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PAN-EUROPEAN VOICE CONFERENCE BOOK OF ABSTRACTS

»VOICING SCIENCE AND EXPERIENCE«

PAN-EUROPEAN VOICE CONFERENCE 2019

Voicing Science and Experience

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A

Assessing and Quantifying Air Added to the Voice by Means of Laryngostroboscopic Imaging, EGG, Acoustics, and Long-Term Average Spectrum

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Objectives: Exploring how singers are able to control air added to the voice in a healthy manner when singing in a Neutral vocal mode, to objectively assess air added to the voice, and to compare findings on Neutral to previous findings on other vocal modes to explore possible boundary conditions allowing or constraining the possibility of adding air in a healthy manner.

Study Design: case-control study with 20 professional singers

Methods: Twenty singers were recorded performing sustained vowels in Neutral with and without air by means of laryngostroboscopic imaging, electroglottography, LTAS, as well as acoustic signals and audio perception. Singers completed VHI and RSI questionnaires prior to examination.

Results: Neutral was observed with less suppraglottic activity compared with metallic vocal modes. Adding air resulted in a visible glottal gap. Singers were able to control the addition of air while maintaining the Neutral phonation by removing the glottal gap, yet maintaining a similar waveform pattern and acoustic spectrum. On EGG and acoustic measures, air added to the voice resulted in statistically significant differences on lowered average Qx, increased jitter and shimmer, and decrease of SPL. On LTAS, air appeared as decreased excitement of spectra between 0-4kHz, and increased excitement of spectra between 4-8kHz and particular excitement between 7k-7.9kHz for males. For females, air did not relate to a similar increased activity between 7kHz and 7.9kHz, probably due to the higher fundamental frequency, providing cause for speculation that air may excite the region between 14kHz and 15.8kHz for females when singing at 494Hz.

Conclusion: Air added to the voice can be objectively measured and visually assessed by means of multiple methods of investigation combined in a multidimensional voice profile. Singers added air by decreasing SPL, allowing for a glottal gap, and by lessening vocal fold adduction. However, in contrast to previous findings, the singers were able to maintain the Neutral phonation with a higher vocal fold adduction without the audible escape of air, supporting that air added can be controlled and trained in a healthy manner in the vocal mode Neutral. This was further substantiated by the reported VHI and RSI scores.

Efficacy of Speech Language Therapy Intervention in Unilateral Vocal Folds Paralysis (UVFP) - a Meta-Analysis

Rita Alegria, Maria Conceição Manso, Susana Vaz-Freitas

University Fernando Pessoa, PORTO, Portugal

Objective: Unilateral Vocal Folds Paralysis (UVFP) is a disorder that affects patients' quality of life by affecting their phonation, breathing and swallowing. The purpose of this study was to evaluate previous studies to estimate more precisely the efficacy of voice treatment on vocal mobility recovery, in adult patients with UVFP.

Data Sources: Pubmed, CINAHL, CENTRAL and Google were searched for retrospective and prospective cohort, case-control and cross-sectional with comparative studies, in adults, published between January 1 2008 and December 31 2018 and written in the English language.

Study Design: Meta-analysis.

Methods: A total of 5748 articles were identified. Duplicates were left out. Further screening using inclusion and exclusion criteria was conducted. Finally, a total of 10 studies were found for the analysis. Articles included morphofunctional

evaluation results, specifically the changes on the motility of the vocal folds before and after voice therapy, allowing pooled data analysis on the efficacy of voice therapy intervention in patients with Unilateral Vocal Cord Paralysis. Random-effect model was used to estimate effect size and publication bias was assessed.

Results: The pooled efficacy of voice therapy in patients with UVFP on vocal fold motility was 72% (95% CI:64.0-80.0). The inconsistency index (I2=18.35%) of the studies included in this meta-analysis revealed low heterogeneity. Funnel plot and Cochran´s Q test showed no publication bias.

Conclusion: This meta-analysis supports the evidence that voice therapy has a good efficacy on vocal motility recovery, regardless the exercises and techniques used. Early voice therapy in patients with Unilateral vocal fold paralysis should be considered, as data indicate an increase efficacy of vocal therapy.

Clinical significance: This meta-analysis indicated that non-chirurgical interventions may be beneficial for reducing voice handicap in patients with dysphonia associated to vocal fold paralysis and could thus be considered as valuable complement and/or adjunct to standard care.

Content and timing of speech therapy intervention for vocal fold nodules - a systematic review

Rita Alegria, Maria Conceição Manso, Susana Vaz-Freitas

University Fernando Pessoa, PORTO, Portugal

Objective: Vocal fold nodules (VFNs) can present with hoarseness, breathiness and vocal fatigue, which significantly affects the participation and activity of the patient. To improve the quality of life and vocal functionality, speech language pathologist provides a well-designed voice therapy program. The aim of this paper is to perform a systematic review of literature around the effectiveness of the intervention of speech language pathology for vocal fold nodules.

Methods: Several key terms were used for database electronic search of articles. Strict inclusion criteria were used and a broad evaluation of the studies performed, including level of evidence based on the National Health and Medical Research Council levels of evidence, assessment and critical appraisal.

Results: Nine out of 30 articles reviewed met the criteria of inclusion and reported positive effects of voice therapy intervention in patients with vocal fold nodules. Most of the studies analyzed reported multidimensional voice measures outcome data, being the morpho-functional, perceptual, acoustic and self-assessment the most common documented areas. Regardless of receiving only indirect, only direct or combination of both voice therapy contents, nearly all voice quality parameters improved after treatment.

Conclusion: Voice therapy is first line of treatment for patients with VFNs. Short period treatments (intensive) is as beneficial as traditional voice therapy programs to improve voice quality.

Why I'm grateful to be officially declared handicapped to the voice - An autoethnographic account by Sarah Algoet, singer, voice teacher & vocal coach

Sarah Algoet

Singsing!, WONDELGEM, Belgium

For 7 years, I have been trained in what I would call the "traditional classical pedagogy", 4 years in the conservatory. I ended up being officially declared handicapped to the voice: genetically not predisposed to be a singer.

Long story short: I am not handicapped. The vocal problems were nothing more than my body telling me that I was going down the wrong road by listening to teachers that were not right for me. I solved all issues on the day I said to myself: "From now on, I'm going to listen to my voice and follow the direction she is leading me to."For the first time since I had started voice lessons, I made true contact with my voice without forcing her down the road I thought was the right one, because my teacher had told me so.

I'm grateful.

It made me the teacher and coach I am today. I firmly believe that **my job is to be in service of the artistic identity of the singer**. I have to guide the singers that come to me through all the possibilities and help them find their own voice. Not a copy of my own voice.

In https://singsingsarah.files.wordpress.com/2017/11/affichesarah_hr.pdf, you find Blue vs. Red. To me, our job as a teacher and coach should be mainly Blue. Even though I recognize the need for some Red once in a while, depending on the singer and situation. But Red should ALWAYS be in service of Blue.

During this lecture, I will elaborate on my story, that I have written out in https://singsingsarah.wordpress.com/2017/11/27/i-am-officially-handicapped-to-the-voice-for-real-no-clickbait/ in 2017. I'd like to share the lessons I have learned, and the basics of what has become my philosophy as a teacher and coach, because of this experience. And I'd love to have a conversation with you on this topic!

In September 2018, I have presented this poster at the conference 'https://lcme.uwl.ac.uk/events-information at the University of West London.

Link to poster:
https://singsingsarah.files.wordpress.com/2017/11/affichesarah_hr.pdf

Link to blog post:
https://singsingsarah.wordpress.com/2017/11/27/i-am-officially-handicapped-to-the-voice-for-real-no-clickbait/

www.singsing.be

Comparison of two different warm-up tasks, using a new tool also

Tamás Altorjay

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Introduction: In our investigation we compared two different warming-up sections on the singing voice. At the first section we used traditional tasks which were based on the "linear model" of the phonation, consisted out of "vocalisation" exercises. At the second section we used developed tasks based on the nonlinear model of the phonation, using also the experiences of the SOVT (semi-occluded vocal tract) practice. We applied also a new – personally developed - tool – called "nose pipe"- for the warming-up.

Method: We integrated in our investigation 30 persons, who attend since more, then one year classical singing education, twenty of them females, ten of them males. We organised two different sections. The participants came on both of the sections without previous warming-up for the singing voice. First we recorded three vowels – [i, a, u] – for everybody on her/his comfortable middle range keeping for longer as 2sec. Than came the 20 minute long warming-up procedure. After this we repeated the recording of the same vowels, and also surveyed the VRP (Voice range profile) of the participants on vowel [a]. For recording we used TASCAM DR-07 MKII equipment. With help of a stage the microphones were held before the mouth of every participant. For analysing the records we used SIEGVIEW 2.4. acoustic program. We analysed one second long part – well balanced in sound level - of the records. The investigated parameters of the – 0-10kHZ part – of the FFT (fast Fourier transformation) figure were: mean of the signal between 0-10kHz, SNR (signal noise ration) between 0-10kHz and between 2-4kHz, before and after both of the sections. The VRP was surveyed only after both of the sections.

Results: Both of the warming-up sections are effective. The traditional is for enhancing the mean of the signal, the developed second section, for enhancing the values of SNR and the VRP. After the second section the personal singing voice ranges of the participants were longer then after the "vocalisation".

Conclusions: Both of the sections are useful, but for other aims. The second section has also an accidental beneficial effect on "singer-formant".

Formant tuning:
Dependence on 'Indoors'/'Outdoors' mode in Lithuanian traditional singing

Rytis Ambrazevičius

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Objective: In the cross-cultural context, formant tuning is not widely studied. The paper aims to compare the examples of Lithuanian traditional singing representing two modes of vocal technique, the 'singing indoors' (especially in small rooms) and 'singing outdoors' (in open air), and to verify the presumption about the role of formant technique as the differential cue for the two modes.

Method: For the analysis, a set of 20 song recordings (10 singers x 2 songs; different regions; males and females) was composed. One of the two songs performed by each singer was a traditional open-air song (rye-harvesting or hay-making song) and the other one was a song performed indoors (wedding, milling, weaving, etc.). Acoustical analysis of sound recordings (measurements of pitches, SPLs, and formants) were applied. Index of formant / the closest harmonic match was introduced for the evaluations.

Results: The analysis shows that formant (F1, F2) tuning is applied clearly in the case of 'singing outdoors' (even if the songs were recorded in a sound studio), thus making the vocal technique more 'economic' in terms of vocal efforts, whereas in the case of 'singing indoors', the economy of vocal technique does not seem that important. In 'singing outdoors', the formant tuning is stronger for the anchor tones (or, generally, tonics shaping the nucleus of the musical scale) – compared to short intermediate tones. Moreover, the upper anchor (in the two-anchors frame) experiences the strongest impact of formant tuning.

For the studied small sample, no large differences between the regional vocal styles were found. More pronounced formant tuning was observed for female singing compared to the high-pitched (tenor-like) male singing.

Conclusion: Formant tuning can be considered as differential cue for 'indoors / outdoors' vocal modes, in Lithuanian traditional singing. Most probably, thus intensified voice emission facilitates communication between distant groups of singers. The issue of formant tuning should be taken into account in the training of contemporary folk singing 'in tradition'. Possibly similar phenomena could be observed in other vocal traditions.

The prevalence of voice disorders in Israel: Comparing Jews and Arabs

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Objective: Information on the prevalence of any disorders is crucial for its description and understanding. While many previous studies have examined the prevalence of voice disorders in the general population, these studies varied greatly in their methodology, and consequently, in their reported results. The purpose of the current study was to evaluate the prevalence of self-reported voice disorders in Israel, while comparing the two major societies in Israel: Jews and Arabs.

Methods: After obtaining the approval of our institutional ethics committee, 1146 people participated in a survey. 44.5% identified themselves as Jews and 54.5% identified themselves as Arabs. Each participant completed a voice-related questionnaire, as well as the shortened VHI-10.

Results: Within the study sample, 13.9% identified themselves as having a voice problem. 30.3% reported experiencing a voice problem over the last year, and 12.8% reported seeking professional help for their voice. No significant differences were found between the participants who identified themselves as either Jews or Arabs, but a higher prevalence was reported in the older age-group. In addition, Higher prevalence of voice disorders was found among people who reside in southern Israel, compared to those residing in center or northern Israel. Finally, within our sample, no significant differences were found between men and women.

Discussion: The prevalence of voice disorders in Israel is comparable with results from previous studies. Yet, a qualitative analysis of the literature suggests that sample size greatly affects reports on the prevalence of voice disorders in a non-linear manner. Finally, data show that regardless of cultural, religion, language and many other factors, the prevalence of voice disorders among the two major cultures in Israel is very similar.

A nasoendoscopic study of 'head resonance' and 'imposto' in classical singing

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Background: Classical singing pedagogy uses many concepts which lack precise definition and whose acoustic and physiologic correlates are unclear. This study focuses on the concepts 'head resonance' and 'imposto', the latter related to Bel Canto technique. 'Head resonance' is typically defined as phonation that causes vibratory sensations on the face. Song pedagogue Lucie Mánén (1974) regarded the opening and closing mechanisms of the upper respiratory trackt, the nose and the nasopharynx, essential in singing. She used Imposto to mean a closure mechanism of the entrance to the nasal cavity, controllable by nasalmuscles. Matthew Hoch, in turn, writes (2014): (It). "Impose" An imprecise Italian term sometimes referenced in bel canto treatises. Some voice pedagogues use the term imposto to describe placement or refer to a sympathetic resonance or feeling in the bridge of nose (Hoch, s 83, 2014).

Aim of the study: To investigate lower vocal tract in head resonance and imposto.

Study Design: Experimental study

Method: Five subjects (3 classical singers, 1 amateur singer and a non-singer) were investigated with nasofiberoscopy during phonation and while holding their breath after inhalation. The singer subjects were instructed to sing on a specific pitch in three different ways: with and without head resonance and using imposto as it is described by Manen.
The non-singer phonated normally and with constriction of the nasalis muscle. The following measurements were made: 1) height of soft palate, 2) area of the hypopharynx, 3) area of the epilaryngeal tube outlet.

Results: All subjects raised the palate and narrowed the epilaryngeal outlet during head resonance and even more during imposto. Similar narrowing of the epilaryngeal tube outlet was observed in the non-singer when constricting the nasalis.

Conclusions: The results suggest that head resonance and imposto are related to control of the epilaryngeal tube, and the nasal muscles may be used as an aid in this maneuver, which in turn, improves the voice-source-tract interaction.

B

Vocal dynamic evaluation of diplophonia using two-dimensional scanning digital kymography

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Purpose: The purpose of this study was to investigate the characteristics of diplophonia using an auditory perception and multi-modal simultaneous examination, which included sound-waveform analysis, electroglottography (EGG), digital kymography (DKG), and two-dimensional scanning digital kymography (2D DKG). Additionally, we compared the diagnostic accuracy of each method using a binary classifier in confusion matrix and convenience of discrimination, based on the time required for interpretation.

Method: One nomorphonic male, 12 patients with diplophonia, and 12 dysphonia patients without diplophonia were enrolled. A multi-modal simultaneous evaluation was used to analyze the vibration pattern of diplophonia. The sensitivity, specificity, accuracy, area under the curve (AUC), and interpretation time were used to compare the various diagnostic methods. Discrimination was determined by 3 raters.

Results: There are 3 types of asymmetric vibratory patterns in diplophonia. The types are based on the oscillators vibrating at different frequencies: asymmetry of the left and right cords (6 subjects with unilateral palsy and 1 subjects with vocal polyps), asymmetry of anterior and posterior cords (2 subjects with vocal polyps), and asymmetry of true and false cords (3 subjects with muscle-tension dysphonia). All evaluation methods were useful as diagnostic tools, with all AUCs > .70. The diagnostic accuracy was highest with DKG (95.83%), followed by 2D DKG (83.33%), EGG (81.94%), auditory perceptual evaluation (80.56%), and sound-waveform (77.78%). The interpretation time was the shortest for auditory perceptual evaluation (6.07 ± 1.34 s), followed by 2D DKG (10.04 ± 3.00 s), EGG (12.49 ± 2.76 s), and DKG (13.53 ± 2.60 s).

Conclusions: Auditory perceptual judgment was the easiest and fastest method for experienced raters, but its diagnostic accuracy was lower than that of DKG or 2D DKG. The diagnostic accuracy of DKG was the highest, but 2D DKG allowed rapid interpretation and showed relatively high diagnostic accuracy, except in cases with space occupying lesions.

Explore Your Richest Voice While Using the Power of Your Feet! 'Integrative Voice Therapy and Voice Pedagogy, Evemarie Haupt'

Franziska Bamer, Angela Fischer

International Association for Integrative Voice Therapy and Voice Pedagogy, VIENNA, Austria

You are invited to participate in an interactive workshop on the established "Integrative Voice Therapy and Voice Pedagogy, Evemarie Haupt" (IVTP). The workshop is designed as an exemplary session with practical relevance. We demonstrate how smoothly IVTP's techniques can be incorporated into the daily work with your clients and how this fresh approach will pay off quickly in stress areas. Join us, get on your feet, move, sing and experience the joyful energy of IVTP!

During the workshop we actively explore a core strategy of IVTP, the "Physiological Stretch Reflex" (PSR)*. The PSR uses the impact of overall postural alignment on the voice. It is a powerful tool to change the sound of the voice fast and effectively, focussing on the resources at hand. You are provided with a variety of possible options to apply the PSR in practice.

In addition, you receive the universal framework of IVTP: the "Voice Function Circle" (VFC). It explains the holistic links between physical and mental parameters relevant for voice production. Furthermore, the VFC helps to structure a session and perform voice analysis. Besides, it gives you the unique chance to integrate any given method or exercise and combine them with the approaches you currently apply.

This workshop gives you the opportunity to experiment with your very own speaking, shouting and singing voice. Discover your personal heel to head balance: flow and structure, breath and sound, motion and stability, body and voice. Voice is balance!

* The scientific background of PSR is promoted by the article "Considerations for Maintenance of Postural Alignment for Voice Production" by Barbara M. Wilson Arboleda and Arlette L. Frederick, Journal of Voice, Vol. 22, No. 1, 2008.

Diversity of styles and techniques in the practice of Mongol Khöömii

Nathalie Henrich Bernardoni[1], Michèle Castellengo[2], Johanni Curtet[3], Christophe Savariaux[1]

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In Mongolia, the vocal practice of khöömii has spread pogressively since the 1950s and has diversified in terms of styles recognized by performers of khöömii (also called khöömiich). It is characterized by the expression of melodies produced by selecting given harmonics from a laryngeal acoustic source using articulators control (larynx, tongue, lips, jaw).

What are the vocal techniques underlying the production of styles in Mongolian khöömii?

To explore physiological and acoustic correlates of various styles, 4 professional Mongolian performers of khöömii were recorded on the production of the same song. Audio, electroglottographic and respiratory signals were acquired, via a Biopac MP 150, simultaneously with articulatory signals measured by 3D electromagnetic articulography (NDI WAVE system).

In this presentation, we will detail the most common styles (isgeree khöömii, tsuurai khöömii, khamryn khöömii, zadkhai kharkhiraa) in terms of phonatory and articulatory techniques. Analyses show that tongue and lip usages can vary among the same style. The phonatory technique, which may or may not involve a vestibular vibration, remains a strong distinctive feature between two basic categories: high (nariin or khöömii) and low (budun or kharkhiraa).

Extreme vocal techniques for producing distorted sounds in rock and metal singing

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Rock and metal singing utilize distorted sounds for aesthetic and expressive purposes. What are the vocal techniques that are used to safely produce screams, growls, and yells in distorted singing? What are the laryngeal structures that are implied into such voice production?

This workshop aims to provide some insights into several extreme vocal techniques that are used by professional rock and metal singers, exploring the physiological behavior related to several specific sounds (*distortion, false cord, fry scream, whistle fry, growl, yell scream, tunnel throat, guttural*) by means of laryngeal endoscopy combined with breathing plethysmography, electroglottography and acoustic assessments.

The sounds will be illustrated, and some clues for teaching them will be given. The physiological correlates will be detailed and discussed. The contributions of vestibular and aryepiglottic folds will be shown.

Training whistle register

Erika Biavati

Bologna University, SAN PIETRO IN CASALE (BO), Italy

Whistle register, also known as Mode or Mechanism 3 (M3), are two separate laryngeal mechanisms: ”laryngeal whistle” and ”stop closure whistle”. Both mechanisms can be taught, developed and used for educational and expressive purposes by singers and actors.

Using the techniques that I’ve developed, workshop participants will experience how to produce both laryngeal and stop closure whistles without damaging the true vocal folds, as well as learn how to connect whistle to M2 (Mechanism 2/head voice/falsetto/ loft register) for artistry and register control.

In addition, we will examine the roles of the cricopharyngeus muscles (aka the upper esophageal sphincter), false fold adduction, and tongue action in whistle register production as well as resonator shaping and harmonic reinforcement to manage the M3-M2 passage.

Singing and Speaking with an Open Mind towards Time, Style and Culture

Malene Bichel

Rythmic Music Conservatory, COPENHAGEN, Denmark

Focus question: How do we teach a voice technique and a culture of voice training that is open to all styles and to the creation of new styles, so voice teaching and voice training does not only become historical and ethnocentric and does not only approach individuals that long to perform.

In this workshop we will let the voices sound and the ears listen and work with the creativity of the group and of the individual in the group.

We will focus on the connection between musical meaning, use of voice and creativity.

An underlying idea is that creativity and musicality depend on the singer's ability to be present in a mindful way, present in a playful way and communicating in a natural way

We will work with gibberish as a meta-language in communicative exercises

The methods presented have been used in the education of music teachers in Denmark, and in projects with children of all ages in, Denmark, Egypt and Iran.

MALENE BICHEL: Danish singer and voiceteacher, lecturer in Music Pedagogy at Rythmic Music Conservatory, Assistant professor at Metropolitan University College, Copenhagen, educated as a classical singer, specialized in contemporary art music, voice improvisation, group creativity and in in education of music teachers and voice teachers, Chair of the Danish Voice Association. As a singer she often collaborates with composers and small ensembles of different instrumentation, founder and leader of the experimenting vocal group "Klangsaft" (juice of sound) in Copenhagen, partner in the project "Ears Wide Open- Intercultural Dialogues Through Creative Musical Processes" in which Danish and Egyptian composers singers and ethno musicologists explored new approaches for intercultural musical education, Malene did presentations in Eurovox Riga 2015, ICVT Stockholm 2017, Eurovox Den Haag 2018 and workshops in Iran, Egypt, Norway, Germany, Italy and Malta.

ASSISLT - Automated Software System in Speech-language Therapy

Zuzana Bílková, Adam Novozámský, Adam Dominec, Barbara Zitová, Šimon Greško, Markéta Paroubková

Institute of Information Theory and Automation, CAS, PRAGUE 8, Czech Republic

The aim of our project is to create a software system to support speech therapy for adults and children with inborn and acquired motor speech disorders. The system focuses on individual treatment using exercises that improve tongue motion and thus articulation. The system offers an adjustable set of exercises recommended by a therapist, motivation by augmented reality, performance evaluation of therapeutic movements, and session archivation. It allows the therapist to evaluate the treatment schedule and its progress. Connection of the tongue movement to a computer game characters will increase children's motivation for regular exercising.

The main component of the system is a module evaluating the tongue motion based on image data from an ordinary web camera. In the preliminary step a patient mouth is located. Based on the expert expertise, we distinguished four groups of exercises requiring different information for evaluation of their execution. They are based on tracking of patient lips, cheeks, a tongue, and of its tip.

The proposed solution for detection of face parts, in our case mouth localizaton, uses Dlib library, based on HOGs. Dlib library automatically detects 68 points on face allowing an easy detection of mouth and lips. Based on the detected lips points, we compute features evaluating the group of lips exercises. The tongue and the tongue tip exercises utilize a segmentation of the tongue body and of its tip attained by convolutional neural network Unet. We use one neural network to output both results to achieve higher speed. The network is trained on data we acquired as well as downloaded from the internet with different quality to ensure robustness of our method.

May opera singers native dialect stimulate emotional expression in their singing?

Kåre Bjørkøy

Norwegian University of Technology and Science, TRONDHEIM, Norway

In two experiments young opera singers applied dialect transition i to transfer emotional expressions from their native dialect into a distant singing language, Italian.

Seven Scandinavian opera singers, age 24-27, voluntered as testpersons, preparing a secco recitative and translated it into their native dialect.

Experiment: 1 hour: four singers. Experiment: 36 hours: three singers.The singers worked as a group with their recitative. A stage director lead the experiments by having the singers exchange between speaking the text in their native dialect and singing the original recitative in Italian.

