of football fans: do you manage to make out the words being sung? Is it at all possible for a group of people singing together to be intelligible? What does it depend on: hall acoustics? articulation? music genre? listeners? composers' choices? language of the text?... Is a soloist more intelligible than a choir? Can a choir do anything to be (more) intelligible? 37 million people practice choral singing in Europe1. Most of them are concerned, to a certain degree, with the issue of intelligibility. Numerous researchers have studied the intelligibility of soloists, mostly opera singers. However, only a few papers dealt with the intelligibility of choirs.

The aim of this brainstorming is to determine the widest possible range of factors which may diminish the intelligibility of a choir and to try and suggest practical solutions overcoming the influence of these factors. Following Veeda Kala and Marju Raju's presentation on the intelligibility of singers, the idea of this session is to bring together representatives of different research fields (phoneticians, phoniatricians, acousticians, neurologists, etc.) as well as practicians of choral singing (choir conductors, voice teachers, singers, etc.) to share views and experience in a multidisciplinary discussion. The brainstorming will be coordinated by Anastasia Kananovich, a PhD student in phonetics and didactics from the University of Strasbourg (France), acting chorister and ex choir conductor, carrying out research on the intelligibility of texts sung by choirs.

## How Voice Teachers Work With Touring Professionals— Round Table Discussion

Lisa Popeil

Singing teachers are often called upon to coach professional singers with extremely demanding vocal loads and schedules. Musical theater singers are often required to perform up to eight shows per week. Touring pop and rock singers, in addition to grueling travel, have press/media responsibilities and perform meet-and-greets with fans putting the singers under great duress physically, mentally and vocally.

Five international commercial voice coaches (including Lisa Popeil, Cathrine Sadolin, Erika Biavati, and Mauro Fiuza) will share their experience and offer suggestions on how they help singers preserve vocal health despite such rigorous professional requirements, sharing such topics as hydration, reflux abatement, pre-show potions, icing, warm-up and cool-down exercises, lifestyle guidance, exercise physiology, and psychological advice.

**Keywords:** singing, voice, vocal health

## Muscle tension dysphonia and vocal fatigue: how can we diagnose and treat it

Jacob Liberman, Markus Hess

Muscle Tension Dysphonia (MTD) is a common and persistent challenge in voice clinics, characterized by an unclear aetiology. Despite extensive literature and various suggested therapeutic approaches, MTD remains a diagnosis of exclusion when no vocal fold lesions are present. Historically, the larynx has not been considered suitable for physical therapy, hindering the development of a functional diagnosis and specific treatment plan. This gap in understanding the anatomy and functional anatomy of voice production is evident in historical literature.

Contemporary advancements have provided valuable insights into laryngeal function, successfully applied in treating dysphonia, dysphagia, and associated symptoms such as Globus, jaw function, and respiratory support. This presentation will delve into the aetiology of muscle fatigue, identify affected laryngeal structures contributing to the MTD puzzle, and explore potential interventions. Specific laryngeal manipulation results will be demonstrated, with participants asked to palpate their own larynx and follow the material.

Additionally, we will contemplate the fundamental causes of MTD and touch upon the psychological aspects influencing laryngeal symptoms.

**Keywords:** Larynx, Manual therapy, diagnosis, treatment

## Voice Care In Acting Academies: How Health Professionals Can Support Acting Voice Pedagogy

Giovanna Baracca, Archimede Pi, Carles Expósito, Alexander Mayr

Objective: Actors are considered a population at risk for voice disorders: this unique population requires a particular voice usage and a strong vocal demands. They must adjust their voice production to theatres of varying size or open stages, while maintaining the ability to express the entire range of human emotions. Their performance is sometimes characterized by extreme voice behaviours and they are expected to portray different characters to meet the artistic demands of their role. Furthermore they have to combine voice projected emissions and sometimes strenuous physical activities. Several studies found an increased prevalence of videostroboscopic abnormalities like incomplete glottal closure, laryngeal hyperfunction, and decreased mucosal wave in first-year drama students. Moreover questionnaires revealed poor vocal hygiene habits. Theatre actors are at risk for developing voice disorders from young age and due to the absolute dependance of these performers on their voice quality and vocal capacity, an education regarding vocal hygiene should be recommended. This workshop is aimed to describe the effectiveness of a vocal education training starting from the drama school in preventing voice complaint and vocal folds damaging in students.

**Methods:** A team composed by a phoniatrician, a voice therapist, a physiotherapist and a voice teacher will illustrate a proposal for the management of a voice health service in the theatre academies, also with practical demonstrations. In particular, to explore with the audience some aspects of how physiology impacts the actor's practice, we are going to propose two activities.