The recitatives were recorded before and after the experiments.

Analyses and results: The recordings were applied to register and compare deviating values of perceived emotional expression, duration of performance, sound pressure and formants.

a. Perception assessments showed a mean improvement of role character portrait of 95,2 %. Mean expression of negative emotions were improved with 80,0 %, while mean expression of positive emotions were improved with 18,9 %.

b. Voice sound analyses in PRAAT showed individual deviations in voice sound pressure, duration of performance, locations of formants from F o- to F 5.

c. Singers in 2.experiment showed larger improvement in emotional expression than singers in 1.experiment.

Conclusion: Dialect transition seems to be a promising method to stimulate young opera singers to perform with emotional expression in a distant language. Singers who expressed role character well, deviated more on voice sound intensity and duration of performance than the other singers.

Functional voice changes considering age in patients with unilateral vocal fold motion impairment treated with injection laryngoplasty and speech therapy

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University Hospital Zurich, ZURICH, Switzerland

Objective: In patients with unilateral vocal fold motion impairment (UVFMI) voice range profiles (VRP) were described as objective assessment method for neuromuscular function and responsiveness to treatment after injection laryngoplasty. Currently it is unclear, which VRP measures are sensitive to change in patients receiving voice therapy alone or injection laryngoplasty combined with voice therapy, and how age affects outcomes. This was investigated in the present work, applying VRP measurements, the Dysphonia Severity Index (DSI) and perceptual Grading-Roughness-Breathiness-Asthenia-Strain scale to describe voice function.

Method: In a retrospective study, 25 patients (21 men, 4 women) with a mean age of 61.4 (37-82) years with UVMI were investigated before and after treatment. 8 patients received speech therapy (group 1) and 17 patients combined injection laryngoplasty with speech therapy (group 2). Outcome measures were VRP minimum, mean, maximum and range of singing and speaking fundamental frequency F0 (Hz) and SPL dB(A), the DSI and GRBAS scale. Differences before and after treatment were assessed by paired t-test and Wilcoxon signed-rank test, and age effects by Pearson`s chi–squared test.

Results: Mean speaking SPL significantly increased in group 1 from 62.6 (SD 4.3) to 64.8 (SD 4.7) and in group 2 from 61.9 (SD 3.5) to 64.1 (SD 4.3) dB(A) ($p<0.05$). Also, the DSI significantly improved from -11.1 (SD 19.4) to -3.2 (SD 11.9) in group 1, and from -9.1 (SD 13.5) to -0.6 (SD 2.3) in group 2 ($p<0.05$). Additionally, in group 2 maximum calling and singing SPL, and calling F0 significantly increased ($p<0.05$). After treatment, in both groups mean GRBAS scale G was significantly improved ($p<0.05$). Age significantly affected minimum speaking F0 (coefficient:-0.53) in all patients ($p<0.05$).

Conclusion: Especially dysphonia and a low speaking voice SPL negatively affect the patients` daily communication. In our study mean speaking SPL, the DSI and perceptual dysphonia improved regardless of treatment type. Therefore, these may be early applicable useful clinical outcome measures. However, age and treatment may affect more VRP characteristics, which should be confirmed in a larger clinical study. This may improve patient counselling regarding treatment decisions.

Voice alterations after thyroid surgery without recurrent laryngeal nerve injury

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Voice alterations after thyroid surgery remain unclear since previous research show diverse results. The aim of this student project was to investigate changes in speech and voice range profiles after thyroid surgery in patients without recurrent laryngeal nerve injury and further investigate whether possible self-reported voice outcomes are confirmed by acoustic measurements. Videostrobolaryngoscopy, self-evaluation questionnaires, and recordings of speech and voice range profiles were used to assess 18 participants preoperatively and two months postoperatively. The results showed that self-reported voice complaints increased significantly after surgery. The results also revealed that speaking fundamental frequency decreased significantly but that the frequency and intensity range did not differ significantly after surgery. However, half of the participants (56 %) did show a reduced frequency range after surgery and results from two individual participants showed a reduced maximum frequency (f0max) of nine and thirteen semitones. Patients undergoing thyroid surgery should be informed about the substantial risk of a reduced frequency range and that voice complaints are common after surgery even though the recurrent laryngeal nerve is intact.

Vowel Migration and Modification: Pedagogic Implications of Howell's Absolute Spectral Tone Color Theory

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Vowel migration and modification across range has been a prominant strategy in voice pedagogy for at least a century. Yet a detailed understanding of why vowels migrate and/or need modification has been lacking. The work of Berton Coffin as well as Ralph Appleman provided early explanations. Johan Sundberg's work on soprano formant tuning elucidated the challenge for treble voices at higher fundamental frequencies as early as 1977. In 2016, Ian Howell of New England Conservatory brought over and expanded concepts from psycho-acoustics that promise to significantly increase our understadning of the mechanisms of vowel migration and modification. The basic premise is 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. Sung tones then are comprised of mixtures of the tone colors of the harmonics being featured by the resonances of the vocal tract. As pitch is raised, the pitch's harmonic set moves through a spectrum of these tone colors. Furthermore, as individual harmonics rise into and through the peaks of vocal tract resonances, their contributions to the overall tone color increase and decrease. 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. These two tone color contributions can be sensed as "under-" and "over-vowel" tone colors, the percentages of which can be varied for best result. This workshop will explore strategies for sensing how the under and over vowel tone colors are perceived, tuned, and varied for best function across range and acoustic register transitions.

At the end of the workshop, participants will:

Have a basic understanding of absolute spectral tone color theory.

Have a handout chart with the approximate tone color contributions of the first two formants (over and under vowel percepts) for the cardinal vowels.

Learn how they vary across range, levels of intensity, and acoustic register transitions.

Have explored pedagogic techniques used in balancing formant contributions for best resonance.

M0 and Supraglottic Extreme Voice

Eleonora Bruni

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Extreme and distorted vocal mechanisms can be used for educational and expressive purposes in singing and acting voice. As a singer, teacher, and researcher, I've developed specific training methods which teach the use of supraglottic structures, excluding or minimizing the role of the true vocal folds, thereby resulting in effective, safe and healthy vocal production.

In this workshop, participants will experience supraglottal techniques for growls and screams, using false folds, arytenoid cartilages, and various supraglottic structures. We'll also explore "distortions" and "scratched" sounds involving the true vocal folds with light and incomplete adduction. The use of these extreme sounds in singing styles such as rock, metal, pop, musical theater, gospel, R&B and in acting will also be discussed.

C

TO SING OR NOT TO SING? The 'Hamletic Approach' of Theater Physicians

Orietta Calcinoni

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What is a "Medicus Theatri"?? Medical profession is ruled by EBM protocols, instrumental data, references in literature. Assessments, treatments, behavioural changes are usually stated and patients must cope with them. But under limelights many things change. Worst than stadium lights, behind scenes many things change, about assessment facilities, timing schedules. Theater physicians must develope a multidimensional approach not only related to Impairment, Disability, Handicap, but to Professional & Stage unavoidable demands. This approach is summarized in relation with professional schedule's different requirements, from anamnesis to "final statement" (to sing/act or to cancel) by real clinical cases and how they were managed, to open discussion with participants.

Herbs for Voice
- proposal of a database for scientific approach to traditional voice remedies

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WHO states that phytotherapy is a worldwide-spread treatment, because of medical traditions, easiness of access, cheaper prices, "safer" than "chemicals" products. People suffering voice impairment often choose first "natural remedies": different countries developing different approaches with the plants easy to be found in each one.

In last year a project of Milan University dealt with Sisymbrium. Erysismum, its common name, is widely used in voice treatments, but WHY does it work?? The project brought to many different results, both in herbal sciences and botanics publications, and in creating a database "Herbs for Voice". Many Phoniatricians, SLTs from different countries of the world sent their "traditional" solutions or the remedies common where they live. Data were classified in an Excel sheet, to assess correct botanical names, active principles, target receptors of each principle and tissues where those receptors are. Then data were analyzed to confirm correlations between traditional use and action on receptors and to look for "similar actions" in different plants. This wants to be a first step to create a shareware database among scientist and health professionals to scientifically base herbal treatments as well as help Voice professionals around the world to find "the plant that better fits your need" in each Country. The database is not intended to become a "vademecum" for each one, but a tool for health professionals and scientists.

Towards a consensus definition of Vocal Effort, Vocal Load, Vocal Loading, and Vocal Fatigue

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Background: Despite the large amount of publications on the influence of vocal loading on vocal fatigue and vocal effort, relatively little progress has been made in translating this information in consensual definitions of these terms.

Purpose: The purpose of this document was to present a linguistically modelled and expert discussed definition of vocal fatigue, vocal effort, vocal load, and vocal loading.

Method: First, a comprehensive literature search of the topics was conducted using four computerized databases: PubMed/MEDLINE, Embase, The Cochrane, and Scielo. Following the review of existing literature, a group of experts met to discuss the definitions of the selected terms.

Results: From the *literature review*, multiple definitions were identified for the proposed keywords. Prolonged voice time was one of the most often used keywords in the definition of vocal loading. Prolonged voice time was a key phrase commonly used to define vocal effort, vocal loading and vocal fatigue. An additional key phrase associated with vocal fatigue was vocal symptom/deficit. The two phrases most often used to define vocal effort were vocal loudness change and raise in fundamental frequency, both of which are effects of vocal effort. From the *discussion with experts and with exiting definitions from the literature*, we have proposed consensual definitions of the following terms: vocal load, vocal loading, vocal effort and vocal fatigue. Vocal load is defined as the vocal requirement or vocal goal given a communication situation, which is independent of the physiology and/or perception of a specific vocalist. Vocal loading is the way voicing is internally produced due to the perceived vocal load, which may be quantifiable in terms of quality or quantity. Vocal Effort is a psychophysical parameter, conceptualized as a perceptual phenomenon perceived by the speaker. Vocal fatigue can be perceived as a perceived measurable symptom that influences vocal task performance and is individual specific.

Conclusions: The results of this research will allow for a unified and consensual definition for clinical and research speech-language pathologists to further the understanding of the concepts of vocal load, vocal loading, vocal effort, and vocal fatigue.

An exploration of the approach to crossing styles for professional female singers using somatic methods

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Vocal performance pedagogy is driven by numerous methods and techniques usually focused on an individual style or genre. Very few methods exist that enable a performer to sing in multiple styles, for example, jazz, classical, music theatre or pop.

The research project that this workshop is based on is investigating the means by which singers can perform across different styles. An aim of this research is to enhance flexibility, authenticity and technical control for adult professional female singers wishing to expand their breadth of styles.

One of the systems that has been developed and publicized that focuses on multi-style singing is Somatic Voice Work ™ The LoVetri Method. Other somatic methods potentially useful to achieve stylistically appropriate vocal production such as the Alexander technique have also been investigated as part of the research project.

This workshop will explore the application of these methods to singing a sample of styles and will address the combination of vocal function and mindful processes including Alexander's "Use of the self".

Responses collected for the research from interviews with crossover practitioners (singers of multiple styles) in relation to their process or approach and a review of the experimental performance and teaching practice undertaken for the research project will also inform activities included in the workshop.

Harmonic concepts in vocal exercises

Kim Chandler

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Aside from the prominence of lead vocals in contemporary pop music, backing vocals are also a key feature of many pop songs. Vocal exercises in private lessons understandably favour the development of the lead vocal role, but the inclusion of work on vocal harmonies will develop the ear more than working on melody alone and foster deeper appreciation for the important role played by backing vocals.

The inclusion of some harmonic work in the vocal exercises employed by the teacher in lessons is a relevant, enjoyable way that harmony concepts (e.g. chord construction, chord types, chord sequences) and coordinated movement can be introduced into vocal tuition to help make students better, all-round musicians and performers. And since this sort of activity will involve the teacher and student singing together, it could also foster a deeper sense of collaborative team work in the learning environment.

Even for singers who never intend to do backing vocals or vocal harmonies themselves in either recording or live performance, understanding this role will help them to create better backing vocal arrangements for the songs they perform. This interactive workshop will provide practical, fun ways that vocal harmony concepts can be included in a private lesson context via a range of different exercises.

The Acoustic Properties of Sibilant /s/ in Patients with Voice Disorders

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Productions containing word-initial sibilant /s/ require relaxation of glottal gestures for maintaining fricative air stream and for voicing. Much research has been devoted to investigating phonetic and phonological aspects of sibilant /s/ in normal speakers. However, relatively little attention has been paid to acoustic correlates of sibilant /s/ in pathological voice. The current study focused on acoustic analysis of words with sibilant /s/ in Taiwan Mandarin speakers with voice disorders. Cepstral, spectral and amplitude measurements were applied to investigate a set of words with sibilant /s/ in a connected speech context. Voice recording data from thirty eight dysphonia patients were collected before and after surgical or injection treatments of vocal cord diseases. The spectral moments, energy, mean power (intensity) in air were measures to determine characteristics of noise source of /s/. The differences in amplitude of the first two harmonics (H1-H2), Cepstral Peak Prominence (CPP) and Harmonic-to Noise Ratio (HNR) were analyzed to indicate quality of voicing. The first two formant frequencies F1 and F2 were collected to understand space changes in the oral cavity. Our findings suggested that (1) fricative noise of sibilant /s/ alone could not explain changes of glottal pathology related difference of voice quality. (2) There was clear sex-specific difference in voice quality of the preceding vowel after fricative noise before and after treatment. The male voice had a more breathy quality before treatment, while became more creaky quality than the female voice after treatment. (3) There was the tone effect found in results of the formant analysis. Patterns of F1 and F2 changed in the Mandarin falling tone (Tone 4). In summary, fricative noise of sibilant /s/ contributes to phonetic identification of speaking voices in which changes of pathological voices were mainly observed from the preceding vowel quality.

Laryngeal comfort, vocal fatigue and vocal habits in future professional voice users and nonvocal professionals in Flanders

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Teachers often experience voice problems. The development of a test, able to predict whether the vocal endurance is sufficient to cope with the daily phonatory effort of a teacher, has been a longstanding goal that has, up to now, not been reached.

During PEVoC 2017, the first attempt to develop such an assessment was presented. This presentation is about a continuation of the study and covers the effect of vocal loading, rest and recovery in 70 future teachers and in a control group of 60 future nonvocal professionals measured by questionnaires: the Current Speaking Effort Level or EFFT (Hunter and Titze, 2009), the Voice Stress Inventory or VSI (De Bodt et al., 2008), the Vocal Tract Discomfort or VTD (Luyten et al., 2015). The vocal habits, care and fatigue (Vocal Fatigue Index, Nanjudeswaran, Jacobson et al., 2015) in these populations will also be described.

A comparison of the results of the study and control group will be presented. Suggestions for further development of an instrument that predicts whether the vocal endurance will be sufficient to deal with the vocal demands of a teacher will be addressed as well as suggestions about the vocal education in future professional voice users.

Implications on the influence of vocal loading, rest and recovery on objective voice parameters will be given by K. Daemers.

References

De Bodt, M., Heylen, L., Mertens, F., Vanderwegen, J., & Van de Heyning, P. (2008). *Stemstoonissen*. Antwerpen: Garant.

Hunter, E. J., & Titze, I. R. (2009). Quantifying Vocal Fatigue Recovery: Dynamic Vocal Recovery Trajectories after a Vocal Loading Exercise. *Ann Otol Rhinol Laryngol*, 449-460.

Luyten, A., Bruneel, L., Meerschman, I., D'haeseleer, E., Behlau, M., Coffé, C., & Van Lierde, K. (2015). Prevalence of Vocal Tract Discomfort in the Flemish Population Without Self-Perceived Voice Disorders. *Journal of Voice*, 1-7.

Nanjundeswaran, C., Jacobson, B. H., Gartner-Schmidt, J., & Verdolini Abbott, K. (2015). Vocal Fatigue Index (VFI): Development and Validation. *Journal of Voice*, 433-440.

D

Changes in voice parameters after vocal loading, rest and recovery in future professional voice users and nonvocal professionals in Flanders

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Although teachers are at risk for voice problems, the development of a test that is able to predict whether the vocal endurance is sufficient to cope with the daily phonatory effort of a teacher, is still missing.

During PEVoC 2017, preliminary data of the development of such an assessment were presented. This paper compares the effect of vocal loading, rest and recovery in 70 future teachers and in a control group of 60 future nonvocal professionals measured by acoustic voice assessment.

The vocal loading task was based on a previous study of Niebudek-Bogusz et al. (2007). The acoustic voice assessment was based on former research of Buekers et al., Boucher, Niebudek-Bogusz et al., Laukkanen et al., Guzman et al. and Maryn. Praat and the Voice Range Profile, the Multidimensional Voice Program and the Analysis of Dysphonia in Speech and Voice of the Computerized Speech Lab (Kay Elemetrics) were used for analysis of sustained vowels and running speech.

The data were collected and are currently being analyzed to reveal whether the results on the intensity (I) and pitch (F0) of soft, normal and loud automatic speech, the ratio between and the acoustic measures of sustained vowels and continuous speech show significant changes prior to and after vocal load and/or rest.

Comparison of the results of study and control group, correlations between different (objective and subjective) measures and vocal habits will also be addressed.

Implications about the influence of vocal loading, rest and recovery measured by questionnaires will be given by Carole Chiers.

References

Niebudek-Bogusz, E., Kotylo, P., & Sliwinska-Kowalska, M. (2007). Evaluation of Voice Acoustic Parameters Related to the Vocal-Loading Test in Professionally Active Teachers with Dysphonia. *International Journal of Occupational Medicine and Environmental Health*, 25-30.

DoctorVox Voice Therapy Instructional Workshop

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DoctorVox Voice Therapy (DVT) is a direct technique which combines phonation, resonance and breathing in voice therapy in a holistic approach. Artificially elongated vocal tract and adjustable backpressure (continuous and alternative) are the main physical factors which intuitively balance the several simultaneous functions included in voice production. DVT has been structured on Sihvo's LaxVox exercise by Denizoglu. Various devices have been devised (doctorVOX, pocketVOX, and maskVOX) to provide multichannel biofeedback and enhance treatment adherence in DVT applications. DVT is not simply the practice of phonating into a tube submerged in a certain amount of water. Exercise is the tool, not the goal; the whole DVT action plan and exercise patterns are programmed due to motor learning principles and biomechanics in physioanatomy.

DVT is a multidimensional-multilevel treatment strategy and an integrative approach for a given voice patient. Three dimensions of DVT survey are distinguished through practice: clinician's action plan, exercise patterns and the monitorization of the patient. DVT has a dynamic algorithm; there are no exercise templates which fits for all. The clinician has an action plan and well-defined muscle-specific exercises to be chosen for an individual voice patient. A preset level containing counseling, relaxation, posture and breath support is followed by vocal exercises. The crucial step of vocal exercises is to elicit the primal sound; only after then, basic exercises (sostenuto, glissando, portamento, portato) are started. After mastering the easy tonal vocal patterns, combined exercises which require advanced vocal skills are given for developing phase of the new vocal skill. After the linguistic load, behavioral transfer is the last step of the DVT action plan.

DVT may be a treatment of choice for various voice disorders such as vocal nodules, presbiphonia, puberphonia, unilateral vocal fold paralysis, functional glottic insufficiencies, etc. DVT helps to develop vocal fitness, learn vocal ergonomics and voice care. In Pedagogical Vocology, it may be useful for the singers for specific demands such as blending the registers, safe and easier high pitches, effective breath strategies, vocal warm-up and cool down as well as developing a resonant and effective voice.

A New Treatment Method for Puberphonia: DoctorVox Therapy Method with High Backpressure

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Object: Puberphonia (mutational falsetto) is a functional problem beyond pubertal period which is seen mostly in males. Treatment of puberphonia has been reported to be done by applying manual pressure externally; by exercises for lowering vertical laryngeal position or by surgery (Type III thyroplasty). DoctorVox Therapy (DVT) is based on Sihvo's LaxVox Methot and developed by Denizoglu. A new method is presented by Denizoglu et al. using high backpressure in DVT.

Methods: 21 male with puberphonia and 25 age-matched healthy male were included in the study. ENT examination, VLS, acoustic (SPL, mean F0, first three formants, jitter%, shimmer%, NHR) and EGG (CQ and CI) analysis were performed, at pretreatment, first and sixth months of treatment. VHI-10 and the GRBAS scales were performed for perceptual voice evaluation. DVT was applied to the patients diagnosed as puberphonia with the doctorVOX Voice Therapy and Vocal Training Device. The tip tuner was adjusted to provide a high backpressure (over 20 cmH2O) to the user and no other methods were used.. After skill acquisition, therapy was completed by transferring the new skill into a behavior.

Results and Conclusions: All patients were able to find their chest register in the first two sessions and use their chest register in a normal habitual speaking tone and timbre after two weeks of therapy. All patients showed statistically decrease in VHI-10, GRB, F0, F1, F2, F3, %Jitt, %Shimm, NHR and CI whereas an increase in CQ after treatment (first month). At the 6th month post-treatment, no patient got back to falsetto register; despite VHI-10, %jitt ve NHR values were higher than of control. DVT with high backpressure provided by the doctorVOX device was shown to be an effective treatment of puberphonia.

Relative Fundamental Frequency During Vocal Loading and Relationships with Laryngeal Muscular Patterns

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Vocal fatigue and vocal effort are prime complaints of teachers and can be captured with self-report instruments, acoustic measures, and neck sEMG sensors. Relative fundamental frequency (RFF) refers to the vowel voicing offset and onset cycles surrounding a voiceless fricative. Decreased offset and onset RFF values have been associated with vocal hyperfunction and vocal effort. This study examined whether (1) vocal loading had an effect on RFF over time, (2) there was a difference in RFF values and time course between early career teachers with vocal fatigue and controls, and (3) extralaryngeal sEMG and RFF results were linked. Fifty-seven young adult women, including a subset of early career teachers with vocal fatigue based on the Vocal Fatigue Index, repeated vowels, sentences, and simulated pressed vowels fifty-five times each while wearing sEMG sensors on the suprahyoid and infrahyoid muscle groups. They also produced a syllable sequence containing /afa/, /ifi/, and /ufu/ once at the beginning, middle, and end of the protocol. Preliminary data for syllables showed that RFF values changed for all participants over time. However, only changes in onset cycle 1 values supported increases in vocal effort while offset values improved over time. Teachers had lower baseline offset values but not lower baseline onset values compared with controls. However, teachers had a quicker deterioration of onset values with vocal loading and reached a lower final onset value than controls. For repeated sentence production, RFF values decreased at the cycles closest to the voicing offset and onset over time. Finally, in a subset of 13 teachers and 13 controls matched on age and skinfold thickness, a pattern recognition algorithm based on sEMG data distinguished with 92.7% accuracy, 0.90 sensitivity, and 0.95 specificity between teachers with vocal fatigue and controls. In conclusion, voice RFF has the potential to track changes in vocal function over time and may be a sensitive marker of vocal fatigue and vocal effort that is linked with underlying laryngeal muscular patterns.

Choral singing with all colours of the world

Alberto Ter Doest

Universal Voice Institute, AMSTERDAM, Netherlands

In this vocal workshop, the aim is to make everybody sing in choral material and learn a new fast didactical approach to change the sound of a chorus in the desired sound wanted by a conductor.

The ensemble material we will use in this workshop will guide us through the 4 voice characters, a more speaking character named SPEECH, a voiced whispered named WHISPER, a dark vibrato sung named CLASSICAL and a calling character named BELTING. Participants will learn and identify these characters with the use of 8 sound parameters, like pitch-range, loudness, clearness or breathiness, vibrato or non-vibrato or its specific timbre, sound colour. The Universal Voice System is based on 8 sound parameters put into a clear Personal Voice Plan. This PVP helps you describe how you sound and how you can change to the desired sound. Voice characters or modes of all methods and/or systems will be easier to understand, to develop or correct. Your pupils/students can benefit from a simple plan on how to learn to control and/or change their voices in a direction you decide together.

You will learn how to achieve the sound you want to develop through: the right posture and support, the right amount of breath-pressure and breath-flow, breath support, how to adjust your vocal folds for the correct sound source and how to shape the vocal tract, the sound space, for the desired timbre. These are the 4 pillars of UVS.

This workshop will be a fun and effective 40 minutes of training your voice with pleasure and enjoying singing in harmony. My aim is to make this learning trip extremely effective, enjoyable and efficient.

Alberto ter Doest
Author of the Universal Voice Guide
Vocal Coach in Classical, Pop, Musical and Rock.
Former Professor of Codarts, University of the Arts, Rotterdam
Member of the Netherlands Chamber Choir. Guest professor at different Academy's and Conservatories.

Belt2themax

Alberto Ter Doest, Daan Smits

Universal Voice Institute, AMSTERDAM, Netherlands

In this workshop about Belting, we will look into the standards and demands of belting anno 2019. What do we hear in Broadway shows, rock concerts and programs like the Voice? How can we teach young students to Belt so loud and high and still maintain a healthy voice?

These questions and examples will be shown and addressed in this workshop.

You are invited to participate in this workshop so you will experience the sound you need to develop for Belting and learn what your body needs to do for it. We will give you exercises and show you pictures and illustrations what you need to do in your posture, power (breath), source and filter, our four pillars.

With some very well-known examples, you will learn what the sound parameters of Belting are and we will show these sound-parameters in a Voice Plan. With this Voice Plan, you can see and understand how you need to sound for the right Beltsound.

Then we will start with exercises to achieve this Beltsound.

First training the range of a basic Belt range and after range, you need to train the right loudness and sound colour.

With the right sound parameters, we will transfer the right sound into a basic Beltsong.

After we have established a basic Belting sound we will listen to and train some higher Belt sounds, which are so popular nowadays. Besides that, we will listen to the more risky distortion Belt sounds and how to achieve these Belting sounds.

We will finish with Questions and Answers.

E

Voices of Obama, Oprah, Trump and Merkel: Vocal Power

Elizabeth Ebbink

Vocale communicatie training, BUSSUM, Netherlands

A speaker's charisma and impact is for a large part determined by the tone of voice. With loudness, sharpness, depth, warmth, tempo, melody the voice creates an impression on the senses of the listener. This impression determines whether the listener will feel secure, scared, attracted of repelled by what you say. Even before they hear the meaning of your words. To use this ability you need vocal souplesse and awareness of purpose.

I will use films of well known speakers to see how they speak and what they accomplish in their audience. Different parameters of vocal influence, pitch, volume, tempo, timbre, will be discussed. With the help of vocal exercises all participants will experiment in using their own voice in various ways.

We will show that your influence can be enhanced with your own vocal apparatus using voice technique, music and psychology.

F

Acoustic Voice Quality Index (AVQI) in screening voice quality

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To diminish the negative effects of voice disorders on people who are highly dependent on their voice quality like teachers, preventing voice disorders is important. This needs a reliable, specified screening tool people with higher risk of voice disorders. Acoustic Voice Quality Index (AVQI) has been found to differentiate normal voice from abnormal voice quality and serve as a treatment outcome measure. This research aimed to find out if AVQI could be a proper screening tool in combination with perceptual and self-assessment tools.

In this study, 129 teaching students (mean age 26.4 years, SD 9.8 years) without any diagnosed voice disorders participated. The participants read a text in Finnish, sustained vowel /a/, and fill in VHI questionnaire. All voice samples were recorded with an AKG C544L microphone, iFocusrite soundcard and Praat software using 44100 sample rate, 16 bits amplitude quantization. Five expert voice therapists evaluated the samples using GRBAS on a scale of 0-0.5; 0.5-1, 1-2; 2-3. Three medial seconds of [a:] and the first 23 syllables of the text were analyzed using the AVQI-script version 03.01 in the program Praat (5.3.55). The analysis gives one AVQI-score per participant (scale from 0 to 10).

The G_{mean}=0.0–0.5 and VHI-score<19 were considered as Normal. Statistical analysis was done by receiver operating characteristic (ROC) curve, Spearman correlation coefficient, and independent sample T-test.

According to the results, the area under the curve (A_{ROC}) was equal to 0.554, which is fair. The Youden index gave a cutoff value of 0.30 with a sensitivity of 85% and a specificity of 81.1%.

There were weak significant correlations between G_{mean} and AVQI, and two AVQI parameters smoothed cepstral peak prominence, CPPS, and harmonic to noise ratio, HNR (r= 0.27; -0.24; -0.20; respectively; $p < 0.05$), and between total VHI and AVQI score and CPPs (r= 0.21 and r= 0.20; respectively; p< 0.05). The AVQI scores differed significantly between groups with lower and higher than 19 in VHI total score.

AVQI could not strongly differentiate normal from slightly abnormal voice quality based on perceptual assessment, but it seems AVQI and VHI combination could better screen slightly deviant voice.

An augmented reality, i.e. the augmented picture of a butterfly sitting on the nose tip when the tongue should be stucked out as far, is introduced into the solution to increase the understanding of the exercises and the patient motivation.

An exploration of the effect of the valleculae during singing based on 3D-printed vocal tracts

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Background and objectives: The valleculae are a pair of side branches of the human vocal tract with some similarities to the piriform fossae. While the acoustic properties of the piriform fossae have been explored in detail (e.g. Delvaux and Howard, 2014), there is little evidence of exploration of the acoustic properties of the valleculae. A recent investigation (Vampola et al, 2015), using a finite element model, suggests that when valleculae are present, two antiresonances and resonances appeared in the high frequency region (above 4kHz) along with those produced by piriform sinuses. In this paper, we used a 3-D printed vocal tract of an operatic tenor to investigate how the valleculae shape the high frequency energy of singing voice.

Method: Two 3-D printed vocal tracts were employed for this experiment. The first was as measured for an operatic tenor singing the vowel /i:/ on the note A3 and this had clearly identifiable valleculae. The second was an edited version of the first in which the valleculae had been 'removed' digitally. The tracts were placed atop a vocal tract organ loudspeaker (Howard, 2017) and recordings were made with the microphone placed in front of the mouth for a white noise excitation.

Result: Analysis of the long-term average spectra of the recordings illustrated clear differences between the output from the two tracts. With the valleculae present a significant antiresonance at around 3,700Hz up to -10dB was noted.

Conclusion: This experiment provides evidence that the valleculae have similar acoustic properties as the piriform fossae and that the valleculae can influence acoustically the frequency region below 4kHz. It is therefore hypothesised that large volume valleculae have the potential to impede to some extent the acoustic effect of the singers formant cluster. It is also noted that the volume of the valleculae changes with the uttered vowel, and this needs further attention. Strategies to control valleculae volume is likely to be highly relevant to voice pedagogy practice.

Youth voices in deliberative democracy - The Røst project: How voice and citizenship is connected

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How do we empower the youth to participate in deliberative democracy? One way to do it is the idea of giving students a voice in order for them to become a voice in society. That is what the Røst project is doing, developing Danish Folk High School students' rhetorical skills and organizing an annual Speech Festival for them (www.røst.dk).

Keeping Robert Asen's "… discourse theory that conceptualizes citizenship as a mode of public engagement." (2004) in mind, rhetoricians recognize citizenship as more than just the right to cast a vote for political elections, making everyday deliberations important. In my presentation I investigate Røst and Røst Festival as a youth empowerment initiative. Being present at select Folk High Schools as a voice coach and at the festival as a stage host, I try to uncover if and how the framework and training that Røst provides can be said to enable young persons in Denmark to participate in deliberative democracy. My working method is characterized as that of a rhetorical field critic relying on observations and qualitative interviews.

In my view there is a link between a speaker's vocal and embodied performance in a safe space with live spectators and the feeling of having a relevant voice and opinion in public matters and the belief of the speaker that she can communicate this opinion effectively. This view echoes well with the fact that quite a few of the former Røst speakers can now be found as public spokespersons, podcast hosts and debaters advocating certain aspects and challenges of youth everyday culture.

Concluding my presentation, I reflect upon the growing number of democracy and knowledge festivals in Denmark, where participants are invited to hear presentations and debates from politicians, scholars and the like. In my perspective, Røsts performative model with its focus on developing rhetorical skills, might be a better way of encouraging participation in democracy and creating voices of and in the public. After all, as Robert Putnam puts it, "… citizenship is not a spectator sport." (2000).

On the relevance of specific parts of the lower larynx on the acoustical properties of the vocal tract - a numerical study

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The vocal tract (VT) is the air-filled cavity between the vocal folds and the mouth opening. Considering the well known source-filter theory, the VT acts as an acoustic resonator that provides a frequency dependent amplification of the glottal source. On the other hand it is widely accepted, that the impedance of the VT determines the vibration of the vocal folds significantly, i.e. source and filter interact with each other.

In order to obtain an overview of the individuality of the acoustical transfer characteristics and the coupling properties, the geometries of the VTs of three subject were determined. The subjects were asked to phonate the corner vowels /a/, /i/ and /u/ in a 3-Tesla MRI for 9.2 s in both a singing phonation as well as a speech-like phonation. Based on the determined 3D-data of the VT (including teeths by means of a postprocessing substep) the cavities were segmented and analysed by means of the finite element method (FE) in the frequency domain. In addition, geometrical variations of the FE-models were conducted: 1) the removal of parts of the lower larynx and 2) the hybrid exchange of the lower larynx with regard to the singing configuration and speech-like configuration. In sum, 90 models were analysed with regard to formant frequencies and specific amplification properties.

Among others, it can be shown that F1 and F2 are only slightly affected despite larger geometrical manipulations of the models. Furtermore, these manipulations may result in a loss of gain in the 2 kHz-region and change the impedance of the VT significantly in this frequency region.

Within the analysed cohort, these results are independent of the vowel. In addition, these calculations allow an estimation of the efficacy of sub-glottal sources that may are relevant in the context of clinical therapies.

Experimental and numerical investigations of the fluid flow and acoustical noise sources in physical models of the vocal tract - a pilot study

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3D-printed physical models of human vocal tracts based on geometries obtained from magnetic resonance imaging (MRI) allow detailed insights into acoustical as well as fluid dynamical velocity and pressure fields caused by external excitation.

In our experimental configuration, we analysed the acoustical output of several physical models caused by an adjustable fluid flow applied at the glottal entry. At this position, the hydrodynamical pressure was measured simultaneously. Moreover, the acoustic pressure was measured via a microphone in front of the lips of the model. Depending on the VT-geometry the acoustical sources are located at the lips or teeth, respectively, or somewhere else within the VT cavity.

For calibration purposes and to get deeper knowledge about the acoustical excitation mechanisms, a numerical computational framework will be presented, which takes into account the fluid-dynamical and the acoustical domain. These computations can overcome the limitations of the measurement equipment in terms of the visualization and evaluation of the 3D-behaviour of the physical quantities. In this study, first results will be presented and discussed. Furthermore, we discuss how these methods can contribute to the overall understanding of speech production.

Tips & Tricks in Endoscopy

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In the first, theoretical part of this workshop, basics of handling rigid and flexible endoscopes are explained and – for advanced participants – special tips and tricks in office-based endoscopy are shown. In the practical part the work with endoscopes will be demonstrated, simulating the conditions during indirect laryngoscopy or office-based phonosurgery (no live-endoscopy). To the extent that the workshop setting can facilitate, the participants will have the opportunity to work with endoscopes hands-on.

'How did that feel?':
The Psychological Motives and Implications of Feedback in the Australian Singing Studio

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Studies show that effective singing teachers offer feedback verbally (e.g., enquiry, compliments) and non-verbally (e.g., gesture, vocal demonstration) when teaching their students in one-to-one lessons as a means of implementing the teacher's methodology, effecting cognitive and affective growth, and establishing rapport. However, no research to date has categorised and quantified the psychological motives and implications of the feedback given to determine if any trends exist. This project sought to understand the psychological characteristics of successful Australian tertiary classical and music theatre voice teachers with regard to their feedback given in the context of the one-to-one singing lesson. Specifically, this project focussed on the types and frequency of feedback used and their psychological purpose regarding motivation, critical self-reflection, and performance enhancement. A multiple-case study design involved interviews with teachers and observations of their lessons. Australian voice teachers (*n=7*), selected through purposive sampling, were interviewed face-to-face and observed delivering multiple voice lessons (*n=23*) to professionally focused singing students. Interview transcripts and observation field notes were analysed using Interpretive Phenomenological Analysis.

Results demonstrated that verbal and non-verbal feedback used in the Australian voice teacher's studio served to accommodate student development by 1) facilitating positive self-talk, 2) directing or redirecting student thinking, 3) creating a comfortable environment for the student to work in, and/or 4) developing student critical self-enquiry and self-awareness. Additionally, the teachers adjusted the manner in which the feedback was given according to the individual students' learning style to ensure their comprehension. The most prevalent form of feedback was teacher-led questions that revealed student self-perception. This worked to encourage student self-awareness, develop their critical self-reflection, and inform the teacher on how best to adapt their teaching style for the individual student. These findings have implications regarding vocal pedagogy courses. Consideration should be made to incorporate training in the effective use of verbal and non-verbal feedback as a tool for promoting effective singing teaching.

Facilitating singing groups for people with Parkinson's disease

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Group singing as an effective creative arts intervention for health and wellbeing is now a matter of global report. In terms of its efficacy as an intervention for people with Parkinson's disease, results from a current study suggest that successful outcomes, whilst dependent on a range of factors, are particularly impacted by the skills and personal attributes of the singing group facilitator. In this paper we will discuss the results from a research study of facilitators of three singing groups operating simultaneously in South-East Queensland (Australia) in 2017. The facilitators were recruited to organize and conduct weekly singing group sessions and to document their experiences in reflective journals written over a 12-week period. The singing groups were comprised of people with varying stages of Parkinson's disease (N=75) and their carers (N=34). Data were collected from the facilitators' reflective journals along with transcriptions of reflections delivered as oral

reports at a symposium on the impact of singing interventions for people with Parkinson's. Analysis of the data revealed overarching themes in relation to facilitators' skills, attributes and challenges. Preliminary findings indicate a major challenge for facilitators was the need for a thorough background knowledge of the degenerative neurological condition (Parkinson's) and the range of symptoms that manifest with the progression of the disease. Also, whilst supporting views in the existing literature around quality of life improvements, the facilitators' journals offered interesting observations on a range of voice function changes for singing group members.

International perspectives on contemporary commercial music voice pedagogy

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Since the late 1980s, Contemporary Commercial Music (CCM) voice pedagogy has emerged as a discipline in its own right; as distinct from traditional classical voice pedagogy. This interactive workshop will provide practice-based insight into the pedagogical approaches of two pioneering CCM pedagogues. Through a series of demonstrations and group activities, participants will have the opportunity to experience differences in voice function for classical and CCM singing styles.
The two pedagogues, Dr Irene Bartlett and Jeannette LoVetri have been key to the recognition of the new discipline while working independently from opposite sides of the globe; yet, their journeys have been remarkably similar. Beginning in the late 1990s, Dr Irene Bartlett has been instrumental in establishing CCM voice pedagogy in Australia and New Zealand advocating for the discipline through national associations such as ANATS and NEWZATS. As a university educator, she has developed an innovative and highly successful post-graduate Masters degree program in Voice Pedagogy recognised both nationally and internationally. During this very same period, Jeannette LoVetri pioneered and championed CCM voice pedagogy in the USA, advocating for the CCM discipline through bodies such as NATS, the American Academy of Teachers of Singing and The Voice Foundation. Jeannette's seminal contribution to the discipline is the term 'contemporary commercial music' which she conceived to distinguish those singing styles previously referred to as 'non-classical'. Both pedagogues have researched and published extensively on CCM. Irene's research has highlighted the work-lives of contemporary 'gig' singers with a focus on voice health and career longevity. Jeanie has partnered with voice scientists and medical professionals producing published research highlighting major differences in CCM and classical singing voice production. Both Jeanie and Irene remain deeply engaged with advances in voice science, and ground their pedagogy in anatomy, physiology and the neuropsychobiological functioning of voice. As a student of both Irene and Jeanie, Dr Melissa Forbes will facilitate this collaborative workshop and provide an overview of the parallel development of their teaching models.

Measuring voice effects of vibrato-free and ingressive singing: A study of phonation threshold pressures

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Today, professional singers of western classical music are often required to perform a wide range of styles and vocal techniques, which they must master in order to be successful in their careers. New pedagogical strategies need to be developed in higher music education to prepare students for these new demands. Especially in the field of contemporary vocal music this is a big challenge, since the so-called extended vocal techniques tend to push vocal demands beyond healthy limits.

Vibrato-free singing and ingressive phonation are two vocal techniques that are often used in contemporary vocal music. Singers often experience these techniques as causing discomfort or even vocal fatigue. Several recently published and widely used vocal-performance treatises and even PhD studies (e.g., De Boer 2012) have been published on ingressive phonation and vibrato-free singing. However they are often built on performers'/teachers' experiences rather than on

scientific evidence (Ischerwood 2013). Therefore, they do not answer the burning question: is ingressive phonation and/or vibrato-free singing harmful to the voice or are there ways to perform them in a non-harmful manner.

Phonation threshold pressure is the lowest subglottal pressure that brings the vocal fold to vibration. There is evidence that this pressure reflects vocal fold motility and is affected by dehydration and vocal fatigue (Solomon et al 2000). We will report on phonation threshold pressure effects in singers before and after vocal loading in terms of normal vibrato singing, vibrato-free singing and ingressive singing, thus aiming to complement the presently mostly experience-based teaching of singing with scientifically based knowledge.

Perceptual evaluation of voice quality modification in pitch, loudness, and voice type changes in dysphonic women

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Diagnostic evaluation of voice quality is usually performed on GRBA scales in habitual reading, or in normal pitch and intensity position of voice. Voice assessment has not yet focused on the dependence of voice quality modification in the basic functional change in a voice production, such as the change in the pitch, intensity and voice type (spoken vs. singing).

RBASI scales and fullness were evaluated in listening tests on recordings of 54 female patients with different type and degree of voice disorders. The spoken voice was rated from the habitual reading recordings and the words ”halo” at the moderate and maximum intensity of a gradual calling task. Singing stimuli were created from the scales singing during the VRP examination oat maximum intensity. The evaluation was attended by 9 evaluators (4 experienced and 5 beginners). The evaluation was carried out on numerical scales with 7 degrees. The results of the evaluation of individual voice tasks were compared by paired t-test.

The results show a very good to excellent interrater agreement (Cronbach’s alpha). In general, changes of voice quality connected with the raising of the voice intensity increased the evaluation of the fullness. The instability was most noticeable in the habitual reading. The calling in the middle intensity generally had the smallest roughness and strain. Breathiness and asthenticity were only partially reduced with increasing intensity.

The voice pitch change in the loudest dynamics was basically connected with a modification in the breathiness and asthenicity that had risen with the increasing pitch. In the middle and higher pitch, the increase in pitch was also reflected by a decrease in the fullness. When the registers changed, tension and instability increased in the higher register.

A comparison of speaking and singing voice type showed a general increase in strain and instability in singing, while in the register transition region also increased the breathiness and astenicity, fullness decreased.

The perceptual evaluation of different voice usage, depending on the change in pitch, intensity and type of voice, showed their basic qualitative differences, which are likely to be used in the differential diagnosis of voice disorders.

Laryngeal framework surgery using the VITOM® 3D visualization system

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Laryngeal framework surgeries for surgical improvement of voice were developed by Isshiki in the 1970s and are performed worldwide. Over the years, the procedures have been modified and become less invasive. For example, one of the laryngeal framework surgeries involves arytenoid adduction by suturing the arytenoid cartilage with a nylon suture. The procedure of arytenoid adduction was changed to approach the arytenoid cartilage througha created small hole in the laryngeal cartilage without division a cricothyroid joint called the fenestration approach. However, with this change, the difficulty level of the procedure increased. Further, assistant surgeons and observers, such as medical students or residents, cannot observe and learn the procedure satisfactorily because of the limited surgical field.

We, therefore, thought that it is important to improve visualization of the surgical field in laryngeal framework surgeries, so that these surgical techniques can be learned easily and used widely. For this purpose, we adopted the VITOM® 3D

visualization system for performing laryngeal framework surgeries, involving Type 1 thyroplasty and arytenoid adduction, in six patients with recurrent nerve palsy. In this system, the surgical field was projected on the monitor as a 3D movie. During the surgery, the surgeon and assistants were wearing 3D-glasses while watching the monitor. Because the depth of field of the camera of the VITOM® 3D visualization system was deep, we could secure a wide operative field and use the VITOM® 3D visualization system from the skin incision to the suturing step. The magnification of the visualization system is 8-30. We, therefore, could identify a branch of the superior laryngeal artery within the larynx easily in an extended field of vision. Our findings indicate that the VITOM® 3D visualization system was useful for improving visualization of the surgical field in laryngeal framework surgeries. We will show the video of the operation in my presentation.

G

Comparison of acoustic voice quality index between version 2.02 and 3.01 for quantification of voice disorders

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Objectives: The acoustic voice quality index (AVQI) is a specific acoustic indicator designed to objectively estimate dysphonia severity and measure the values of acoustic parameters based on the diagnostic category. This study compared the performance of two AVQI versions (2.02 and 3.01, v2 and v3) and PraatCPPS using a voice sample of Korean population.

Materials and Methods: Voice samples for sustained vowel and connected speech were elicited from 2257 patients across 14 diagnostic categories. Auditory-perceptual (A-P) assessments of dysphonia severity were compared to acoustic parameters of severity derived from two versions of the AVQI (v2 and v3) as well as the PraatCPPS.

Results: The AVQI-estimated severity (v2 and v3) and PraatCPPS severity for concatenated voice samples strongly correlated with each other and were significantly associated with A-P ratings. The AVQI (v2 and v3) and PraatCPPS showed high reliability in differentiating between pathological voice disorders.

Conclusion: The AVQI (v2 and v3) and PraatCPPS were strongly correlated with the A-P ratings and provided valid estimates of dysphonia severity. However, the associations of the A-P ratings with the AVQIv2 were significantly stronger than those with the AVQIv3 and PraatCPPS, suggesting that the V2 outperformed the V3 and PraatCPPS.

Identifying the vocal needs of Parkinson's disease subjects to elaborate new technologies in support of voice therapy

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Introduction: Up to 90% of people living with Parkinson's disease (PPD) have hypokinetic dysarthria, where hypophonia can have a central role. Considering the degenerative aspect of PD, the impact of dysarthria on quality of life increases with time. As symptoms of PD evolve differently from one individual to another, some people may see the voice and speech symptoms as their main disability. Voice and speech therapies may be effective in improving or maintaining these skills,

but effectiveness relies on significant patient and clinician engagement and regular home-based patient training in addition to sessions with a therapist. Performing the exercises without the support of the speech-language pathologist represents a real barrier and contributes to the relatively low rate of adherence to treatment. Indeed, some studies report up to 65% of withdrawal from voice therapy before it is completed. Technologies that offer support for voice therapy have recently been explored as an interesting avenue for PPD, but there is little data available on the expectations and needs of this population.

Objectives: Our team is working towards the development of new interactive technologies supporting voice and speech therapy in PD. The first step of our work is to identify the needs and expectations of PPD. This data will be used to inform the development of new technologies adapted to PPD.

Methodology: To achieve this first step, we are conducting semi-directed individual interviews and group interviews with 10 PPD with a communication disorder related to voice and/or speech. The interviews are recorded using a video camera and then transcribed for qualitative content analysis. Themes such as the impact of PD on communication and voice, anterior or current voice therapy or the level of comfort with technology and its usage are explored.

Results/Conclusions: For the moment, we have conducted individual interviews with five PD subjects. The results of these first interviews will be presented.

Mindfulness in training flow phonation: voice training with greater specificity

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Background: Flow has been a ”hot topic” in the world of voice for some time now. After all, it is what makes the vocal folds vibrate, resulting in speech and singing. The amount of flow used in this process of making sound is often disputed. However, two of the most significant voice researchers of our time, Drs. Johan Sundberg and Ingo Titze, have both reported findings suggesting that increased flow is what sets trained vocalists apart from untrained vocalists. More specifically, Dr. Titze has reported the difference between trained and untrained singers is that singers ”obtain two to three times greater peak flow for a given lung pressure” (Titze, 1992). A few years earlier, Dr. Sundberg (along with Dr. Jan Gauffin) similarly discovered that singers employ what they call ”flow phonation” (Sundberg/Gauffin, 1989). This is defined as maximum flow with complete glottal closure. Considering this apparent importance of flow, we must, as practitioners, learn to train our clients to achieve this increased flow.

Objectives: This talk will demonstrate several protocols for training flow phonation using well-established exercises employed with greater awareness of the specifics behind their execution. In addition to adding specificity to the training of well-known semi-occluded vocal tract postures, the talk will include an introduction to some SOVT tools developed by this author.

Methods: First, the rational for the use of Semi-occluded Vocal Tract Postures will be briefly discussed. This will be followed by a description of the salient aspects of each SOVT exercise to be discussed, of which all practitioners should be aware. The main portion of the talk will involve a demonstration of how to employ these exercises with audience participation.

Results: We will uncover the results after the audience participation!

Conclusion: While it is nice to know of the importance of flow, it is somewhat meaningless if we don’t know who to achieve it.