**Activity 1:** Explore how an inclined floor, mimicking a theatre stage, alters appoggio and sostegno dynamics. Participants will experience shifts in breath support and resonance.

**Activity 2:** Examine how "Commedia dell'Arte" characters postures influence breathing and voice.

Through interactive exploration, participants will understand how exaggerated stances can improve or challenge vocal production and character portrayal.

**Results:** The results about the voice surveillance service in theatre academies will be illustrated and analyzed by the panelists in an open discussion with the audience.

**Conclusions:** The cooperation between voice teachers and health professionals can support efficiently the management of acting voice in students and prevent voice damage. Acting voice, posture, voice surveillance.

## Sinonasal diseases- are they a real cause of voice disorders?

Kristel Kalling

**Introduction:** The nasal cavity and paranasal sinuses form an anatomical complex. The nose is rarely affected in isolation, and most conditions impact the adjacent paranasal sinuses too. The nose responses in pathologies with nasal congestion, rhinorrhoea, sneezing, itching, nasal bleeding, headache, facial pain.

The functions of the nose and nasal mucosa are air passage; warming, humidifying, cleaning and filtering the air; sensing odors; contributing to the resonance of speech. A common voice change related to obstructed nose and nasal cavities is hyponasality.

Nasal obstruction may be due to irreversible (structural) causes or reversible (mucosal) congestion.

Structural causes are deformities of the nasal septum, valves or turbinates. Mucosal causes are infection, allergic rhinitis, all types of nonallergic rhinitis. According to the European Position Paper on Rhinosinusitis and Nasal Polyps we call all mucosal pathologies a rhinosinusitis and divide it two: acute and chronic.

Acute rhinosinusitis is the most frequent type of rhinosinusitis and is usually the consequence of a viral infection. The most common symptoms are a sore throat, nasal congestion, rhinorrhoea, sneezing, and cough.

We conducted a survey in 2024, asking which causes for vocal emergencies are the most frequent ones in the practices of the members in Collegium Medicorum Theatri. According to the answers, the second common was an upper respiratory tract infection (URTI).

URTI-s can lead indirectly to acute vocal changes because of localized oedema, secretions, pain, throat clearing, coughing, nasal congestion, and other symptoms.

Young singers lose control of their singing voice when they are affected by a rhinitis.

They do not only perceive a change in the sound of vocal consonants, but they also sense a kinaesthetic change. The kinaesthetic perception is essential feedback systems during professional singing. In the case that this control mechanism is constrained, singers often try to compensate by 'pressing' or 'pushing' the voice which, may cause an increase of the subglottal pressure as well as the mechanical strain of the vocal cords.

This may result in either a swelling at the free edge of the vocal fold, oedema or bleeding into the vocal folds.

**Keywords:** Nasal obstruction; Acute rhinosinusitis; Hyponasality; Vocal emergencies; Kinaesthetic perception

## The effect of nasal congestion caused by sinonasal polyposis on voice acoustics

Kristel Kalling, Anna Maria Rüütmann, Erik Luht, Allan Vurma

**Introduction:** Chronic rhinosinusitis (CRS) is defined as a complex inflammatory condition involving the paranasal sinuses and linings of the nasal passages that lasts 12 weeks or longer. CRS is divided into: CRS with nasal polyps (CRSwNP) and CRS without nasal polyps. Symptoms associated with CRSwNP include anosmia, nasal blockage, nasal drainage, facial pressure.

Alterations in configuration of these anatomical structures may produce differences in vocal quality.

A common voice change related to nasal cavities is hyponasality, which usually occurs with nasal obstruction like sinonasal polyposis. Hyponasality is percieved, when the listener does not hear normal nasality during the production of nasal consonants.

**Case Study:** Two patients with sinonasal polyposis and nasal congestion were studied, before and after functional endoscopic sinus surgery (FESS), while assessing hyponasality and congestion's effect on voice acoustics.

Pre- and postoperative ENT examinations were executed, including rhinomanometry, videolaryngostroboscopy, paranasal sinus tomography and the calculations of Acoustic Voice Quality Indexes (AVQIs). Sino-Nasal Outcome Test-22 (SNOT-22) & Voice Handicap Index-10 (VHI-10) were

used for patients' own subjective assessments. The tests were carried out 1 week before and repeated 6 weeks after FESS. Videolaryngostroboscopy was reperformed, to exclude the potential effect of endotracheal intubation on vocal cords before postoperative tests. Patients recordings were evaluated by speech and language therapists (SLT-s) for hyponasality in the patients' speech, using Likert scale.