Real time phonetography with RecVox

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RecVox is a recently released and free computer program for real time phonetography. It can record, store, display and overlay phonetograms in the stdpg file format. RecVox can extract 17 different statistical measures from phonetograms, or a selection of these, such as min, max average, mode and percentiles of fo and SPL. It can also store the sound that was recorded during the phonetography, making it potentially useful as a sound recording program in the clinic. It has a built-in pink noise generator to provoke the Lombard effect and a keyboard for giving a target pitch during recording. RecVox

detects the background noise and its spectrum, and automatically sets a threshold that eliminates the false detection of static background sounds as phonation.

The workshop is an introduction on to how to get started with the program and what equipment and acoustic conditions that are necessary. The requirements on the acoustic conditions vary. For serious recordings of phonetograms and soundfiles, a quiet environment with little reverberation is desirable, but some exercises can be performed without access to a studio in a reasonably quiet treatment room. Examples of such exercises will be shown during the workshop. In particular, it will be demonstrated how to use the phonetogram for visual feedback in order to coach a client to reach a certain target with respect to fo and SPL. Finally some aspects of studying speech and voice range profiles pre and post transgender treatments, that is, feminizing voice therapy or pitch raising surgery for transfeminine clients or testosterone treatment for transmasculine clients. In particular the opportunity of overlaying speech and voice range profiles in RecVox for comparison will be discussed.

Medically unexplained voice and throat complaints

Heleen Grooten

Heleen Grooten voice and traumatherapy, GENNEP, Netherlands

Medically Unexplained Oto-Rhino-Laryngeal Symptoms (MUORLS) are generally considered as psychosomatic complaints lacking a medical etiology. Recent data (Bayens e.a 2014, website NOLK) indicate that General Practitioners cannot explain physical complaints in 20% of new clients and medical specialists in 25 to 60% of new clients with physical complaints.

Functional aspects of voice complaints are treated by voice therapists. Some of these clients have besides voice problems also problems with swallowing, breathing, globus, tinnitus and even irritatable bowel syndrome, symptoms that also are lacking medical etiology.

The autonomic nervous system consists of the sympathetic and the parasympathetic nervous system. The Nervus Vagus is the most important parasympathetic nerve, it innervates several organs such as the larynx, lungs, heart and intestines. Grooten (2019, under review) found that clients with voice- and throat problems might have an elevated sympathetic arousal. Neurobiological research outcomes show that a disfunctioning autonomic nervous system, can be caused by long lasting stress or trauma (Porges 2011, Cabrera 2018).

Knowing this, life events or trauma might subconsciously influence the functioning of the larynx on a neurobiological and fysical level.

This workshop will give an overview of the autonomic nervous system, the influence of survival mechanisms on the system and how long lasting stress can deregulate mind and body.

The connection with the Nervus Vagus is explicated and how voice- and other complaints might be caused by a disregulated nervous system. In the workshop the consequences for assesment and therapy will be discussed: how to recognise and treat these clients with MUORLS and complex voice problems? New ways to treat symptoms of a disregulated autonomic nervous system will be presented.

Heleen Grooten has a private practice for clients with MUORLS. She is a voice- and body oriented trauma therapist and researcher in cooperation with the Traumatic Stress Research Centre of the Indiana University (US).

Validation & reliability evaluation of a self-assessment questionnaire of voice for transgender people assigned female at birth

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Objective: There is no validated and reliable self-assessment questionnaire for transmasculine peoples' voice problems. The objective of this study was therefore to evaluate Skattning av Rösten vid Könsinkongruens*Assigned Female At Birth* (SaRK*AFAB*), translated as "Valuation of Voice in Gender Incongruence*Assigned Female At Birth*". The study was done as a thesis within the Speech and Language Pathology programme at Karolinska Institutet, Stockholm, Sweden.

Method: SaRK*AFAB* contains ten statements (five with follow-up questions), ratings of *current and desired* voice and one question regarding self-identified gender. SaRK*AFAB* was completed by 34 vocally healthy cismales, 19 cismales with voice disorders and 76 transmasculine persons, of whom 31 filled out the questionnaire on two occasions, approximately three weeks apart. The group of transmasculine persons were also divided into five subgroups after how long they were treated with testosterone according to a study by Nygren et al. (2016). In the reliability analyses, only data from the transmasculine group were used.

Results: The results showed high internal consistency (Cronbach's Alfa = 0,90) and reliability over time (ICC = 0,96). The Item-Total Correlation Analysis with a subsequent exploratory Principal Component Analysis identified two underlying components, 1) voice function and 2) voice in relation to gender identity. SaRK*AFAB* distinguished the transmasculine group from the vocally healthy cismales and on statements regarding voice related to gender identity also from cismales with voice disorders. The subgroup of transmasculine persons treated with testosterone for 0-3 months scored the highest levels of voice problems. Subsequently, the total score decreased systematically in the subgroups that were treated with testosterone for a longer time period. This is consistent with the results in Nygren et al. (2016), where the treatment period also covaried with voice satisfaction.

Conclusion: The conclusion is that SaRK*AFAB* is sensitive to the changes in the voice and possible voice problems that transmasculine persons may experience. SaRK*AFAB* is reliable, valid and suitable for clinical use.

Nygren, U., Nordenskjöld, A., Arver, S., & Södersten, M. (2016). Effects on voice fundamental frequency and satisfaction with voice in trans men during testosterone treatment - a longitudinal study. *Journal of Voice,* 30(6), 766 e723-766 e734. doi: 10.1016/j.jvoice.2015.10.016.

H

Computational modelling of the effect of superficial lamina propria stiffness on human vocal fold self-oscillations

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Material properties of the vocal fold (VF) structure influence the resulting sound of vowels produced in human speech. To simulate such a process, a two-dimensional finite element model of fluid-structure-acoustic interaction during self-sustained oscillation of the human vocal folds was created. The influence of superficial lamina propria (SLP) stiffness on VF motion and produced sound was analysed. The model enables to use different vocal tract shapes for Czech vowels [a:], [e:], [i:], [o:] and [u:]. Their geometry was obtained from magnetic resonance images. A fluid part of the model also includes idealized trachea. Airflow is described by unsteady viscous compressible Navier-Stokes equations. Geometry of the VF was based on the widely used Scherer's M5 geometry and consists of four layers: epithelium, SLP, ligament and muscle. Homogenous linear elastic model of material was considered for each layer and includes large deformations of the VF tissue. During the self-sustained oscillations VFs are coming into contact and while closed, the fluid flow is separated. The fluid-structure interaction is solved using explicit coupling scheme with separated solvers for structure and fluid domain which exchange displacements and forces in each iteration. The different vibration pattern of the VF due to varying SLP stiffness is influencing spectrum of produced sound. From preliminary results can be observed that there is no significant frequency shift in the sound spectrum but the spectrum is more corrugated for stiffer SLP. For the most stiff SLP the maximum width of glottis is nearly 10 % smaller comparing to the least stiff SLP.

Acknowledgement: This work was supported by Czech Science Foundation project no. 19-04477S "Modelling and measurements of fluid-structure-acoustic interactions in biomechanics of human voice production".

Expression of emotions in classical and CCM singing. Acoustic study

Tua Hakanpää, Anne-Maria Laukkanen, Teija Waaramaa

Tampere University, ESPOO, Finland

Objectives: This study examines the acoustic correlates of vocal expression of emotions in Contemporary Commercial Music (CCM) styles and Classical styles of singing. This information may be useful in improving the training of interpretation in singing.

Study design: Experimental comparative study

Methods: Eleven female singers with a minimum of three years of professional level singing studies either in CCM or Classical technique or both participated. They sang on vowel [a:] at three pitches (a 220Hz, e1 330Hz, a1 440Hz) expressing anger, sadness, joy, tenderness and neutral states. Vowel samples were analyzed for fundamental frequency stability (SD of F0), formant frequencies (F1-F5), sound pressure level (SPL), spectral structure (Alpha ratio = SPL 50-1500 Hz – SPL 1500-5000 Hz), harmonic to noise ratio (HNR), perturbation (Jitter, Shimmer), onset and offset duration, sustain time and rate and extent of F0 variation in vibrato.

Results: The parameters that were statistically significantly (RM-ANOVA, $p < 0,05$) related to emotion expression were SPL, alpha ratio, F1 and HNR. Additionally, for CCM, significance was found in sustain time, jitter, shimmer, F2 and F4. When F0 and SPL were set as covariates in variance analysis, it was observed that jitter, shimmer, HNR, F2 and F4 did not show pure dependence on expression. Alpha ratio and F1 had emotion related variation also independent of F0 and SPL in CCM, while variation of alpha ratio and F1 was related to F0 and SPL in Classical.

Conclusions: Results differed somewhat in CCM and Classical. Alpha ratio showed less variation in Classical most likely reflecting the demand of more stable voice source quality. Alpha ratio and F1 were related to F0 and SPL control in Classical. CCM style offers more freedom for expression related changes in voice quality.

All that jazz?

Sølvi Elise Halvorsen

NSKI University College, OSLO, Norway

Jazz music and musical theatre were once intertwined, but different demands on the jazz singer and the musical theatre singer in the last few decades have made the training of the jazz student and the musical theatre student to differ significantly in the higher educational system in Norway. In this workshop we explore what the two disciplines can learn from each other. Will they meet again?

What kind of jazz pedagogy strategies can be applied to musical theatre and vice versa?

We explore different strategies from the jazz and the musical theatre disciplines, and see what they have in common, how they diverge, what they can learn from each other, and which strategies from one field does not easily convert to the other. We utilise a pedagogical approach and explore different practical exercises from both jazz and musical theatre pedagogy, and apply them to the repertoire from the other field.

The background of this workshop is the presenters profession as a jazz voice teacher in musical theatre academies in Oslo, Norway. On first glance, the training of jazz singers and musical theatre singers seems to be quite different, but can teachers, students and practitioners in the two fields learn from each other?

To make the workshop partisipant understand the presenters perspective, the workshop include a brief summary of musical theatre and jazz voice training in Norway. The majority of the workshop focuses on practical implementation on how to work with tools from musical theatre training in jazz voice training, and tools from jazz voice training in voice training for the musical theatre student. The presenter gives live audio examples and practical exercises on stylistic differences. The workshop touches upon different aspects of voice training, including: interpretation, rhythm and groove work, improvisation, projection of the voice, microphone technique, staging, articulation, breath support, voice qualities, posture, performance and performance anxiety.

Participants are encouraged to actively participate both as a group and individually in this workshop.

Spasmodic Dysphonia - and a new SLP-treatment.

Inge Brink Hansen

Center for Specialundervisning for Voksne, COPENHAGEN, Denmark

Most SLP's and ENT's may be convinced, that the only or best treatment of Spasmodic Dysphonia (SD) will be Botox. But there is another option for at least a great deal of people diagnosed with SD, which is not so well known.

Connie M. Pike, SLP in US since 1981 and diagnosed with SD in 2004, have since 2005 offered a holistic treatment for SD. It includes a psychosocial profiling (questionare); explores the emotions involved in communication; supports self-responsibility for health and change (locus of control) and stress-management; and introduces breathing and voice exercises and body work (Alexander, Feldenkrais, mindfulness, yoga etc.).

She has built the therapy upon her own experiences overcoming the disease, and has found that it is not always irreversibel and first of all, that there is much to do in terms of minimizing the symptoms, increasing the knowledge of and coping with the disease, resulting in a much better life for people diagnosed with SD.

Conni M. Pike and her co-workers have been able to help many clients over the years (i.e. more than 120 clients have participated in the treatment from 2005 til 2011). About 80 % of those participants who did not resume Botox, reported a significant decrease in VHI-30-score and a moderate to significant improvement in voiceproduction as such (Connie M. Pike, *Free to Speak I: Overcoming Spasmodic Dysphonia, a Non-drug Holistic Rehabilitation Model (2005), Free to Speak II: Successful Long Term Management of Spasmodic Dysphonia (2010)*).

The approach is challenging to the most common view, that SD is a purely neurologic disorder, that is incurable. It may show a way for SLPs to help people overcoming or minimizing the invalidating symptoms from SD. Recently I have started using the approach with promising results, thus I find it very important that professionals in Europe are informed.

The workshop will give an introduction to the SLP-approach to Spasmodic Dysphonia that Connie M. Pike has initiated and give the participants a possibility to get to know a new way of thinking about SD and working with new tools for helping people with SD.

Effective Voice Work, or how SLP's may help singers with voice problems

Inge Brink Hansen

Center for Specialundervisning for Voksne, COPENHAGEN, Denmark

Effective Voice Work, or how SLP's may help singers with voice problems.

The purpose of this workshop is to give insight and tools for speech therapists for working with singers who have voice problems. In CSV Copenhagen we have several years of experience in successfully treating singers, who have come to the point of stopping their career or have been forced to cancel concerts because of voice problems.

Singers with voice problems are not a homogeneous population, but as both a singer and a speech therapist I have found, that there are some essential approaches that are beneficial working with, and which the speech therapist should know about, in order to be able to make a difference. Areas that singing teachers mostly are not addressing.

Singers with voice problems often have a problem with the speaking voice, even though it is to be considered within the ”normal area”, even for the well trained ear. They may never have worked consciously with the deep tones in the singing- or speaking voice. But thereby the voice in general has become too weak - they haven't developed the strength of the musculus vocalis in an appropriate way. They might have a little too high throat-position and a tendency to be hyperfunctional while speaking, as they haven't found the optimal relaxed condition of the throat. They also may have focused too much on breathing in, which prevents the natural bodily support of the voice.

In the workshop I will give a suggestion for treatment with tools based on these needs and demonstrate the exercises. The members of the workshop will be activated, learn the exercises and afterwards be able to use the simple, but highly effective tools in their own practice.

Our experience is that after working with the exercises when used intensively, systematically and in a more extreme way than we might be used to, the voice is fundamentally changed, the speaking voice is stronger and more flexible and

less tense, the singing ability is reestablished and the singers are able to diagnose and treat themselves to prevent the problems from returning.

World Voice day in Copenhagen since 2006 - impact on interdisciplinary voice-professional environment.

Inge Brink Hansen[1], Hanne Smith Pedersen[2]

[1]Center for Specialundervisning for Voksne, BRØNSHØJ, Denmark

[2]University of Copenhagen, COPENHAGEN, Denmark

This poster document how the celebration of the World Voice Day (Stemmens Dag) in Copenhagen has been a benefit to the vocal interdisciplinary climate in Denmark. This outcome may be inspiring for participants from other countries to see how cooperation, recognition, and curiosity towards other vocal disciplines may be encouraged in a common celebration of the voice! In Denmark we have celebrated Stemmens Dag every second year since 2006. The volunteer initiative group, have from the beginning been a unique cooperation between different voice related professional disciplines. Our goal with Stemmens Dag has been to enlighten people about the voice and show the voice in all facets. We aim to heighten the public knowledge about the voice, what it is capable of, how to train it and keep it healthy. Thus, with many different activities we, and our guests have gained greater insight, knowledge and joy for the diversity of the voice. We have deliberately made efforts to underline celebration of the voice, and therefore have chosen to unfold Stemmens Dag in one of the most iconic buildings in Central Copenhagen – Rundetårn. We have had permission to utilize the buildings unique possibilities for spectacular events. Among many other activities, we have had contributions from: ENT's with stroboscopy, music therapists, actors, osteopaths, speech therapists, storytellers and speakers, singers, human beatboxers, phonetics, ventriloquists, experts on computer programs for voice training and voice massage, public speakers and overtone singers. And in the evening we have had very diverse concerts with vocal improvisation choirs, different singing styles etc. As an outcome of both preparations and enactments of the event, the interdisciplinary climate in Denmark is strengthened and much more open minded by getting to know about each other's professional approach to the voice. Through the years we have created a comprehensive network through which we can cooperate with and refer to each other's competencies, in favor of people who is in need of vocal treatment, voice development, education etc. The poster will give a hint of what has been going on through the years since 2006 and the benefits from it.

Therapeutic elements in voice therapies dispensed by speech language pathologists : their effect on patient motivation and vocal motor learning

Sandrine Hébert[1], Valérie Giguère[1], Patrick Cardinal[2], Claire Croteau[3], Dahlia Kairy[3], Annelies Bockstael[3], Ingrid Verduyckt[3]

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Description: Voice is an important aspect of communication and a voice disorder can have negative functional and psychosocial consequences. Voice therapy (VT) delivered by a speech language pathologist (SLP) is efficient in improving the functional, emotional and physical symptoms linked to dysphonia through supporting the motor learning of new vocal patterns. Although multiple studies have taken interest in the efficiency of different therapies, the way SLPs are conveying the information and the support to teach patients new voice motor skills has not received much interest. Better insight in the therapeutic process in VT could be helpful to understand why some SLPs are more efficient than others while using the same therapies and also for the development of a virtual voice training systems offering home support to patients. A better understanding of the effective therapeutic elements in VT is the first step in our team's efforts to develop a virtual voice SLP. In this study, we aim at developing an observation grid to facilitate the documentation of a large amount of VTs with different SLPs.

Research question: What are the therapeutic elements in VTs dispensed by SLPs and how do they affect patient motivation and voice production?

Method: Ten therapy sessions with 5 different SLPs will be recorded and transcribed to identify and document the effects of different elements of instruction or feedback given by the SLP on the patient from both a motor learning perspective and a motivational perspective. A mixed method approach with both qualitative and quantitative analyses will be used.

Results: 4 therapy sessions have been recorded to date and the analyses are in progress. We will present the results of these recordings and a preliminary observation grid.

Research benefits: On the short term, this project will result in a grid shared with the clinical and scientific communities to facilitate knowledge development on the therapeutic process in VT. On the long term, our results will be used to define the basic characteristics of a virtual voice training system to support dysphonic patients with their home exercises.

Perception of One's Own Voice after Hearing Aid Fitting in First Time Hearing Aid Users and Experienced Hearing Aid Users

Johanna Hengen, Inger Lundeborg Hammarström, Stefan Stenfelt

Linköpings universitet, LINKÖPING, Sweden

Background: Dissatisfaction with own-voice sounds are common among hearing aid users, even when they should not be affected by the occlusion effect of the hearing aid insert in the ear canal. Few studies have considered how hearing impairment and hearing aids separately affect own-voice perception. The present study examined the own-voice experience in individuals with hearing impairment who were undergoing a hearing aid fitting.

Method: First-time users (n = 70) and experienced users (n = 70) of hearing aids completed questionnaires (Voice Handicap Index, Hearing Handicap Inventory for the Elderly, Own Voice Qualities) before and after having new hearing aids fitted (average length of fitting process = 3.5 months). The groups were compared to a control group without hearing impairment (n = 70), who completed the same questionnaires once.

Results: Problems with own-voice sounds increased after (44.2%) compared to before (7.1%) hearing aid fitting for first-time users ($p<0.001$). Experiencing the sound of the own voice as problematic to some degree was more common among first-time users fitted with molds (occluded ears) (67.8%) than first-time users fitted with domes (open ears) (32.7%). The control group reported significantly less problems achieving correct vocal intensity and whispering compared to both groups with hearing impairment before fitting ($p=0.035$). First-time users reported significantly more problems achieving correct vocal intensity after fitting compared to before ($p<0.001$). Problems with speaking and hearing simultaneous external speech did not increase for either group after fitting, and decreased among experienced users ($p<0.001$).

Disturbing sound qualities in the own voice increased for the first-time users after fitting ($p<0.01$). The perceived sound quality of the own voice was relatively poor both before and after fitting for the experienced users, and did not change significantly.

Conclusions: Own-voice problems are still common among experienced and inexperienced hearing aid users with open or occluding inserts. Achieving appropriate vocal strength appeared affected by both hearing impairment and hearing aids, while the ability to speak and hear at the same time is more likely to be reduced by only the hearing impairment. The perceived sound quality of the own voice appeared mostly affected by hearing aids.

Voice production physiology of non-human primates

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A long standing scientific debate stands over whether – in comparison to non-human primates and other mammals – the human vocal organ has evolved especially to support speech, or whether the capacity for speech is mainly determined by advanced neural control and cognition in humans. Mounting evidence seems to support the latter hypothesis.

By inversion of this argumentation, we can speculate whether non-human primates would be able to speak and sing like humans if they had the required neuronal and cognitive adaptations. For this, they would require a voice production apparatus that is in essence similar to that of humans, both anatomically and functionally.

While the laryngeal and vocal tract anatomy of non-human primates is relatively well investigated, relatively little is known about the functional aspects of their voice production. In particular, physiological data in vivo is scarce, which is mostly attributed to experimental difficulties.

In this presentation, the available empirical evidence concerning voice production physiology in non-human primates is reviewed. Where possible, comparisons to the respective human traits are made, highlighting analogous mechanisms.

Japanese macaque phonatory physiology

Christian Herbst[1], Hiroki Koda[2], Takumi Kunieda[2], Juri Suzuki[2], Maxime Garcia[3], W. Tecumseh Fitch[1], Takeshi Nishimura[2]

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While the call repertoire and its communicative function is relatively well explored in Japanese macaques (Macaca fuscata), little empirical data is available on the physics and the physiology of this species' vocal production mechanism. Here, a 6 year old female Japanese macaque was trained to phonate under an operant conditioning paradigm. The resulting ”coo” calls, and spontaneously uttered ”growl” and ”chirp” calls, were recorded with sound pressure level (SPL) calibrated microphones and electroglottography (EGG), a non-invasive method for assessing the dynamics of phonation. A total of 448 calls were recorded, complemented by *ex vivo* recordings on an excised Japanese macaque larynx. In this novel multidimensional investigative paradigm, *in vivo* and *ex vivo* data were matched via comparable EGG waveforms. Subsequent analysis suggests that the vocal range (range of fundamental frequency and SPL) was comparable to that of a 7-10 year old human, with the exception of low-intensity chirps, whose production may be facilitated by the species' vocal membranes. In coo calls, redundant control of fundamental frequency in relation to SPL was also comparable to humans. EGG data revealed that growls, coos, and chirps were produced by distinct laryngeal vibratory mechanisms. EGG further suggested changes in the degree of vocal fold adduction *in vivo*, resulting in spectral variation within the emitted coo calls, ranging from ”breathy” (including aerodynamic noise components) to ”non-breathy”. This is again analogous to humans, corroborating the notion that phonation in humans and non-human primates is based on universal physical and physiological principles.

Phonosurgery: Hands-on instrument demonstration

Markus Hess

Deutsche Stimmklinik, HAMBURG, Germany

In this workshop, techniques of phonosurgery and videos of typical surgical procedures are demonstrated. To the extent that the workshop setting can facilitate, the participants will have the opportunity to work with instruments and endoscopes, simulating the conditions during phonosurgery with direct laryngoscopy. They can experience how much precision is necessary for working bimanually on small objects and how to handle different instruments for procedures like injections, biopsies, excisions or laser-surgery.

Phonomicrosurgical challenges in world class professional singers

Markus Hess[1] & Jale Papila

[1]Deutsche Stimmklinik, HAMBURG, Germany

Phonomicrosurgery of vocal fold lesions in professional singers can be a challenge due to the unpredictable voice outcomes, be it (patho)physiological or functional. We present cases of singers and give recommendations how to deal with surgical and rehabilitative problems including the rationale behind our postoperative voice rehabilitation program.

Mean fundamental frequency in connected speech and sustained vowel with and without a sentence-frame

Rikke Hollen, Josefine Næs

University of Copenhagen, COPENHAGEN, Denmark

Sustained vowel phonation is a common patient task in the assessment of voice disorders. Free from articulatory influence, it allows for acoustic voice analyses unfeasible for connected speech. Previous research indicates that the fundamental frequency (f0) of a self-chosen vowel is not necessarily representative to mean of the same subject's connected speech.

Objective: The purpose was to examine mean f0 in text reading and to compare it with sustained vowel phonation with and without a sentence-frame. It was hypothesized, that a short phrase of context embedding the prolonged vowel would affect mean f0 of the vowel to be closer to that of text reading.

Method: Thirteen vocally healthy women, age 22-27 was audio recorded during three tasks: reading of a standard text, producing an isolated, sustained /a/ and repeating three times a frame sentence with an imbedded /a/ and the third time to sustain the /a/. Mean f0 of the three conditions was analyzed by means of the Praat computer program.

Results: The isolated vowel condition differed significantly from the mean f0 of the sentence-framed one, the latter being closest to mean f0 of the reading task. The isolated vowel condition also differed significantly from text reading. The difference in mean f0 between sentence-framed vowel and text reading was not significant.

Conclusion: Data support that the use of a sentence-frame is helpful to get female client's f0 elicited from sustained vowel production in voice assessments more representative to that of text reading as compared to an isolated vowel.

Acoustic Breathiness Index for the Japanese-speaking Population: Validation Study and Exploration of Affecting Factors

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Objectives: The acoustic breathiness index (ABI) is an ecologically valid tool to estimate perceptual breathiness levels in concatenated voice samples of both continuous speech and sustained vowels. Since the ABI was first developed for the Dutch-speaking population, validation studies have been finished in the Spanish and German languages. On the other hand, to be established as an acoustic representation of perceptual breathiness, ABI should be insulated from the influences of perceptual roughness because acoustic measures usually tend to be sensitive to both perceptual dimensions of roughness and breathiness. Furthermore, gender and age differences have been reported to affect acoustic measures. Therefore, the first aim of this study was to validate ABI for the Japanese-speaking population. As the second aim, we confirmed ABI's specificity in representing breathiness levels without the influence of perceptual roughness, gender, and age factors.

Methods: First, the concurrent validity of the ABI for perceptual breathiness was evaluated on the concatenations of continuous speech and sustained vowels from 288 patients with varying degrees of dysphonia. The diagnostic accuracy was examined on 343 samples with 55 additional normophonic speakers. Second, the validity related to responsiveness-to-change was estimated on 222 samples obtained before and after interventions for 111 voice-disordered patients. Third, the relationships between the ABI and other variables (i.e., perceptual hoarseness/breathiness/roughness, gender, and age) were explored using bivariate and multivariate analyses for the 288 patients.

Results: First, the concurrent validity and the responsiveness-to-change validity were confirmed by strong correlation coefficients of 0.890 and 0.878, respectively. Second, the receiver operating characteristic analysis showed the area under the curve to be 0.939, indicating excellent accuracy. The ABI of 3.44 exhibited a sensitivity of 76.3% and a specificity of 94.1%. Third, although bivariate analyses revealed a weak relationship between ABI and roughness and an ABI difference by age, a multiple regression analysis showed a strong relationship between only ABI and breathiness, without a meaningful contribution from roughness, gender, and age factors.

Conclusion: The study confirmed that the ABI is an accurate and specific tool to estimate breathiness levels in the Japanese-speaking population, and neither roughness, gender, nor age significantly affects ABI.

Introduction of a biofeedback system for voice training based on an inverse source-filter-model

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Voice production includes combined and complex physiological processes such as respiratory movements, laryngeal activity and modifications of the vocal tract shape. Recently, we proposed a novel route to address specifically the adjustment of the vocal tract to meet acoustical demands without phonation [1, 2]. As the vocal tract configuration is essential for resonance properties of voice production, the technique may enable novel training tools in voice formation.

The approach is based on an inversion of the source-filter-model were the sound source is placed outside the open mouth. Participants are able to actively enhance or mute the static acoustic field depending on the position of the articulatory elements such as tongue, jaw, velum, larynx etc. An amplification is possible if (i) the frequency of the acoustic signal matches the resonance frequency of the resonator (vocal tract) and (ii) the damping of the vocal tract is low. An amplification at resonance frequency relates thus to smaller formant bandwidths and lower acoustic losses. In subsequent phonation, this leads to higher vocal output and enables a modification of the formant frequencies addressed.

We present theoretical considerations on the inverse source-filter-model and experimental data including a study with 30 vocally healthy lay-singers with acoustical measurements and a self-assessment of the participants. Additionally we present imaging data of vocal tract adjustments acquired via dynamic 2D and 3D MRI showing the adaptive movements during amplification of the introduced sound source. Hence, the precise type of the adjustment movements and their relation to vocal tract modifications can be discussed.

[1] Hoyer P. and Graf S., 2018 , Adjustment of the Vocal Tract Shape via Biofeedback – a Case Study, Journal of Voice in press, DOI: 10.1016/j.jvoice.2018.01.018#_ednref2

[2] Graf S., Schwiebacher J., Richter L., Buchberger M., Adachi S., Mastnak W., Hoyer P., Adjustment of Vocal Tract Shape via Biofeedback: Influence on Vowels, Journal of Voice, in press, DOI: 10.1016/j.jvoice.2018.10.007.

Can the origin of scales be derived from vocal tract resonant amplification?

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The emergence of scales dates back to very early times in cultural history. We hypothesize that a focus of the first musicians on output intensity only may have led to the emergence of musical intervals and scales.

While prehistorical musical instruments date back some 40.000 years, there are no prehistoric remains of vocal music other than basic anatomical structures. Physiologically, the human vocal capacities result primarily from the interaction of the sound source (vibration of the vocal folds) with the acoustic surrounding. The vocal tract determines to a large extend the spectral shape or timbre as well as the intensity of the resulting sound. Formants (resonant modes within the vocal tract) may amplify frequencies that are similar to the frequency of the acoustic modes. At speaking pitch, these are usually selected harmonics (multiples of the fundamental frequency).

Vowels result from an amplification of selected harmonics via an adjustment of the first and second formant frequencies. The amplification of the harmonics is strong if (i) the formant frequency matches the frequency of the harmonics and (ii) the bandwidth of the formant frequency is small.

A glissando (sweep) of the fundamental frequency (f_o) of one octave passes through all basic musical intervals and can be performed by changing the muscular structure within the larynx. In the case of unchanged formant structure of the vocal tract, different harmonics will cross the formant frequencies depending on the pitch of f_o.

Therefore we hypothesize that a focus of the first vocally active musicians on output power may have led to a preference of selected intervals being the base of musical scales. The acoustic power during a glissando phonation at different vowel configurations of a subject is obtained as the sum of the fundamental and the harmonics via Fourier analysis of the acoustic output signal. If the amplified frequencies are found to support intervals, a focus on intensity only could allow the emergence of scales. The approach is underlined with theoretical calculations and first experimental data.

Singing is an Unnatural Act. How the understanding of the biological functions of the layrnx can help us when working with the performing voice as Singers or Speakers

Dorte Hyldstrup

Dorte Hyldstrup, ØLSTYKKE, Denmark

Jo Estill - the world-renowned educator, researcher, singer and founder of https://www.estillvoice.com/™ (EVT) used to say: ”Singing is an unnatural act”. And she would talk about ”the Natural Scale” versus ”The Nurtured Scale”.

What did she mean?

To answer this, we will work with specially selected exercises from **Figures for Voice™**, a series of exercises, that train independent verification of the structures that influence our voice. These exercises are relevant for both singing and speaking. We will be working with our true vocal folds, the ventricular (false) folds, and the relation between the thyroid & the cricoid. How can the natural biological function of your larynx affect your voice?

What exactly happens when we sing through the passagio and how can the Estill tools help us to disguise the break. We will also discuss the term ”Mixed Voice” - a concept that could mean something different from one voice teacher to another.

Everybody will get the chance to see, hear and feel their voice.

About the presenter: https://www.dortehyldstrup.dk/, DK. Estill Voice Training Mentor & Course instructor with advanced testing privileges & .

She has been working as a **singer** and **voice teacher** the last 35 years. She has extensive experience as a teacher at all levels – from Rhythmic Music Conservatory, the Royal Academy of Music, Department of Musicology (Copenhagen), several music schools as well as many courses associated with music seminars and continuing education. Since 2011 she has been working freelance in her private studio and as Estill Voice Training Course Instructor.

Dorte graduated from the Royal Danish Academy of Music, Copenhagen in 1987 and was further educated by Jo Estill from 1988 to 1998 getting the highest certification.

In 2005 she finished an education in NLP (Neuro Linguistic Programming) with a Master Degree.

Dorte has presented more than 250 EVT Courses in Europe and works as a mentor for candidates, who train to become EVT Certified Trainers.

As a performing Soul/Blues/Jazz Singer she has released 2 CD´s in her own name and has lately been active with ”Kitchen Concerts” a serie of intime House Concerts.

A Powerful Voice. How to speak or sing with more power

Dorte Hyldstrup

Dorte Hyldstrup, ØLSTYKKE, Denmark

Belting is a loud and penetrating sound.

It is often heard in Musical Theatre, ethnic music styles, Gospel, contemporary styles like Pop, Soul, R&B & Rock and in everyday life from children in the playground to coaches on the sideline of sportarenas.

In the litteratur you can find different descriptions. This workshop will present the version that is taught in https://www.estillvoice.com/™ (EVT).

A loud Voice Quality like ”Belting” can endanger vocal health due to its high intensity; however, when produced correctly, poses no threat.

On the basis of EVT this workshop will focus on how to build up this exciting Voice Quality in a safe way.

We will do that by practically working with essential **Estill** tools to find the balance between **Power, Source & Filter.**

Finally we will apply the sound to Speech and Music.

About the presenter:

https://www.dortehyldstrup.dk/, DK. Estill Voice Training Mentor & Course instructor with advanced testing privileges.

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Dorte graduated from the Royal Danish Academy of Music, Copenhagen in 1987 and was further educated by Jo Estill from 1988 to 1998 getting the highest certification.

In 2005 she finished an education in NLP (Neuro Linguistic Programming) with a Master Degree.

Dorte has presented more than 250 EVT Courses in Europe and works as a mentor for candidates, who train to become EVT Certified Trainers.

As a performing Soul/Blues/Jazz Singer she has released 2 CD´s in her own name and has lately been active with ”Kitchen Concerts” a serie of intime House Concerts.

Comparison of Classical singing and ‘Edge’ vocal mode

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Several studies have compared Classical singing and different types of Non-Classical singing styles. Belting is a commonly used term to describe a loud high-pitched Non-Classical singing style. This study compares acoustic, vocal fold vibration related, and subglottal pressure characteristics between female Classical singing and a sub-type of Belting labeled as Edge in Complete Vocal Technique (CVT) terminology.

Four female singers, two Classical (a lyric and a dramatic soprano) and two CVT specialized (authorized CVT teachers), were recorded in an anechoic chamber from the distance of 1 meter while singing syllables [pi:], [pe:] and [pæ:] loudly at pitch C5 (523 Hz). Simultaneously with acoustic signal, electroglottographic signal (EGG) was recorded to study the contact quotient (CQ). Oral pressure during [p:] was also recorded (Glottal Enterprises MSIF II) for the estimate of subglottal pressure (Psub). All signals were recorded with Computerized Speech Lab (CSL, Model 4500, Kay PENTAX). Acoustic signal was analyzed using Praat (version 6.0.21), EGG using Voce Vista (version 3.3.7) and Psub using CSL-software.

The data revealed that Edge had markedly higher CQ values compared to Classical singing. Mean CQ (threshold level: 50) was 0,63 for Edge and 0,34 for Classical singing. CQ was also lower for lyric singer than dramatic (mean 26,5 vs 39,5, respectively). Average Psub in Classical singing exceeded average Psub in Edge by 7 cmH_2O. Psub between the two Classical singers varied also considerably as the average Psub for the lyric soprano was 13 cmH_2O (approximately the same level as in Edge) and for the dramatic soprano at least 26 cmH2O. Sound pressure level (SPL) did not differ significantly between the singing styles. Edge showed more energy in higher harmonics than Classical, while in Classical

most energy was concentrated on the fundamental. Vowel [i:] in Edge was sung with less SPL and energy in higher harmonics compared to other vowels. Classical singers performed [æ:] with lower SPL than other vowels.

Results reflect genre related differences in preferred voice quality and loudness control.

J

How does it work? Voice, speech and communication

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In preschools and schools children and adults share the environment. High noise levels have been reported for both preschools and schools (e.g. Shield and Dockrell, 2003; Sala et al, 2002) and voice problems among preschool teachers are well documented (e.g Roy et al. (2004); Sala et al. (2002); Simberg et al. (2009)). In a previous study children in preschools higher levels of hoarseness and hyperfunction after a day at the preschool indicating similar reactions to high background noise levels (McAllister et al 2009). Within the first part of the present study focus group interviews with children and teachers were conducted to identify the main themes in relation to voice, speech, communication and noise (McAllister et al. 2019). The aim of the present study was to develop and asses an educational material on voice, speech, communication and noise for children in pre-school and early school years based on the three themes identified in these interviews.

Method: Based on the themes *Environment, Experiences and Strategies* and subcategories an educational material was constructed in collaboration with an artist. A first version was assessed by nine pre-school and school teachers as well as 100 children (50 from preschool and 49 from first class) ages 5 - 7 years respectively. The teachers were asked to rate different aspects of the material on an ordinal scale from poor to excellent. Areas of improvement were included. The children were asked if they liked the material or not using a scale from very amusing to not amusing.

Results: All nine teachers found the material both educational and amusing addressing relevant topics in relation to teaching. Some teachers felt it was too long and suggested a shortening of the material. Off the 50 school-children 80% rated the material as very amusing and 20% rather amusing. One child rated the material not amusing.

Based on these ratings a revision and shortening was made. The revised textbook ”Voice don´t make noise” including guidelines for teachers is now available in English and Icelandic.

The study was supported by a NORDplus Horizon grant, HZ-2012_1a-30063.

Examining wind musicians with standard phoniatric equipment - results concerning lip vibrations

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Musicians playing wind instruments are athletes of the small muscles of the oro-pharyngeal region, just as singers. Muscular complaints are quite common in this group, but rarely spoken about. However we know very little about the variations of normal and abnormal function in the muscles related to playing compared to the abundance of knowledge related to song and speech. Studies are far between, with few participants and often involving unique or very expensive equipment. When we meet patients with problems related to playing a wind instrument we have no guidelines or databases of normal material to consult.

I have started a project with the aim to explore the possibilities in using the standard equipment of a phoniatric surgery, including stroboscopy, when examining and treating musicians with muscular problems related to playing a wind instrument. As collecting a normal reference material is an important part of the project, most of the participants have little or no muscular problems. Musicians playing all the different symphonic wind instruments are included. Age, musical education and current activity as well as muscular problems related to playing are recorded in a questionnaire. Velopharyngeal and laryngeal movements are filmed during playing with differing loudness and pitch as well as during phonation. In addition the lip vibrations of brass musicians are filmed with stroboscopic light while the musician is playing on only the mouthpiece.

The first results from the project presented here are a description of typical opening patterns in the lip vibrations and a strongly suggested relationship between asymmetric opening patterns and the severity of lip problems related to playing.

Effective training of public speakers

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A speaker must control and adjust on the spot an endless list of factors in the situation. Volume, tempo, voice quality, pauses and contact with the audience and the room etc. But our brains and bodies cannot administer so many details, and at the same time be present with a good contact with the listeners and the content.

We as voice coaches must present a meaningful method for the speaker to adjust in the situation, instead of insisting on doing exercises that are disconnected from the actual performing situation.

The method presented in this workshop is a hands-on simple way to work with a multiple spectrum of details in verbal communication. It is a way to bring efficiency and sensemaking into voice coaching of public and professional speakers.

In the workshop I will be demonstrating how to work with general presence and how to create a meaningful way to achieve a rich spectrum of details (voice quality, breathing, pauses etc.) in good verbal communication when speaking in public. The goal for the method is for the speaker to feel free on stage, instead of focusing on details detached from the performance.

The participants will try themselves how this hands-on method works. The form will be both practical exercises for all participants and a masterclass where a number of individuals will get guidance with some of the specific tools.

The method has shown to be very effective and easy to incorporate.

The background for this method is what I experienced first as an actress and later as voice coach at The Royal Theatre in Copenhagen, that there was a need for a method that had a direct link between practicing and the actual performance. It is a supplement to existing methods for voice work.

Lisbeth Holdt Jørgensen: Trained actress and master in Speech and Language Pathology and Rhetoric's from the University of Copenhagen. Former actress and voice coach at The Royal Theatre in Copenhagen and teacher at The Royal Leadership Academy. Independent voice coach and speaker coach at TEDxFrederiksberg.

K

The relationship between functional voice disorder, physical condition, body composition and pulmonary function

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Objective: The purpose of this study is to examine whether the physical activity and muscle condition affects the production of voice.

Method: We studied functional voice disorder patients aged 37,7 ± 8,5. The control group consisted of healthy people, aged 38,7± 6,2. In both groups the subjects where non-smokers and mainly office workers. The amount and speed of the air were assessed using the spirometry. The trunk muscle strength was tested by Lafayette Instrument. Subjects filled the physical activity questionnaires and the results were calculated by MET score.

Results: According to the BMI, both groups were overweight (25, 02± 4,2 vs 24,31 ±4 24). Significant correlation were between functional voice disorder and *m. erector spinae* function (p=0,007). Patients group MET-value was lower than control group (p=0,049). The control group maximum phonation was longer (p=0,006) and their results in spirometry were better (p=0, 0190 vs. p=0, 0340).

Conclusion: The research indicated clear correlation between voice disorders, muscle function, physical activity, maximum phonation time and spirometry. Shortened and weak *m. erector spinae* limited range of motion of the diaphragm and thus hindered deep breathing. Physical activity affects the production of voice through the lung volume and improvement in respiratory function.

Comparison of laryngeal carcinoma and epithelial dysplastic lesions via aerodynamic evaluation

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Purpose: Vocal fold leukoplakia is clinically defined as white mucosal lesions. Benign and malignant lesions of vocal fold leukoplakia could discriminated clinically with a pathological biopsy. The purpose of this study is to compare the aerodynamic parameters between vocal cord carcinoma and dysplasia (mild to severe) group.

Materials and methods: From February 2014 to December 2018, we collected 1,192 voice evaluation data before laryngeal microsurgery (LMS). Patients with LMS surgery or nose surgery in the past time, other cancer (gastric cancer, lymphoma etc.) hearing loss (including hearing aid wearer), history of cerebral infarction, cerebral hemorrhage or hemiplegia, asthma or pneumonia, vocal cord paralysis, radiation therapy related with thyroid cancer were excluded. A total of 147 patients, diagnosed with vocal fold leukoplakia, were selected first by visual examination. Because of no pathologic findings or women, we selected only 112 male patients finally. The pathologic findings after LMS were divided into carcinoma group (56 patients) and dysplasia group (56 patients). Only patients with carcinoma in situ and T1 were included. Seventeen parameters of the aerodynamic evaluation using PAS model 660 were selected. The covariance analysis (ANCOVA) was used to calibrate the age between the two groups.

Results: There was no difference in smoking duration between the two groups, but the age of the carcinoma group was significantly higher. The ANCOVA corrected age between the two groups showed that the mean-intensity parameter (P = 0.024) was significantly lower and the mean-pitch parameter (P = 0.010) was significantly higher in the carcinoma group.

Conclusion: Differences in some parameters of the aerodynamic evaluation may help to differentiate early glottic carcinoma from dysplasia.

Teachers' vocal health and well-being in relation to an intervention program targeting classroom communication

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The classroom is a common workplace integrating teaching staff and pupils. Media frequently reports about following challenges in Swedish schools; teachers' work conditions, well-being and pupils' results. Poor sound environments affect both teachers' vocal health, general well-being and pupils' performance. The effects of noise and a deviant voice quality on children depends on the child's cognitive capacity, language- and hearing skills. According to Pellegrín-García (2011) it is not enough to treat the room acoustics. It is necessary to combine optimized acoustics with other preventive measures, such as vocal training and evidence-based tools to improve classroom communication in order to support teachers' vocal health, well-being and students' performance and study-environment. Knowledge is lacking about outcomes of offering teachers practical communication training to cope with different sound environments and providing them with tools to improve language learning environments.

The purpose of this study is to investigate the effects of an intervention program for teachers targeting classroom communication in different acoustic environments. Teachers (n=25) teaching in school year 3-6 participated in the program. Assessments were made pre/post intervention and at 5-weeks and 3-months follow-up. The teachers made self-assessments by answering questionnaires on vocal health, stress, burnout and self-efficacy. Their classrooms' acoustics were measured for reverberation time, C50 and back-ground noise.

The results post- compared to pre-intervention measured by questionnaires showed significant decrease of voice problems at 3-months follow-up and of stress and burnout at the follow-up at 5-weeks. The assessment of self-efficacy had increased significantly at 5-week follow-up. The acoustic data are under analysis.

In conclusion the intervention program helps teachers improve vocal health, decrease their perception of stress and burnout whilst increasing their self-efficacy. The results of the intervention-program are promising and should be considered also in formal teacher education.

Evaluations of acoustic resonances above the glottis using transnasal endoscope

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Introduction: The flow-induced vibrations of vocal folds were investigated as a function of vocal fold supraglottal acoustic resonance. The acoustic analysis approach provided a better understanding of the voice production. We developed a direct sound level measurement device at the tip of the flexible transnasal fiberscope. Acoustic measurements and resonance analysis were taken in the vocal tract.

Methods: A probe-microphone that was airtightly connected to the channel for inserting the biopsy wire. The output of the microphone (Brüel & Kjær,Type 4192-L-001) was recorded via the channel of the endoscope. Sound level calibration was obtained in an anechoic room. The fiberscopic examination was performed transnasally to enable observation of vocal fold vibration. Acoustic intensity was obtained through the fiberscopes' channel. The experiment utilizes acoustic measures in an attempt to identify an amplitude of the first and second formant in Japanese vowel sounds /i/,/e/,/a/,/o/,/u/ and straw phonation /u/. All measures were made using the fast Fourier transform algorithm. During the voice evaluation, the subjects were asked to perform sustained phonation of vowel sounds at their comfortable pitch and loudness levels.

Results: The acoustic pressure in the vocal tract was obtained above the glottis in human subjects. The sound pressure levels are extremely large above the glottis and frequency distributions have containing a high frequency component. Thanks to the high-frequency resolution of the pressure sensors, a more detailed analysis of the acoustic phenomena around the glottis becomes possible. Formant positions were estimated for voice and supraglottal waves.

Discussion: The sound frequency distributions have containing a high frequency component. Acoustic resonances exist along the vocal tract. Amplitude spectra of the segments, prominent harmonics, formant bandwidth above the glottis are evaluated in vowel sounds phonation.

Effects of Gender-confirming Pitch-raising Surgery in Transgender Women a Long-term Follow-up Study of Acoustic and Patient-reported Data

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Background: Many trans women feel that their voice is not in congruence with their gender identity. Therefore may trans women seek to feminize their voice. Many receive voice therapy (VT) with good results. For those who have not been able to acquire a female voice in voice therapy pitch-raising surgery may be needed. A study was conducted at Karolinska University Hospital with the aim to investigate long-term effects and to compare outcomes between two surgery techniques for feminizing the voice, cricothyroid approximation (CTA) and glottoplasty (GP).

Methods: The study included retrospective data from 24 patients (35–67 years). Eleven patients had undergone CTA and 13 had undergone GP. Audio recordings were performed in a sound-treated booth, according to clinical routine, and patients answered questionnaires before and after VT, post surgery, and at 1-year follow-up. Fundamental frequency (Fo) measures were extracted from voice range profiles (VRPs) and speech range profiles and were compared with cisgender data.

Results and conclusions: Minimum Fo in VRP increased significantly only after CTA (95–123 Hz). Maximum Fo in VRP was significantly lowered after GP (765–652 Hz), even more after CTA (677–475 Hz). Speaking mean Fo increased significantly after VT and post surgery, and was stable over time (CTA 167 Hz, GP 169 Hz). The maximum Fo in the speech range profile increased only after VT. The frequency ranges were strongly reduced after CTA. Patients were in general satisfied at follow-up and rated the GP outcomes more favorably than CTA. It was concluded that both surgical methods have advantages and disadvantages. The very restricted speaking and physiological frequency ranges, which do not favor an optimal female voice, were mainly found after the irreversible CTA. Thus, CTA is no longer performed at our hospital, whereas surgical techniques based on GP are being developed further. We strongly recommend the use of VRPs to evaluate treatment effects.

Crossover: Shakespeare for business and actors

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In this interactive workshop we will look at how teaching voice, speech and language skills in different fields can cross-fertilize and inspire voice-pedagogy. We will look at how to apply learnings from teaching voice and presentation skills in the corporate world, to teaching student actors/professional actors and vice versa.

In both areas we are dealing with professional use of voice and language. In the area of corporate business there is a high demand for efficiency, limited time for training. The tools need to be easy to understand, they need to make immediate sense and they need to be efficient and practical. In the area of actor training for the theatre, the training needs to empower the student (or the actor), and the goal is the ability to not only have voice and language that meet the technical demands (understandable, resonant, being able to handle different styles of language a.s.o.), but also, and maybe as the primary goal: to create art. In training student actors, we generally have more time, can work in depth, and yet we also need to be efficient. To our experience, teaching in and crossing over between these two apparently very different fields has inspired our approach to teaching voice and communication skills profoundly.

Unintended imitation of fundamental frequency in female speakers

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Objective: Former studies have shown that humans unintentionally adopt speech characteristics from their conversation partners, a phenomenon known as speech convergence. Unintended imitation of voice characteristics such as speaking fundamental frequency seems relevant in the field of voice therapy where repeating exercises and imitation approaches are commonly used. This university bachelor's project investigated imitation of fundamental frequency (fo) in nine healthy females in a repetition task.