**Results:** The postoperative patients demonstrated improved nasal airflow on rhinomanometry. SNOT-22 scores in both patients improved after FESS, by 33% and 48% respectively. Postoperative VHI-10 decreased in one of the patients, while a slight increase was presented in the second. SLT-s marked in patients speech less hyponasality. AVQI did not show any change postoperatively.

**Conclusions:** The incidental increase in one of the postoperative VHI-10 results, may have been affected by the emotional component of the subjective questionnaire.

Treated nasal congestion does not change the acoustic parameters of the voice, measured using AVQI.

Indeed, the acoustics of the voice may change after endoscopic surgery (SLT-s found less hyponasality), but the change should be measured with some other tests.

**Keywords:** Chronic rhinosinusitis; Hyponasality; Acoustic Voice Quality Index; Sino-Nasal Outcome Test-22; Voice Handicap Index-10

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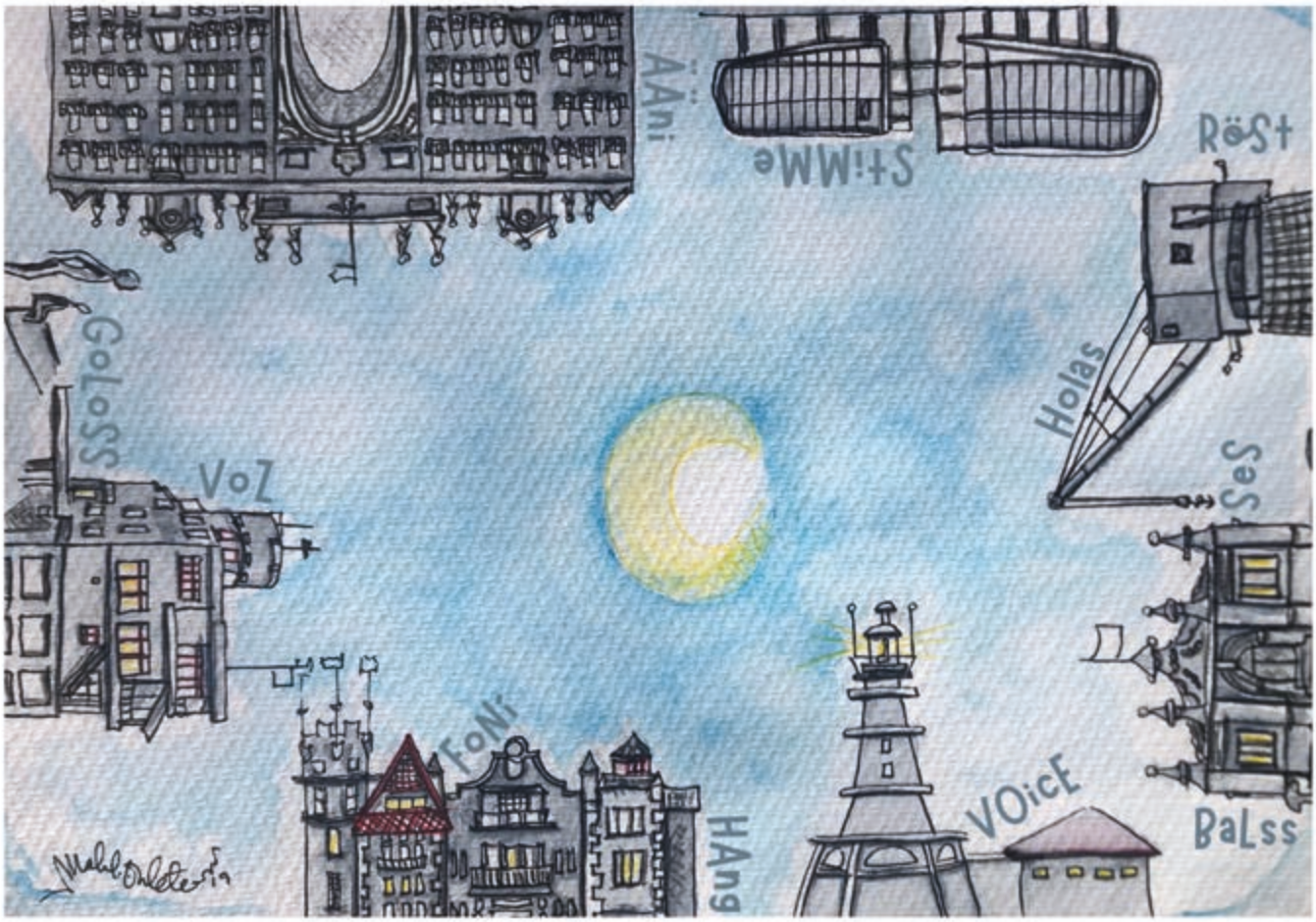


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