Method: The design included two conditions; loud reading (baseline) and repetition after a model talker. The model talker was a female with a high-pitched voice and stimuli included both words and nonwords. All productions were analyzed with regard to mean and SD of fo and compared between conditions and word types by means of a two-factor analysis of variance (ANOVA).

Results: The participants showed different patterns regarding the imitation effect on *fo*, thus indicating that some individuals are more likely to change their speaking fo in a repetition task than others. Group results showed somewhat but not significantly higher mean *fo* in the repetition task as compared to baseline (reading). Moreover, nonwords were produced with a significantly higher mean fo than real words, in both reading and repetition conditions. No interaction effect between condition and word type was found.

Conclusion: The phenomenon of speech convergence and unintended imitation appears to be a mechanism that deserves more attention in both assessment and intervention of patients with voice disorders. Especially in imitation approaches of voice therapy, this mechanism and its consequences to outcome seems important to investigate in closer detail.

L

Augmented feedback of airflow in semi-occluded vocal tract exercises

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Background: The provision of augmented feedback in a voice lesson, i.e. the one that excludes feedback from the individual's sensory system, has been shown to encourage the development of consistent subsequent repetitions of the same neuromotor behaviour - "Knowledge of Results". Airflow is an important component for healthy voice production; flow phonation is the most advantageous phonation type in terms of ease of phonation, thus being emphasized when training voices. However, as compared to the provision of real-time visual feedback of resonance strategies and vibratory patterns of the vocal folds (by means of espectrography and electroglottography, respectively), the provision of real-time visual feedback of airflow in the voice studio as been much less explored.

Objective: In this workshop, participants are encourage to experiment practical applications of the use of the flow ball as a voice-training device that provides feedback of airflow while practicing different exercises using semi-occluded vocal tract postures.

Method: Participants will be invited to read a text and sing a song before and after experimenting specific task-orientated flow ball exercises. These will include isotonic and isometric types of exercises, performed at different pitches and degrees of vocal loudness. Other potential applications of the flow ball in training voices will be explored, such as breathing exercises. When necessary, spectrographic and electrolaryngographic displays will be used to visually display immediate effects of flow ball use.

Results: Phonating with the flow ball requires airflows superior to 0.2 L/s in order to lift up the ball, thus creating an immediate memory for less glottal resistance during phonation. Lifting of the ball and its maintenance in the air promote kinesthetic awareness that flow and pressure are different dimensions, and that they can be changed separately.

Conclusions: The control of ball height encourages the trainee to learn how to optimize the relation between glottal adduction and subglottal pressure at different pitches. Phonating with the flow ball encourages the use of maximum flow with complete glottal closure, i.e. flow phonation, defined as a phonation that requires low subglottal pressure and a moderate degree of adduction force.

Voice source parameters before and after flow ball exercise

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Background: The flow ball is a device that visualizes airflow during phonation. It lifts a ball located in a small basket, such that ball-height linearly reflects airflow; for flows greater than 0.2L/s, the ball rises about 5 cm per 0.1 L/s increase in airflow. Hyperfunctional phonation is characterized by low airflow. Hence, visualization of flow might be advantageous to train voices to avoid such phonation.

Objectives: To investigate immediate effects of using the flow ball on voice source parameters, peak-to-peak pulse-amplitude (PtP), maximum flow declination rate (MFDR), closed quotient (CQ) and speed quotient (SQ), defined as the ratio between the duration of the rising and the falling parts of the flow pulse.

Methods: Ten singers (five males and five females) performed a *messa di voce* at different pitches over one octave before, during and after phonating into the flow ball device. For all conditions, both audio and electrolaryngographic (ELG) signals were simultaneously recorded using a Laryngograph microprocessor. Voice source parameters were analyzed by means of inverse filtering the audio signal for the before and after conditions.

Results: Effects of the flow ball use on voice source parameters differed substantially between individuals. The relationship between MFDR and fundamental frequency tended to be linear for both conditions, but their correlation tended to be stronger after the flow ball exercise. Furthermore, PtP and SQ tended to increase for many participants. For one of the participants, who is blind, no clear effects of the flow ball exercise was observed.

Conclusion: Phonatory exercises with the flow ball device can positively affect phonation.

Velopharyngeal opening in singing: effects on vocal fold contacting

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Background: In the absence of scientific investigations the benefit of a velopharyngeal opening (VPO) during singing has long been debated in voice pedagogy. A previous investigation on spectrum effects of a VPO in classically trained singers suggested that a slight VPO tended to increase the level of the highest spectrum peak in the 2-4kHz region. This could be due to a change in the vibratory pattern of the vocal folds, e.g., an extension of the contact phase.

Objectives: To test this hypothesis, we investigated how a wide, a narrow or the absence of a VPO affects the duration of the contact phase relative to the period, i.e., the contact quotient ($Q_{contact}$).

Methods: Four male and five female singers sang a sequence of five vowels at pitches covering one octave (i) with a wide VPO, (ii) with a narrow VPO and (iii) with the velopharyngeal port closed. Recordings of audio, electrolaryngograph, nasal and oral flows were made simultaneously using a hybrid system, a combination of a 110-MS computer interface and a Laryngograph microprocessor. The nasal and oral flows were captured by means of a flow mask that the singers held well sealed to their faces. A plastic divider plate at the level of the upper lip separated the oral and the nasal airflows. The VPO conditions were documented in terms of the amplitudes of the nasal and oral DC and AC airflows. The audio and the airflow

signals were all digitized with a sampling frequency 48000 Hz and recorded in separate channels by the SpeechStudio software, providing also $Q_{contact}$ data.

Results: The $Q_{contact}$ tended to decrease with rising fundamental frequency, correlation coefficients ranging between 0.6 and 0.7. The decrease was greatest for the wide VPO condition and smallest for the narrow VPO condition. The effect was greater for the male second passaggio region.

Conclusion: Different sizes of a VPO seem to affect $Q_{contact}$: a narrow VPO lessens the decrease of $Q_{contact}$ with rising fundamental frequency. Possible benefits for singers will be discussed.

Fundamental frequency variations accross the menstrual cycle

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Background: Changes in auditory function and vocal motor behaviors have been associated with concentrations of oestrogens, progesterone and testosterone. However, effects of phases of the menstrual cycle and oral contraceptive pill (OCP) use in fundamental frequency (f_o) are still debated.

Objectives: To investigate effects of sex steroid hormones on f_o at phases of the menstrual cycle and when using an OCP.

Methods: Audio and electrolaryngographic recordings of nine healthy females reading *The Rainbow Passage* were carried out at menstrual, follicular and luteal phases, for placebo and OCP use, blindly and randomly allocated. At the end of each recording, a blood sample was taken. *SpeechStudio* software was used to extract f_o; blood samples were analyzed in terms of concentrations of estradiol, progesterone and testosterone. Two-factor ANOVA and Bonferroni post-hoc corrections were carried out to obtain pair-wise comparisons. Pearson correlations between f_o and sex steroid hormonal concentrations were made.

Results: fo was significantly different between all phases for placebo but only different between menstrual and luteal phases of OCP use. When inspecting the effect size of these differences, f_o varied almost 2 semitones for the placebo condition, whereas for the OCP condition, variations were only about 0.1 or less semitones. No correlations were found between fo and hormones for all phases and conditions. When comparing f_o between placebo and OCP, significant differences were found for all phases.

Conclusions: Variations in f_o and in hormonal concentrations were significant for all phases of the menstrual cycle during placebo. These variations were significantly lessened across the menstrual cycle for OCP. No correlations were found between f_o and individual hormonal concentrations for both conditions and all phases. Thus, the effect of sex steroid hormones in f_o seem to be associated with constant variations across the menstrual cycle rather than with specific sex steroid hormonal concentrations: when hormonal variations were lessened with OCP use, f_o variations across the cycle were lessened. This stabilization effect of OCP use may well explain why f_o was significantly different between conditions for all phases, despite concentrations of individual sex steroid hormones were not.

Flow ball-assisted training: immediate effects on vocal fold contacting

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Background: The flow ball is a device that creates a static backpressure in the vocal tract while providing real-time visual feedback of airflow. A ball height of 0 to 10 cm corresponds to airflows of 0.2 to 0.4. L/s. These high airflows with low transglottal pressure correspond to low flow resistances, similar to the ones obtained when phonating into straws with 3.7 mm diameter and of 2.8 cm length.

Objectives: To investigate whether there are immediate effects of flow ball-assisted training on vocal fold contact.

Methods: Ten singers (five males and five females) performed a *messa di voce* at different pitches over one octave in three different conditions: before, during and after phonating with a flow ball. For all conditions, both audio and electrolaryngographic (ELG) signals were simultaneously recorded using a Laryngograph microprocessor. The vocal fold contact quotient Q_{ci} (the area under the normalized EGG cycle) and $dEGG_{maxN}$ (the normalized maximum rate of change of vocal fold contact area) were obtained for all EGG cycles, using the FonaDyn system. We introduce also a compound metric I_c ,the 'index of contact' [$Q_{ci} \times \log_{10}(dEGG_{maxN})$], with the properties that it goes to zero at no contact. It combines information from both Q_{ci} and $dEGG_{maxN}$ and thus it is comparable across subjects. The intra-subject means of all three metrics were computed and visualized by colour-coding over the f_o-SPL plane, in cells of 1 semitone × 1 dB.

Results: Overall, the use of flow ball-assisted phonation had a small yet significant effect on overall vocal fold contact across the whole *messa di voce* exercise. Larger effects were evident locally, i.e., in parts of the voice range. Comparing the pre-post flow-ball conditions, there were differences in Qci and/or $dEGG_{maxN}$. These differences were generally larger in male than in female voices. I_c typically decreased after flow ball use, for males but not for females.

Conclusion: Flow ball-assisted training seems to modify vocal fold contacting gestures, especially in male singers.

Effect of the blackboard writing voice exercise on thirteen healthy women with vocal fry

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Objective: This students Bachelor project investigated the effect of an exercise called the blackboard writing voice exercise (BBWVE) on vocal fry in thirteen healthy female speakers.

Method: The method used was a pretest-posttest within-subject design study. A 15-minuites voice intervention program was carried out. In the BBWVE the client is pretending to write on a blackboard while saying the text aloud. The intervention consisted of the BBWVE, combined with information about vocal fry, attention-guiding questions, and negative practice. Before and after intervention, the participants were recorded reading a short text. The recordings were analyzed by means of perceptual analysis of vocal fry using a visual analogue scale (VAS), combined with acoustic analysis using a Praat script, where the percentage of vocal fry is calculated from the twin-peaked histogram in a fundamental frequency distribution.

Results: Individual results showed that four of the participants significantly reduced their vocal fry. One of these had the highest degree of vocal fry at pre-test. Two of the subjects however, significantly increased their vocal fry after intervention. Looking at the whole group, the results from the perceptual analysis showed a minor, non-significant reduction of 1,81 mm in average (SD 11,03 mm) on the VAS for vocal fry. Results from the acoustical analysis showed a minor, non-significant increase in creak percentage with an average of -0,53% (SD 4,07%).

Conclusion: The BBWVE combined with information about vocal fry, attention-guiding questions, and negative practice failed to reduce vocal fry in this study. The results indicating that the intervention may be useful for patients with a higher degree of vocal fry will be discussed.

Quasi-Output-Cost-Ratio (QOCR) in female Classical singing and 'Edge'

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Different song genres apply different techniques to gain loudness. It would be of interest to know how cost effective these techniques are and how much biomechanical loading they pose on the vocal folds. One way of quantifying cost-effectivity presented by Berry et al. (2001) is to measure Output- to -Cost Ratio, ie. sound pressure level SPL in dB divided by Impact stress (pressure per unit area during vocal fold collision) in Pa. As it is, impossible to measure IS reliably in humans, an estimate of OCR has been proposed. This estimate, quasi-output-cost-ratio, presented by Laukkanen et al. (2009), uses contact quotient, CQ, from electroglottography, as an estimate of IS. This study compares QOCR in loud Classical singing and a subtype of belting, called Edge, according to Complete Vocal Technique ™.

Four female singers participated in the study. Two of them were professional classical operatic singers (one lyrical and one dramatic soprano) and two were professional comtemporary commercial music CCM singers. The subjects sang syllables

‘pe’, ‘pä’ loudly on the same pitch C5 in an unechoic chamber. The success of the samples was perceptually analyzed by the singers themselves. Recordings were made using B&K microphone and sound level meter (Mediator 2238) at one meter, CSL 4100 sound card and software. Sampling rate 44.1 kHz and 16 bit depth were used. Electroglottography (EGG) was recorded with Glottal Enterprices dual-channel EGG. CQ was analyzed with VoceVista, using 35% threshold. QOCR was calculated with the formula SPL/ CQ* T/To, where T is period time and T0 was set to 0,005 s, which is derived from mean speaking pitch of females, 200 Hz.

The samples with highest SPL from each subject gave the following QOCR values: Dramatic soprano 5,6 and 5,4 for pe and pä, respectively. Lyric soprano 8,5 and 5,9. The Edge samples gave QOCR of 3,6 and 4 for pe and 3,5 for pä. Operatic singing style seems to uses lower price of decibels. As CQ is not a very reliable estimate of IS, especially in singing, there is a strong need to develop more reliable ways of estimating IS.

Creaky voice versus vocal symptoms

Anne-Maria Laukkanen, Leena Rantala

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The use of creaky voice in speech has become more common. Intuition may relate creaky voice with excessive laryngeal tension, and thus it may be expected to be related to increased risk of vocal fatigue. This study investigated the relation of creaky voice use and vocal symptoms in 104 female university students (mean age 24,3 years, SD 6,3 years). They had no known pathology of voice or hearing, and the voices were judged to sound normal by a speech therapist. The participants were recorded while reading aloud a text of circa 40 seconds in duration. They also filled in a questionnaire consisting of Voice Handicap Index (VHI) and questions about the frequency and severity of symptoms of vocal fatigue, the latter were evaluated on a scale from 0 to 6. A total fatigue score was calculated by multiplying the occurrence rating with severity rating (maximum being 36).The samples were perceptually analyzed by a speech therapist and a voice trainer. The amount of creakiness and strainedness was evaluated using a four point scale (0 = not at all, 4 = a lot).

Inter-rater reliability of the listeners was acceptable (Pearson Chi-Square 100,159, p 0,000 for creakiness, 69,199, p 0,000 for strainedness.) Twenty-two percent of the participants were rated to have no creakiness, 27 % moderate amount and 1,9 % a lot. The ratings for strainedness were 2,9%, 16,4 % and 1,9 %, respectively. VHI total score mean was 15,6, SD 10, range 1-58 (VHI max score 120). Mean fatigue score was 5,6, SD 6,5, range 0-36. Fatigue correlated with VHI total (r 0,42, p 0,000). Creakiness did not correlate with vocal symptoms. Strainedness showed low to moderate correlations with various VHI items signifying difficulties to be heard (T2: r 0,44, p 0,000; T3 r 0,39, p 0,000; T7 r 0,51, p 0,03) and strenuousity of speaking (E 8, r 0,37, p 0,000). Furthermore, creakiness and strainedness correlated positively (r 0, 40, p 0,000). Vocal symptoms naturally depend on many things. The results suggest that creakiness has no direct relation to vocal fatigue symptoms, while strainedness may increase the risk of them.

Acoustic correlates of ’head resonance’ in classical singers

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The song pedagogical concept ‘Head resonance’ is related to vibratory sensations of the singer. Acoustically it has been related to singer’s formant (Gibian 1972). This study investigates acoustic correlates of head resonance in male and female singing.

Samples from 11 professional male operatic singers (2 basses, 4 tenors, 5 baritones) and 10 female singers (1 alto, 3 mezzosopranos and 6 sopranos) were included. One of the females was a student singer. The samples (58 in total) included folk songs and arias. Six voice experts (5 song pedagogues and a voice researcher) listened to the samples and rated them for the degree of head resonance on a scale from 0 (not at all) to 5 (very much).

The samples were analyzed for long-term average spectra with Praat. Sound level differences were calculated between frequency bands: 50-1000 Hz, 1-2 kHz, and 2-3 kHz for males and 50-1000 Hz, 1-2 kHz and 2-4 kHz for females. Singing power ratio (SPR) was calculated for both sexes (50 Hz-2000 Hz – 2-4 kHz).

Inter-rater reliability of the rating was moderate (ICC 0,62, p 0,001 for male samples, 0,72, p 0.000 for females). Degree of head resonance did not correlate with sound level differences of different frequency bands or with SPR. However, the samples with high and low degree of head resonance were distinguished from each other. In males, difference between 50-1000 Hz and 1-2 kHz was in average 5.3 dB (sd 5.3 dB) in samples with low degree of head resonance and 0.73 dB (sd 2.2 dB) in samples with high degree of head resonance (Student's t-test p 0.045). In females the results were similar for samples where fundamental frequency (F0) was below 580 Hz, level difference between bands was larger in samples with low degree of head resonance, suggesting *weaker overtones*. For female samples where F0 was at maximum 650-1060 Hz the result was the opposite: Level differences between bands were *larger* for the samples with high head resonance suggesting *a strong fundamental*. The results suggest that this listening panel rated as signs of head resonance those characteristics that make the voices more projecting.

Change of the mean speaking pitch of Finnish female university students during the last two decades

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The habitual mean fundamental frequency (Fo) in speech is a variable which among other things is supposed to reflect the speaker's social status, social and personal relationships, and even changes in the society. A tendency for a decrease of the speaking pitch in women has been reported in various countries during the last century. The present study investigated Fo changes in the 1990's and 2010's in young (19-25 years) Finnish female university students. The material was derived from the voice archive of the Speech and Voice Research Laboratory at Tampere University. We chose samples randomly from 200 females who did not have any known pathology of the voice or hearing, and whose voice quality sounded normal. The samples consisted of neutral text reading (ca 40 seconds in duration) in a habitual way of speaking, without artistic or any other intentional expression. The samples had been recorded digitally in a sound treated studio using a Bruel & Kjaer 4165 measuring microphone or an AKG C544 head-mounted microphone. The analyses were made with Praat software. In the results, a small but statistically significant increase was observed in the mean Fo: In the 1990's the mean Fo was 201.4 Hz (sd 17.5 Hz), while in the 2010's it was 213 Hz (sd 17.8 Hz) (significance of difference with Student's T test for independent samples was: F 0.059, t -4.725, df 198; $p < 0.001$). The Fo variation also had significantly increased; earlier, the variation of the mean Fo was 2.3 semitones (sd 0.4 semitones), while in the newer data the Fo variation was 2.6 semitones (sd 0.6 semitones); ($p < 0.05$, Wilcoxon Signed Ranks test). The changes in the Fo in the speakers of the Finnish language may reflect the effects of foreign languages (e.g. English) which have been shown to be spoken using higher Fo than the Finnish language. The higher mean Fo and wider variation in it may have been adopted through increasingly frequent intercultural relationships, through a general globalization in different social areas, and very potentially, through the growing global entertainment industry.

The Human Voice and its Instrumental Counterparts

John Lehman

Musikhochschulen Hamburg, Leipzig, Lübeck, Germany, HAMBURG, Germany

Every musical instrument has five functional components. When we become aware of and understand the optimal way of playing other musical instruments we will be able to see parallel truths in how the same five parts of our vocal instrument work and how one could implement these successful methods of operation and optimize one's art of singing. Through some clear and concise demonstrations and fun exercises to experience these ideas themselves, the workshop participants will discover helpful ways to observe how the voice functions through the perspective of their fellow musicians.

Lost In Transition – Negotiating Vocal Register Changes

John Lehman

Musikhochschulen Hamburg, Leipzig, Lübeck, Germany, HAMBURG, Germany

Whether you sing classical, pop, musical or jazz, I can give you tried and true tips and tricks for connecting the vocal registers and show you how to glide through that elusive passage between chest and head voice. By explaining a few easy to understand concepts and employing some simple physical exercises for optimal air flow and vocal tract resonance, you will quickly learn to negotiate bridging and overlapping the high and low registers for seamless phrasing in all types of singing.

Characterizing vocal-fold dynamics in singing vocal modes from Complete Vocal Technique using high-speed laryngeal imaging and electroglottographic analysis

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Complete Vocal Technique (CVT) is a method used in voice pedagogy. In CVT, all voiced sounds (with vowels) are divided into four vocal modes – Neutral, Curbing, Overdrive and Edge. The vocal modes are identified and defined according to auditory attributes - metal, density, vowel and loudness – setting practical rules for the use of vocal modes. Recent laryngostroboscopic imaging studies have demonstrated visibly different laryngeal gestures between Curbing, Overdrive and Edge (McGlashan et al., 2016; Thuesen et al., 2017; Aaen et al., 2018). There are no study on vocal-fold dynamics of the vocal modes using high-speed imaging.

The aim was to examine vocal-fold dynamics in CVT four vocal modes by means of laryngeal imaging techniques and electroglottography (EGG) analyses. Furthermore, the purpose was to test the feasibility of the selected methods to assess CVT vocal modes.

Five non-classical singers (3 F mean age 38 yo; 2 M mean age 41 yo) trained in CVT were imaged with highspeed endoscopic camera while singing sustained vowels at the same pitch (F4 for male and Bb4 for female) in all vocal modes. Audio and electroglottography signals were simultaneously recorded. For each vocal mode, the singer could repeat the task several times in order to produce the most representative samples for further analysis. Stable parts of the samples were selected using Praat software. Audio and EGG signals were processed using Matlab software. Highspeed images were processed using kymography and optical-flow analyses (Andrade Miranda et al., 2017).

The results show that contact duration, as evidence by EGG-derived contact quotient CQ, is greater than 44% of glottal-cycle duration for the three modes Curbing, Overdrive, and Edge. Lowest values and greater variability are found in Neutral mode, with contact quotient ranging between 12-57% of glottal-cycle duration. These vibratory behaviors are reflected on high-speed kymograms and optical-flow playbacks.

Concerning the feasibility of highspeed endoscopy for vocal-mode assessment, singers had difficulty to produce vocal modes based on closed vowels, such as Curbing. The rigid endoscopy interferes with the singer's lingual and labial articulatory behavior modifying the resulting vowel and the expected sound for a given vocal mode.

The human behind the voice problem: a multidisciplinary approach of voice disorders

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Voice disorders are considered multifactorial and require a multidisciplinary approach. Therefore, Gert Leunen (voice therapist) and Barbara Gibboni (voice osteopath) combine their knowledge and skills to guide people with organic, functional and psychogenic voice disorders.

Our speaking and singing technique is connected to our body and person. To understand the origin, evolution and maintenance of voice disorders, it is encouraged to know how these aspects are related with each other. The voice can be seen within the idea of the osteopatic concept. Osteopathic treatment can be a complementary or alternative treatment to traditional voice therapy. Traditional voice therapy can also be expanded to create more body-awareness and understand the relationship between our technique, body and person.

Within osteopathic medicine, the larynx is seen as a functional and dynamic unity. Voice problems are approached as a loss of function. Laryngeal muscles and ligaments, that react to a series of habits and reflexes, will adapt in a certain time. The absolute basic condition, when carying out an osteopathic examination, is to have a deep knowledge of the overall anatomy and function, a local and general systemic history and palpation. By this examination, you'll get an idea which structure is provocative to the complaint and in what domain (neurological, vascular, lympatic, ...) the complaint finds its origin. Most important relations are TMJ, the respiratory system, the digestive system, posture, ADL and chronic stress.

In this workshop, Gert and Barbara talk you through their vision and collaboration. They will also present you some case studies and give practical advice to recognize the most important signals that indicate a multidisciplinary approach.

Statistical considerations when analysing speaking fundamental frequency

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Mean and standard deviation have been the most common descriptive summary statistics reported for speaking fundamental frequency (f_o). These measures of central tendency and variability are designed for, and are interpretable only in the context of, unimodal probability distributions. Large scale studies have suggested, however, that f_o follows a bimodal distribution (Hudson, de Jong, McDougall, Harrison, Nolan, 2007; Dorreen, 2017) rendering current descriptive statistics for f_o inaccurate at best and systematically misleading at worst. The observed bimodal distributions are likely the result of two (or more) qualitatively different phonation types captured together: creak, modal and sometimes also falsetto phonation. No consensus currently exists on how to best report summary statistics for non-unimodal distributions. At the same time, there is ample sociophonetic evidence that creaky phonation is on the rise in many English-speaking countries. The ”traditional” method of treating the distributions as unimodal is therefore untenable in the light of the available data.

In this paper we introduce a principled way to report reliable population statistics of f_o. We first compare statistical methods designed to examine and evaluate modality, namely, Hartigan's Dip Test, the Bimodality Coefficient, Otsu's method, and an innovative use of antimode measures. Next, we algorithmically separate the f_o distributions into unimodal phonation modes, and then report a set of summary statistics for each distribution. We demonstrate the method on 379 speakers (244 female, 135 male) from AusTalk, a large-scale corpus of Australian English. Finally, our analysis of f_o is compared to the outcome of ”traditional” approach to highlight the loss of accuracy that stems from the assumption of unimodality and not explicitly addressing creaky phonation.

Therapeutic impact of sound in artistic vocal

Anna Jeremus Lewandowska

I.J.Paderewski Music Academy, Poland, Poznan, LÓDZ, Poland

From the point of view of voice education methodology (vocal pedagogy), the interesting issue is the impact of sound on the vocalist (student, professional artist). We note that it causes extremely strong reactions: inspirational, allowing for the desired effects or negative, causing the effect of getting lost, to a serious vocal crisis. From my experience, it appears that issues concerning the ”therapeutic” properties of sound in vocal pedagogy, as well as professional work on the stage, are considered extremely important by many pedagogues and singers.

My study will be focused on two issues. The first one is methodical-preventive actions related to the impact of sound, the second: interaction of sound in the moments of crisis of the vocal singer.

Methodology and prophylaxis: the colour of sound - and the vocal imagination of the singer (modelling on sound, voice colour correction, analysis of own voice, constant control of voice properties, analysis of own recordings, etc.).

Influence of sound in the moments of vocal crisis (in initial and occupational training) - silence therapy, starting voice work, working on a functioning voice, sound therapy after a surgery - eg removal of thyroid lobe etc.)

The submitted presentation is based on: a) my own experiences, as an opera singer and artistic singing teacher, b) interviews conducted by me with other artists - vocalists and vocalists – teachers c) observation of vocalists - students and professional artists.

Overcoming the vocal crisis, for a student of vocal studies, and above all a professionally active artist-singer, is a task of fundamental importance. It can therefore be concluded that the ways of indicating sound as a therapeutic element can be successfully used and in vocal pedagogy and in professional work with voice.

Sorting out the confusion between Circumlaryngeal none specific massage and the application of osteopathic principles as performed by trained manual therapists.

Jacob Lieberman

Deutche Stimmklinik, HAIFA, Israel

Aronson SLP from the USA acknowledged that MTD meant what it said, namely tension in muscles. He then described none specific massage to certain laryngeal muscles.

For the manual therapist, none specific massage is lacking specific description such as, what is the diagnosis, what is the tissue that is causing symptoms, what are the specific joints that lost range of mobility what is the aim of treatment and more.

In parallel, through research into a large group of healthy voice users and voice patients, the author, who is an osteopath, has developed, using palpation, a comprehensive protocol that describes laryngeal function and by applying osteopathic principles of ”normal” physiological movements was able to develop specific treatment techniques.

Many approaches to treating voice symptoms are described on the market, yet most of them are not more than named osteopathic techniques but are lacking a comprehensive approach namely a diagnostic procedure, function diagnosis and specific treatment plan as described above.

In the presentation (can be integrated into a workshop) those differences will be discussed using video clips of osteopathic management vs none specific approaches.

Difficult singer's personalities and how to deal with them

Jacob Lieberman[1] & Markus Hess[2]

[1]*Deutsche Stimmklinik, HAIFA, Israel*

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In some cases of treatment of singer's voice problems, we encounter interactional problems that seem counterproductive to successfully managing voice problems – due to psychological issues and problems. In this presentation we focus on some of these aspects and give clues on what might be underlying causes and how to deal with them.

Association of vocal dose and vocal fatigue in professional voice acting

Nicole Yee-Key Li-Jessen, Lisa Martignetti, Zhengdong Lei, Laura Fasanella, Nick Ogrodnik, Luc Mongeau

McGill University, MONTREAL, Canada

Objectives: Vocal fatigue is a major complaint in the workplace for occupational voice users. Increases in laryngeal discomfort, vocal or respiratory effort are common symptoms of vocal fatigue. This study was to investigate the association of vocal dose and vocal fatigue in professional voice actors using neck surface accelerometers (NSA) and clinical voice measurements.

Methods: Sixteen professional voice actors (5 males and 11 females) were recruited to participate in this study. Participants were randomly assigned to either a vocal warm-up group (N=8) or a no warm-up control group (N=8). Participants in the vocal warm-up group were trained by a speech-language pathologist and practiced a 30-minute session of semi-occluded vocal tract exercises immediately preceding the recording session. The control group was asked to rest their voice by refraining from speaking instead. All participants were instructed to perform a 4-hour voice over session using a standard video-game script. The session took place under the supervision of a voice director in a professional voice recording studio. All participants were mounted with a custom-made NSA on their sternal notches before the recording session.

Self-perceived vocal fatigue ratings and NSA-derived acoustic markers (such as fundamental frequency, jitter, shimmer and spectrum slope) were collected at seven time points before, during and after the recording session. In order to calculate the vocal dose accumulated during the recording session, signal processing methods were implemented to discriminate voiced sounds from unvoiced sounds to obtain accurate dose measures. Machine learning algorithms and established metrics were used to correct previously established accelerometer artifacts.

Results: Compared to the control group, the vocal warm-up group showed significantly better voice acoustics at the midway point and immediately following the session; but not for later time points after adjusting for distance dose. Machine learning analysis is now underway to discriminate specific voice features used during the session. The new analysis may provide further insights into how an individual's voice use patterns could lead to vocal fatigue.

Conclusions: The use of vocal dose with NSA technology can be further developed into an e-health device to aid in the prevention of vocal fatigue in occupational voice users.

What is Free Singing? Why is it Necessary?

Jeanette LoVetri

The Voice Workshop, NEW YORK, USA

The human throat needs to easily be able to inhale and exhale, exchanging oxygen for carbon dioxide. To do so with optimum efficiency, the larynx needs to sit in a relaxed, comfortable position in the throat and all physical structures of the vocal tract need to function fluidly and efficiently, without excess tenseness. The laryngeal and pharyngeal musculature needs to be able to freely move in order to sing well. This has been true since the beginning of singing training in the 1700s and is still true today.

Functional vocal training promotes flexibility and strength in both vocal and breathing muscles. Regardless of the style, it is never necessary to do any direct movement or behavior in the throat, larynx or vocal folds in order to sing well. In Contemporary Commercial Music (CCM) direct intervention in the throat as a means to belting or other sounds found in rock, pop, gospel, R&B, blues and country music (particularly as found in the USA) is not only unnecessary, it is counter-indicated if the artist is to breathe easily and sing with true expressive freedom and uniqueness.

Somatic Voicework™ *The LoVetri Method* is an approach to vocal pedagogy for Contemporary Commercial Music. It advocates free singing, emotional authenticity, stylistic integrity, personal uniqueness and vocal health. It is used to expand vocal range and dynamics, promote control over inhalation and exhalation while singing, enhance connection to and awareness of physical sensation, cultivate increased perception of auditory feedback, and rests on what is known of voice science and research, vocal hygiene practices and medical protocols aimed at health.

This method was created in 2002 in the USA and has been taught there in several universities as well as in Sao Paulo, Brazil; in Hamburg, Germany; in London, England; Toowoomba, Australia and in Vancouver, Canada. Over 2500 people have been trained to use the principles of Somatic Voicework™ as teachers of singing of all styles.

This presentation will explain the particulars of **Somatic Voicework™** *The LoVetri Method*. There will be time to work with a volunteer singer from the audience.

Typical Functional Issues for Singers in Contemporary Commercial Music Styles

Jeannette LoVetri

The Voice Workshop, NEW YORK, United States of America

For over 47 years, working with singers in CCM styles, the presenter has taught singing to several thousand people. Throughout that time, she began to notice that singers of specific styles often had similar patterns of vocal response. While not based on research or objective measures, the tendency for singers in specific styles to exhibit similar functional behavior was observed far too often to be merely random.

Holistic voicework incorporates knowledge of the entire person including professional demands, vocational training, lifestyle habits and artistic and career goals. Correcting vocal behavior involves understanding all aspects of vocal use within the context of a human being's life as a serious amateur singer or as a professional vocalist.

In order to ascertain whether or not a vocalist who has had illness, injury or pathology will return to singing patterns that do not serve their long-term vocal health, it is useful to understand what the typical vocal patterns are in each musical style. While it cannot be stated that all singers of a style will always have exactly the same vocal behavior characteristics, many vocal responses are common enough to be considered as being important when considering the best path toward successful retraining. If the clinician uses an exercise which moves toward vocal health but away from a desired sung output, it is likely to be met with resistance even if the singer understands that vocal behavior changes are necessary. A useful way to encourage compliance and avoid resistance is to know what the various style demands are and what they typically produce when singers do them well in any given Contemporary Commercial Music style. Working in this manner moves both the clinician or singing teacher/voice coach towards restoring vocal health without sacrificing marketability making long-term success more likely.

The guidelines presented here will be based entirely on the life experience of the presenter. The observations are offered as food for thought.

To use or not to use sound environment systems in the classroom: A pilot study of the effects on children with normal and impaired hearing and on their teachers

Viveka Lyberg-Åhlander[1], Suvi Karjalainen[1], Heike Von Lochow[1], Jonas Christensson, Susanna Whitling[1]

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Classroom communication can be a challenge to teachers and students. Children who sit in the backrow of the classroom are missing out on higher partials of their teacher's speech. This risk hamper their understanding of what is being taught. A shortage of phonological information affects children with hearing impairment worse than children with typical hearing, as they need more redundancy in a speech signal than others, in order to comprehend meaning. When teachers notice some children cannot hear them, they adapt their oral communication, e.g. by reiterations, driving up their relative phonation time, loudness and pitch of phonation and thus, increasing their vocal load. Sound field systems have existed commercially since long. Reports about the use of such systems have been positive but, systematic studies including teachers, students and the classroom are scarce.

The purpose was to investigate the effect of interventions to improve clarity of speech by electronically enhancing high spectral properties of speech in teachers using sound field systems. We wanted to explore how sound field systems with a teacher microphone and a loudspeaker may affect children's performance in a hearing comprehension test, in which the teacher gives oral instruction. A further aim was to explore teachers' voice use and, vocal load and, research all participants' well-being related to the different sound field systems.

We used two sound field systems available at the market and compared three conditions: the two systems to no system. Six female voice healthy teachers participated. Children aged 8-12 (n=76), in five different classes at four different schools participated, 9/76 children were hearing impaired (HI). Hearing was screened in all participants. The teachers were equipped with a voice accumulator, VoxLog, in all sound conditions, tracking their voice use, F0 and SPL during the work day and monitoring the competing sound levels. The children were tested through hearing comprehension tests. Teachers and children reported their perceptions of the sound conditions through questionnaires.

Children as well as teachers preferred any sound field system compared to no system. The results of the voice measurements and comprehension tests corroborated this conclusion. Results concerning HI-children were inconclusive.

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Injectionglottoplasty with autologous fascia lata - Manual for a simple alternative injection procedure

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Glottal insufficiency is a bothersome medical condition that results in a poor voice function with increased vocal fatigue and/or muscular strain in the neck after voice use. Clinical scenarios where the voice function does not meet the individual requirements of a patient are typical indications for injectionglottoplasty. This technique is aiming at augmenting the volume of one or both vocal folds so it becomes easier to speak up for the patient.

Different materials are used for glottal injections, one of them being autologous fascia lata. The advantages comprise a high tissue compatibility and a probably good duration of action. Whereas the material is rather easy to harvest from the outer thigh, the mode of application is somewhat difficult because it involves a preprocessing of the material to make it injectable. In addition, a high-pressure syringe combined with a rather large injection canula are considered to be necessary for the procedure.

The poster describes a technique of vocal fold injection with fascia lata by help of a high precision 1ml syringe and a mere 19 Gauge injection butterfly needle. It allows for a targeted, better controlled injectionglottoplasty with autologous fascia lata.

Relationship between Epilarynx Tube Shape and radiated sound pressure level in singing

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Voice production involves a complex interaction of the breathing system as the generator of static air pressure, the glottal vibratory mechanism as a converter into acoustic pressure fluctuations and the vocal tract, which filters the sound. The result is the voice sound, as emitted by the mouth opening.

Vocal loudness is known to be mediated by subglottal pressure und different vibratory characteristics of the vocal folds.

The Vocal tract can be actively adjusted during singing e.g. whilst different loudness conditions. Thereby source-filter-interactions have been linked to the epilaryngeal tube, which is the downstream resonating chamber of the inner larynx just above the vibrating vocal folds.

In our study, we target the morphology of the epilaryngeal tube as a function of the radiated sound pressure level.

Five female and five male subjects – all of them western classically trained singers - were recruited for the study.

The experimental setting consisted of a static magnetic resonance imaging (MRI) with consecutive 3D reconstruction of the complete epilaryngeal tube with exception of the laryngeal ventricle and simultaneous measurements of vocal loudness. The singer subjects were ask to maintain phonation in three different loudness conditions.

As a result, the female subjects tended to maintain the morphology of the epilaryngeal tube rather constant, whereas male subjects showed a narrowing of the epilaryngeal tube when singing at higher sound pressure levels.

The data represent the first detailed morphological analysis of the 3D dimensions of the epilaryngeal tube during phonation in different functional conditions.

Voice rest after vocal fold polyp surgery: a study of patients in the National Swedish Phonosurgery Register

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At present there is no consensus regarding optimal type and duration of voice rest after phonosurgery. The studies published so far are either from surveys around clinicians or on a limited number of patients.

The aim is to report data from the National Swedish Phonosurgery register about the patient´s subjective voice outcome 4 months after surgical removal of vocal fold polyps in relation to type of voice rest.

Material: 419 patients which were operated for vocal fold polyps at different Phoniatric Clinics or ENT clinics in Sweden reported information about type of voice rest (no voice rest, total voice rest or relative voice rest) and voice satisfaction after 4 months. Data were also available about gender, age and VHI-10. We did not analyze short time effects on voice recovery or data about duration of absence from work.

Results: No significant difference was found between degree of satisfaction regarding voice and type of voice rest reported. Younger patients were more satisfied ($p<0,05$), and there was a trend that the patients which did not keep voice rest were more satisfied (not significant).

Conclusion: The report did not show any significant effects on degree of voice rest on voice satisfaction 4 months after vocal fold polyp surgery.

Vocal cord leukoplakia - is it dangerous? Diagnostic methods and challenges

Camilla Slot Mehlum[1], Nina Munk-Lyhne[2], Thomas Kjærgård[3], Ågot Møller Grøntved[1], Gita Jørgensen[1], Bahareh Philipsen[1], Christian Godballe[1], Dalia Gustaityte[3], Andreas Jørkov[4], Jesper Tvedskov[5], Kristian Bork[5], Preben Homøe[4], Sören Möller[6]

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Objective: Surgical cordectomy was recently introduced in Denmark, as a treatment option for early glottic cancer, and the value of a thorough preoperative assessment was emphasized. Simple biopsy is not recommended, as this may compromise the outcome of the surgical treatment. Thus, cordectomy is a one-stage surgical procedure that allows histological evaluation of the entire lesion and sufficient treatment in case of precursor lesions or early cancer. However, cordectomy may result in chronic voice problems and should therefore be avoided when non-invasive treatment is sufficient, e.g. in case of inflammation or infection. Unfortunately, this distinction is sometimes not obvious, without the aid of biopsy.

We evaluate the diagnostic accuracy of four available diagnostic methods videolaryngo-stroboscopy (VS), high-speed digital imaging (HSDI), Narrow Band Imaging (NBI) and saline infusion (SI) in diagnosing laryngeal precursor lesion (LPL) or early cancer in patients with glottic lesions.

Methods: A prospective cohort study of patients treated by cordectomy for suspected LPL or early glottic cancer was conducted in the ENT-departments of the five Danish university hospitals. Data registered prospectively in the national database (DANGLOT) from August 1st 2016 to October 31st 2018 was analyzed. Summary statistics for demographic and clinical characteristics were calculated. Sensitivity, specificity, negative predictive value (NPV), positive predictive value (PPV), and accuracy were calculated with 95% CI for VS, HSDI, NBI and SI in correlation to the final histopathological diagnosis. Logistic regression and an imputation model for missing data were used to investigate the relationship between outcomes and multiple simultaneous clinical and demographical covariates.

Results: 261 patients, aged 34-91 years participated, 79 with non-neoplasia and 182 with neoplasia (95 with LPL and 87 with cancer). Data from 188 VS, 60 HSDI, 215 NBI, and 236 SI were analyzed. The results and relevant associations by multinomial regression are presented, with suggestions for a preoperative diagnostic set-up.

Conclusion: The accuracy of available diagnostic methods in detecting LPL or early glottic cancer in a national, clinical setting are lower than often reported in single-center studies and studies based on data generated for research purpose. This should be taken into account in treatment planning and patient information.

The long-term effects of manual therapy on the vocal change and pain reduction in patients with muscle tension dysphonia

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Introduction: Manual therapy is one of the treatments used for muscle tension dysphonia. The goal of this treatment is to reduce the tension of the external muscles and improve the laryngeal position, changing the parameters of the voice features and improving the voice quality. People with muscle tension dysphonia complain of pain during phonation and at

other times. Most studies have investigated the immediate effect of this treatment on muscle tension dysphonia patients. None of the studies have looked at the treatment route. The purpose of this study was to evaluate the treatment process and its effect on pain.

Material and method: Circumlaryngeal manual therapy was used to treat 11 patients with muscle tension dysphonia in eight treatment sessions. The subjects' voices were recorded at all 8 assessment sessions and two weeks after the last session for performing acoustic analyses to assess the treatment course. Pain assessment was completed by the subjects at three points before treatment, at the eighth sessions of treatment, and two weeks later.

Results: Reduction of fundamental frequency and jitter in all sessions were observed compared to the first session (p <0/05). It also showed a significant decrease in the frequency and severity of pain in the regions of the back of neck, front of neck, larynx, underjaw, maseter muscle and temple (p <0.05).

Discussion: MTD is a voice disorder that is caused by excessive phonation efforts. hyperfunctional phonation is characterized by excessive phonation efforts. Muscular effort can be observed all the way to the vocal tract that affects intrinsic and extrinsic laryngeal muscles, as well as the size and shape of resonators. It can be concluded that strategies aimed at relaxing the excessive tension in the muscular structure around the larynx can improve the function of the glottal source. In the case of pain relief in these patients, it can be concluded that by reducing tension in the muscles, stressful behaviors that cause pain and muscle tension are reduced gradually by relaxing the pain muscles.

Voice aspects in sulcus vocalis with coexisting benign lesions of the vocal folds

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Sulcus vocalis is often associated with different benign lesions such as polyp, edema or nodule, cyst, and fibrous mass of the vocal fold.

Objectives: The purpose of the study was an analysis of clinical characteristics of benign lesions coexisting with sulcus vocalis in terms of psychosocial handicapping, auditory-perceptual and acoustic measurements, and vibratory patterns.

Materials and Methods: We reviewed the medical charts of 38 patients with diagnosis of pathological sulcus vocalis. The study group consisted of 16 subjects with sulcus and associated benign lesions. Twenty two patients with isolated sulcus were enrolled to the control group. We analyzed psychosocial (VHI-30), auditory-perceptual and acoustic assessments, and laryngovideostroboscopy images.

Results: The mean VHI scores of all subscales ranged from moderate to severe handicap, and the total score was in moderate values. The majority of patients had a mild grade of hoarseness, roughness, breathiness, asthenic and strained voice as well. The most abnormally increased values were observed among amplitude parameters. The incomplete glottal closure was observed in all patients from the study group. The amplitude of vibration was diminished in all patients, mostly in a moderate degree. The mucosal wave was moderately restricted in 75% of patients.

The difference between groups in the VHI scores was significant in emotional ($p=0.004$) and physical ($p=0.007$) subscales. In all domains of GRBAS the differences between the study group and the controls were not statistically significant ($p>0.05$). There was a significant difference between the study group and the controls in SPI parameter. Its mean value was lower in patients with coexisting benign lesions ($p=0.049$). The considerably higher value was also observed in the vAm parameter, but it was not statistically significant ($p = 0.067$). The assessment of stroboscopic measurements did not show significant differences between the study group and the controls.

Conclusions: The patients with sulcus and coexisting benign lesions were more handicapped in emotional and physical subscales of VHI. The glottal gap in most of cases was smaller than in isolated sulcus, but vibratory patterns were moderately impaired. The acoustic evaluation of voice shows the most severe disturbances among amplitude parameters.

Colour and Timbre: educating a Singer's Vocal Perception

Susan Yarnall Monks

University of Chichester, CHICHESTER, United Kingdom

A multi-disciplinary workshop exploring the different techniques to open the ear and awake fresh colours in the singing voice: this can be open to all, especially voice scientists and speech therapists who may not have experienced a singing workshop.

Colour and timbre in singing sound are very difficult to define and to identify with any degree of agreement between singing teachers and scientists but just because it is challenging should we just give up? This workshop will explore the nuances of timbre and the language singers use by experimenting with voiced sounds and singing a simple English folk song.

I believe as a singing teacher that one of the greatest skills a singer can possess is the ability to produce an interesting and colourful interpretation of music and text. I encourage my own students to develop the perceptual skills to hear the nuances between languages, vowels, consonants, the attack of the note and the articulation that can vary with the shape of the tongue and the pharyngeal space as well as the sub-glottic air flow and the use of resonances in the skull.

Using Spectrographic analysis, visual imagery, colour cards, word patterns, poetry and movement, the aim will be to explore the differences singers can create in their timbre with light and shade, texture, tuning, breath management and using a clearer understanding of consonants and vowel subtleties. Eight exercises with a specific focus will be used: chiaroscuro- light and shade, texture, colour, word painting, movement, tuning, resonance, sculpting space in 3 dimensions. Many ideas are stimulated by drawing and painting techniques from the art world.

There will be a brief introduction based on my doctoral research into Vocal Perception. It will be of particular interest to singers, singing teachers but also anyone working with the voice for expression and communication.

Reference: *Yarnall, S. (2018) The 'Real' Me: Practical Application of Research into the Perception of Vocal Timbre, Contemporary Music Review, Volume 36 Issue 6.*

EVTA Voice Clinic

Susan Yarnall Monks

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In July 2018 the European Voice Teachers Association (EVTA) ran a drop-in Voice Clinic with two highly experienced singing teachers at the Europa Cantat Choral Festival in Tallinn, Estonia. For 2 hours each day of the singing event (with 4500 singers from over 40 countries around the world including professional and amateur choirs) EVTA offered a chance for any singer or conductor to come and talk about singing, their vocal problems or choral dynamics. In the programme it said:

"The Voice Clinic will be open for any singer/conductor/composer to come and ask questions about healthy singing, tips for maintaining a good tone quality, tips on breathing, posture, vocal technique, developing colourful timbres. We look forward to meeting some wonderful singers, but we know with the extensive opportunities to sing in Tallinn, vocal tiredness and loss of vocal tone may become problems. Advice will be available for all styles and genres of music in a friendly but informative way. EVTA is an umbrella organisation with 21 European country member associations and we look forward to enjoying a fantastic Festival of Singing."

As a result we were overwhelmed with participants of all ages, male and female, singers and conductors and the results were fascinating including a singer with only one vocal fold, an ageing singer who had been turned away from a choir she loved, a young man just discovering his vocal range, a conductor of a young girls choir needing help to blend the sound. The organisers of Europa Cantat were surprised and pleased at the positive feedback of this new type of vocal support at a big Choral Festival.

For PEVoC Copenhagen 2019 it is proposed to give a brief insight into the experience but to then offer the "EVTA Voice Clinic" as a practical facility for anyone attending Pevoc to come, ask questions and work with two singing teachers as they co-teach and respond to diverse vocal dilemmas. This is 'research in action', challenging but important as we seek practical ways of assisting singers and choir conductors in the activity of singing and performing.

Hyaluronic acid injection as treatment for unilateral vocal fold paralysis in 116 patients

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Background: Unilateral vocal fold paralysis (UVFP) often has a marked negative effect on the voice quality. The voice of the affected individual is often very breathy, weak and sometimes diplophonic. The aim of this retrospective study was to evaluate treatment effect of hyaluronic acid injection in UVFP.

Subjects/Methods: A review of patient charts from 2009 to 2017 from a university hospital ENT clinic revealed that 224 individuals were diagnosed with UVPF and 116 of these patients were treated with hyaluronic acid injection in local anesthesia in an outpatient setting. Maximum phonation time was measured before and directly after injection. Patient satisfaction with treatment result was evaluated after 1 month by telephone call.

Results: A total of 229 injections were given. Sixty three patients (54%) received one injection, 24 patients (21%) received two injections and 29 patients (25%) received more than two injections. The mean time between injections was 8,5 months. A mean 2,5 fold increase in maximum phonation time was noted after injection. Of the 100 patients with a follow-up evaluation, 52% were very satisfied, 40% were moderately satisfied and 8% patients were dissatisfied with their voice. Three of the patients treated with hyaluronic acid injections experienced breathing difficulties due to swelling or infection and were admitted to the hospital for observation.

Conclusion: Hyaluronic acid injection as treatment of UVFP increases maximum phonation time, at least in short term. The great majority of patients were satisfied with their voice at one month follow-up.

Intraoperative i-scanoptical enhancement for assessment of marginal lesions in vocal fold leukoplakia

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Introduction: Treatment for vocal fold leukoplakia is complicated by a high positive margin rate. We hypothesized that invisible lesions under white light remained around vocal fold leukoplakia after surgical resection. The I-SCAN optical enhancement (OE) system (Pentax Medical, Tokyo, Japan) revealed that lessvisible epithelial lesions under white light of the endoscope existed in the esophagus. The purpose of this study was to investigate the existence of lessvisible lesions around vocal fold leukoplakia under white light by using OE during laryngomicrosurgery.

Methods: Thirty-six patients with vocal fold leukoplakia were included in this study. Twenty-six patients underwent intraoperative endoscopy immediately before resection of lesions through direct laryngoscope; observational movies were recorded using white light and OE (endoscopic observation group). The remaining 10 patients did not undergo intraoperative endoscopy (no endoscopy group). All patients underwent resection of lesions under a surgical microscope. The otolaryngologist watched the recorded white light movies and subsequently marked borderlines of lesions on the vocal fold images visible under white light during endoscopy. In the same manner, the otolaryngologist watched the recorded OE movies and marked the borderlines of lesions on captured images. The marked areas were calculated by ImageJ. We compared the marked areas of lesions between white light observation and OE observation. The relapse rates were compared between the endoscopic observation and no endoscopy groups.

Results: The areas of lesions marked in OE observation were significantly larger than those marked in white light observation. Invisible lesions under white light were confirmed in 16 patients of 26 patients (62%) in the endoscopic observation group. The relapse rates were not significantly different between the two groups.

Discussion: OE improved the visibility of lesions around vocal fold leukoplakia that were invisible under white light.

Pedagogy for the mature female voice: A research-based model designed to enable the mature female singer sustain vocal competency and health

Rebecca Moseley-Morgan

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The researcher proposes a workshop based on her doctoral research of a study of vocal function and efficiency in the mature female singer and whether effective pedagogy can promote sustained healthy vocal production and competence. Despite Caprilli noting in 2013 (p2), that 'literature on pedagogical strategies for the ageing voice is lacking', a search on Journal of Voice reveals 506 articles on the ageing voice, however, none are specifically focussed on pedagogy.

Like all instruments, the voice is subject to wear and tear; it can become dysfunctional, the vocal folds may swell due to infection, they may bleed due to misuse and they may change structurally and asymmetrically due to variations in the hormonal system. In addition, the respiratory system functionality can decline and the pharynx can become constricted.

This research investigated the potential benefits of pedagogical intervention on any negative features of female vocal aging in older singers. Accordingly, part of the research and review of the literature has led the researcher to devise a series of targeted exercises to assess the function of key components of the voice: respiratory function, agility, onset, stamina and resonance.

The findings have produced statistically significant results which support the hypotheses that the vocal competency of the mature female singer can be sustained through effective pedagogy.

The vocal tests devised for the study, and the knowledge accrued from the scientific literature referring to the problems that the mature singer is likely to face, now form the basis of a pedagogical model for the mature singer.

The core components include the rationale of why the following are essential:

- Vocal history of the singer
- Posture and breathing of the singer
- Vocal warm-up
- Stategies for dealing with the most common issues facing the mature singer:
- Tongue root tension
- Constriction
- Onset
- Agility
- Stamina

How to stay calm at auditions - Mental training for singers.

Ulla Munch

Ulla Munch - Performance, KØBENHAVN NV, Denmark

What can a singer do to balance voice, body and nervousness before and during an audition?

Auditions are the primary way of applying for jobs as a singer. You get 3-5 minutes to show your very best. It is one of the most challenging kind of job interviews you can imagine! You alone in front of a jury, going to perform a piece of music to perfection.

How do you manage to stay alert and calm at the same time?

How do you balance voice and body when nervousness suddenly pops up?

Every singer know how nervousness can make the body freeze, mucus in the throat, tighten muscles and reduce the freedom of the voice.

Knowing how to do mental training alongside the musical and technical preparations is like training a mental muscle. Participants in the workshop will be introduced to techniques that will help them become mentally robust and resilient in an extremely competitive environment.

Workshop: Singers Mental Toolbox

Participants in the workshop will work with the following techniques, which reduces performance anxiety:

Breathing - Anchoring the body by breathing will help the performer to stay calm and reduce anxiety.

Body Balance and centering - Knowledge of how to balance muscular tension and loose joints, to secure a free functioning voice.

Visualization - Get to know how you can benefit from using visualization in your preparation for an audition. Working with preplanned images in a relaxed state of mind focuses the thoughts and calms the mind. Visualization is a skill that needs to be practiced weeks ahead of an audition

Voice care - How mental training can support the voice – connecting the voice and mental training

Reduce stress - How mental training reduces stress before an upcoming audition.

Adapting Repertoire for Male Students during Voice Change

Janet Munro

Trinity Laban Conservatoire of Music and Dance, LONDON, United Kingdom

The aims of this workshop are to offer some practical suggestions for adapting solo repertoire for use with male students during voice change. Teaching singing to boys between the ages of 10 and 18 is challenging. Historically boys were often advised to stop singing during puberty until their voices settled. Current practice is to encourage boys to continue singing throughout adolescence and while there is a reasonable quantity of choral repertoire to use with boys during this stage, repertoire for solo singers is more limited. This workshop we will look at ways of adapting technical exercises and standard repertoire for use with boys who are studying classical or Musical theatre singing.

The workshop will start with a brief over-view of voice change including strategies to motivate learners to continue singing and ideas for female teachers teaching male students during this period, on the most appropriate way to demonstrate vocal exercises and songs. This will be followed by a discussion on identifying the stages that boys' voices go through during voice change and the selection of suitable repertoire. Audio examples will be played during the presentation and the audience will be asked to comment on the recordings and suggestions will then be given for repertoire during this period. Some examples of standard repertoire will be discussed including different modifications to allow students to continue singing during the different phases of voice changes. The audience will be invited to sing through the repertoire before and after the modifications.

Investigating reflux in student singers

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A number of research studies have suggested that gastroesophageal reflux may be a work related disease as professional singers appear more susceptible to it than members of the general population. There is less research on under-graduate and post-graduate student singers, specifically whether they suffer from a higher incidences of gastroesophageal reflux than other student musicians. As part of the Musical Impact Project (2013-17) which studied the health and well-being of musicians working in the UK, an initial pilot project was undertaken through online questionnaires at Trinity Laban Conservatoire of Music and Dance to discover where there was a higher incidence of student singers with reflux compared to the rest of the student population. The initial results appeared to show that student singers were more likely to report the symptoms of reflux than other student musicians. Following this further research was conducted using a qualitative, semi-structured interview format with five student singers to determine their awareness of the symptoms, and the possible long-

term effects of severe and/or chronic reflux. We sought to identify possible indicators of susceptibility, together with exploring students' perceptions of their own anxiety levels.

Data from the interview study revealed that both lifestyle choices and breath management strategies appear to be contributory factors in causing higher than average levels of reflux. All participants recognized the significance of diet as a causative factor and the two with highest reflux scores reported suffering from stress and anxiety. All knew that reflux is a significant issue for singers, but none understood the full implications of the symptoms and how symptoms might manifest themselves in the singing voice.

We highlighted a general lack of awareness of the significance of symptoms of reflux, including breath management strategies used by singers and reflux and poor lifestyle choices, including diet and sleep patterns. The study was small scale with a number of limitations however it suggested that further research is needed into student singers breath management strategies and awareness of reflux.

New perspectives in voice diagnostics by 3D-videolaryngostroboscopy

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Three-dimensional videolaryngostroboscopy is a highly promising development in the field of voice diagnostics and phonosurgery. In comparison to 2D procedures with missing depth information and limited diagnostic sensitivity due to the tangential view of the medial surface of the glottis, it offers enhanced visualization of the detailed vibration pattern of the vocal folds and of the laryngotracheal anatomy. Although high-definition 3D endoscopy is quite well established for instance in laparoscopic surgery, just recently 3D endoscopy has been introduced to laryngostroboscopic procedures (1). The workshop will high lighten the advantages of the procedure and its enormous potential for improving voice diagnostics, higher surgical precision and tissue preservation in laryngotracheal interventions, and for teaching physiology and pathophysiology of voice production.

With regard to diagnostics, 3D laryngostroboscopy contributes to a better understanding of the functional and surgical anatomy by means of qualitatively improved depth perception and spatial representation. In comparison to 2D videolaryngostroboscopy the newly developed 3D system supports a more precise indication of phonosurgical interventions and an increased accuracy of surgical planning. Since operating otorhinolaryngologists and phoniatricians are accustomed to high-resolution stereoscopic vision in direct laryngoscopy while working with the surgical microscope, the use of the 3D videolaryngostroboscopy permits stereoscopic examination also in indirect laryngoscopy. This might facilitate office-based phonosurgery and a better evaluation of prognostic factors. The latter condition might by preferential for some organic pathologies and a valuable option especially in cases of professional voice users. For teaching, the 3D information strongly supports the understanding of the principles of voice production and should be introduced to the curricula, both in the medical and the artistic fields.

Reference: (1) Caffier PP et al., Development of three-dimensional laryngostroboscopy for office-based laryngeal diagnostics and phonosurgical therapy. Laryngoscope. 2018; 128:2823-2831.

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Towards a 21st century contemporary commercial music (CCM) singing voice pedagogy

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As we move into the 21st century, research into the science and pedagogical practice of voice training has failed to reflect the realities and demands of the today's music industry. Contemporary Commercial Music (CCM), as a pedagogical discourse, emerged in the literature in 2000 and it was during this time a lack of a specific pedagogical framework for singers in CCM styles was first identified. While the overwhelming growth in CCM production over the past 100 years indicates the

legitimacy of these music styles, the pedagogy has not evolved sufficiently to reflect this diverse landscape of music styles and its associated vocal characteristics.

The CCM industry is dynamic and, as new styles and sub styles emerge, voice teachers require new types of expertise to accommodate these styles. This recognition poses major problems for teachers and students of CCM. Many CCM voice teachers are faced with students who want to be vocally fluent and artistically expressive in a particular CCM style or across a broad range of styles. Due to the current absence of a pedagogical framework specifically tailored for CCM singing voice that addresses the myriad of style-related effects and embellishments inherent to the CCM genre, voice teachers often struggle to equip students with a firm understanding of how to successfully and safely produce these sounds.

This paper reports the findings from a research study that investigates the teaching beliefs and approaches of nine pedagogues who have extensive experience and/or prominence in the field of teaching CCM singing voice. Using semi structured interviews, this study thematically explores these pedagogues' perceptions and teaching approaches in relation to alignment, breath management, breath flow and support, resonance, articulation, repertoire, style authenticity, performance and artistry, vocal health and the territory of CCM. Although a preliminary analysis identified both commonalties and distinctions in the management of CCM singers, the pedagogues all agreed that efficient vocal instruction must be geared to function and style based on individual student needs. The results from this research offers a foundational pedagogical framework and informed recommendations for teachers, and other industry professionals about progressing the field of CCM singing voice pedagogy.

Teaching singing with natural body movements. Practical exercises combing singing and body movements to improve and facilitate the singing process

Pirjo Nenonen

Music School Johann Sebastian Bach, VIENNA, Austria

The workshop is based on my research and on the approach ”A holistic approach teaching singing with body movements”, which I developed in practice and from the need to help singing students. The research was conducted as an action research with vocal students, but the same ideas can be used with all kinds of singers.

The aim of this workshop is to learn and to indicate how natural body movements can facilitate the singing process, improve the vocal quality and expressiveness as well as own interpretation. In addition to that, to encourage the usage of one's own body language. Natural body movements help to bring flow for singing and naturally activate the abdominal and back muscles, and also develop a ”kinesthetic awareness”. Good posture precedes good breathing and singing and helps to find a natural and free voice.

The workshop includes practical exercises combining singing and body movements. One learns different kinds of vocal exercises and songs combined with body movements to facilitate and improve the singing process. Verbal instructions guide the voice and body movements, imagination and thinking, and lead to different kinds of expression. The participants learn to use the body movements consciously to achieve the expected singing quality and own personal interpretation.

Through the body, participants learn to sense and to hear what kind of singing qualities one achieves with different kinds of body movements. And seeing the body movements help to understand how the voice flows. With experimenting participants learn more from their own voices and bodies, and find new ways to improve the singing process. Learning happens through several channels: auditory, kinesthetic, visual and cognitive.

The idea is based on vocal pedagogy, combined with natural body movements and on pedagogies by Émile Jagues-Dalcroze and Rudolf von Laban, especially on the Laban´s Movement Theories. Body movements and voice open the whole person and provide holistic well-being.

The approach, teaching singing with body movements, can be used broadly in singing/vocal education and in class music education with groups. It suits all age groups, all kinds of singing and music genres.

Botulinum toxin injections for the treatment of spasmodic dysphonia

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Spasmodic dysphonia is a voice disorder that causes involuntary contraction of the laryngeal muscles during phonation. It is a neurological condition of unknown cause. In the larynx, there are two groups of muscles that can be affected: the adductor muscles comprising of the thyroarytenoid and lateral cricoarytenoid; and the abductor group comprising of posterior cricoarytenoid muscle. The voice will sound strained and strangled if the adductor muscles are affected, whereas the voice will be weak and breathy if the abductors are affected. Spasmodic dysphonia is a rare neurological voice disorder, which is often missed by the inexperienced ear. There is no laboratory test or investigation to diagnose this condition therefore, it is best diagnosed by listening to the patient's voice. While older adults who develop the condition may believe that the changes in their voice are simply age-related, young adults will struggle understanding if the voice changes are stress related and psycogenic. These factors may delay the diagnoses and the treatment, in some cases by several years.

The use of botulinum toxin for the treatment of spasmodic dysphonia is currently the treatment of choice for management of this neurological voice disorder. Over the past 25 years, botulinum toxin has been used to treat both adductor and abductor forms of the disorder at our neurolaryngological multidisciplinary clinic, Bispebjerg Hospital, Copenhagen, Denmark.

In my workshop I would like tell the participants about the background of the spasmodic dysphonia and introduce the botulinum toxin injection tecnique in clinic using EMG to locate the laryngeal muscles to be injected. I will do so by showing videoes of the treatment sessions conducted in our clinic at Bispebjerg Hospital and playing audio files of before and after injection voice recordings.

Magnetic resonance imaging of the vocal folds in women with congenital adrenal hyperplasia and virilised voices

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Objective: Congenital adrenal hyperplasia (CAH) is a disorder resulting in lack of cortisol and aldosterone and exposure for androgens. High levels of androgens in women with CAH may cause a virilised voice due to late diagnosis or suboptimal suppression of adrenal androgens and result in a lowering of the voice pitch. Changes in the vocal folds due to virilisation have not been studied *in vivo*. The purpose was to investigate if the thyroarytenoid (TA) muscle is affected by virilisation and correlate findings to fundamental frequency (f_o).

Method: A case-control study using magnetic resonance imaging and digital audio recordings of the voice. Four women with CAH with virilised voices (26 to 40 years), five vocally healthy female, and four vocally healthy male controls participated. Measurements of cross-sectional TA muscle area, vocal fold length, vocal tract length, and acoustic analyses of fo from speech range profiles and voice range profiles were performed.

Results: Women with CAH had a significantly larger cross-sectional TA muscle area than female control subjects and a significantly smaller TA area than male controls. The vocal fold length and vocal tract length did not differ significantly between the women with CAH and the female controls. Both the women with CAH and the female controls had shorter vocal folds and shorter vocal tract compared to the male controls. A significant inverse correlation was found between TA muscle area and mean fo (i.e. a larger TA area correlated to a lower fo-values). Women with CAH had a smaller physiological voice range than both female and male controls.

Conclusion: The present study suggests that a larger TA muscle area is strongly associated with a lower fo. Therefore, it is likely that the anatomical explanation for a female virilised voice is a larger TA area, suggesting an androgen effect on the vocal folds. Since data from the present study is small, the findings need to be confirmed in a larger study.

Educating performers:
Assessing contemporary singers in higher music education in the Nordic Countries

Bodil Kvernenes Nørsett

Ansgar University College/University of Agder, KRISTIANSAND, Norway

The presence of popular music has grown in higher music education. Teaching and learning contemporary singing in higher education has been done for several decades, but there is a need for more research. Knowledge and further development of a contemporary song performance terminology are needed to be able to talk extensively about the issues of performing popular music. This project aims to contribute to the research body of popular music research in higher music education.

Contemporary vocal students attending a higher education system, seek guidance and feedback to learn more. I want to investigate how guidance, feedback and assessment that is given from the institution (curriculum), teachers and assessors, are used by the students as a tool for learning. Learning how to be a performing singer who, in the end, can make a living of it.

Method: The project is a comparative case study, exploring the practice of contemporary vocal performance exam assessment, in five higher music educations in the Nordic countries. Multiple qualitative methods will be used, as participating observation and structured interviews of bachelor and master students, vocal teachers and external sensors.

Results: Will be given from the empirical data from observations and analysis of the answers of the following questions:

How is the assessment of the contemporary singers' exam performances constituted and conducted?

How are the students using this occasion as a tool for (lifelong) learning and motivation?

How do the students use the received grade/feedback for further development?

Conclusion: Assessment of an artistic performance is a delicate, complex and multilayered task. The students want it, as assessment feedback can give them valuable information for further artistic development. Gathering information and answers to the questions above from five different institutions can be useful to increase our knowledge of how higher music education can enhance the learning outcome of the future contemporary vocal performers.

Taking care of treasures: Orally passing by Norwegian traditional folk song.

Bodil Kvernenes Nørsett[1], Sigrid Kjetilsdotter Jore[2]

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A workshop by Sigrid Kjetilsdotter Jore, folk singer and Bodil Kvernenes Nørsett, conductor and singing teacher

Stev is a form of Norwegian folk song consisting of four line lyric stanzas. The English version of the word is stave, meaning the stressed syllable in a metric verse. A stave verse has about 40 different melodies that can be used, and it is traditionally performed by a solo singer, but there can also be conversations, so-called ”stevleik”, where two or more singers sing for and to each other.

This song performing tradition has a unique way of singing, and a person who can perform a stave in this traditional way is called a ”kvedar”. The way of singing is close to speech, singing ”through” the consonants to the vowels. The pulse is measured from the rhythm of the syllables, and there is extensive use of ornaments, slides and ”curls”. The melodies have elements of microtones, especially on the third, fourth and seventh step of the scale.

The stev tradition from Setesdal in Norway is a well-known part of the Norwegian folk music tradition, and it is also suggested becoming a part of the UNESCO world heritage list of immaterial culture.

The folk singer and kvedar Sigrid Kjetilsdotter Jore from Valle in Setesdal, Norway, and the choir conductor Bodil Kvernenes Nørsett from Kristiansand, Norway, has cooperated since 2017 in a project with Kristiansand Chamber Choir and the folk music group Raabygg. The choir singers have learned stev from Sigrid, and they perform them as a choir, in the traditional

manner. The singers tell that they have discovered a different and unique way of singing, being introduced to this particular folk song tradition.

For all who would like a unique singing experience, we will introduce interested conference participants to Norwegian stev singing in Setesdal manner in a group (as a choir).

This will be a practical workshop, where we will learn a stev orally.

Open for all who would like to explore new and interesting aspects of language and singing. Everything from 2 to 30 participants is possible.

Sigrid Kjetilsdotter Jore on Spotify:
https://open.spotify.com/album/2ijNQ98Kkxwk80ReSuI4Uj?si=hesBBmdtQ9mQpHa1XLJD-A

O

Humming Facilitates a Gradual Increase in Vocal Intensity by Alleviating the Enhancement of Vocal Fold Contact and Supraglottic Constriction

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Objectives: Our research group has previously reported that humming can alleviate the prephonatory glottic closure, place the vocal folds slightly laterally to the median line, and release the supraglottic compression, hypothesizing that humming can help produce a loud voice without depending on an increase in laryngeal resistance. This study aimed to assess whether or not humming can help increase vocal intensity gradually only with a slight increase in the glottal contact and supraglottic compression.

Methods: Seventeen healthy nondysphonic speakers without experience in music training were asked to perform two phonatory tasks in order: gradually increasing vocal intensity (crescendo) during sustained phonation of a vowel /e:/ or production of a hum (vowel- or humming-crescendo task: VCT or HCT, respectively), while the sound pressure levels (SPL), electroglottographic (EGG) signals and high-speed laryngeal movies were simultaneously recorded. The glottal contact parameter of the EGG signals and the glottal opening and laryngeal outlet (LO) parameters as well as the duration of prephonatory transient glottal closure (PTGC) on the laryngeal movies were calculated.

Results: With a gradual SPL increase during both tasks, most participants showed a progressive decrease in the LO, but no discernible change in the EGG glottal contact. In comparisons between tasks, an HCT produced a significantly lower SPL, greater LO parameter value and shorter PTGC duration than a VCT, although neither of the glottal contact or opening parameter showed any significant differences. A significant difference between tasks was found in the proportion of failed task performance due to an abrupt SPL increase (41% and 6% in VCT and HCT, respectively; P=0.011), and the failed VCTs showed a significantly higher EGG contact parameter value than the successful VCTs.

Conclusion: These results demonstrate that during an gradual increase in vocal intensity, humming alleviates the enhancement in both the glottal contact at the vocal onset and supraglottic compression in the stable vibratory state, and prevents an abrupt increase in vocal intensity instead of adequate vocal output, and suggest that the humming crescendo task is useful for facilitating a hygienic loud voice phonation independent of increased laryngeal resistance.

Motor learning in voice therapy - Verbal Instruction Model (VIM)

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Voice therapy in speech clinics implies that the speech therapist helps the patient to change vocal behavior to achieve an improved voice function and quality of life. Thus, the goal is that the training effects will be generalized by the patient into everyday life. However, this generalization aspect forms a great stumbling-block.

How come that transfer-to-speech in everyday life of the 'new' vocal behavior is a problem? Voice is one aspect of the individual's motor behavior, in the same way as e.g. a person's style of walking and using gestures. The difficulty of generalizing the 'new' voice behavior could be explained by the fact that voice function is an integrated part of the patient's communicative behavior. Thus, the patient faces the difficult task to substitute an old voice behavior with a new, but keeping the 'old' personal everyday communication style. To break through this stumbling-block the patient probably has to rely on intrinsic and implicit motor learning from voice therapy.

Traditionally, voice therapy in Sweden is based on demonstration, i.e. the therapist shows with her own body and voice how the patient is supposed to produce voice in different exercise tasks. During the last decades a voice therapy technique based on motor learning has been developed. Instead of demonstration this model is based on verbal guiding, i.e. the therapist verbalizes the voice task to the patient without demonstrating, and asks questions while the patient is occupied by investigating different options to perform the task. The model is termed Verbal Instruction Model (VIM). Our clinical experience is that VIM seems to break through the stumbling-block of generalization.

The aim of this workshop is to show VIM in comparison to traditional voice therapy. Selected therapy issues will exemplify how the speech therapist communicates training tasks to a patient in VIM voice therapy in comparison to how the same tasks are presented in traditional voice therapy. The authors ACO and MÖD will demonstrate the techniques pair-wise in short simulated therapy sessions. The core differences between the two voice therapy techniques will be explained to the audience after each session.

The Importance of Spectral Variation in the Tuning of a capella Singers

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In the organisation of musical sound, tuning systems are used to arrange the possible notes used within a culture. In the case of a *capella* vocal music the tuning system is not fixed and the notes are chosen by the singers. In psychoacoustics there is a connection between the notes chosen in different tuning systems and those notes when combined in intervals and chords, whose sensory dissonance due to beats between all spectral components is at a minimum of a sensory dissonance curve based on their spectra. Despite strong neurological evidence to suggest that neural processes involved in the perception of dissonance are also reliant on the ability to detect pitch, few experiments have aimed to connect pitch and sensory dissonance perception.

In musical contexts, singers will change their spectral output during a piece as they sing the lyrics, and adapt their vocal style to be appropriate for the performed music, while also adapting their intonation to the tuning of the wider group. As the lyrics are changed, the spectrum changes and this has a direct consequence on the perceived intonation. In other circumstances the lyrics may limit singers' ability to make such changes, and stylistic aspects of a piece can affect this even further. The result is a complex series of adjustments in both actual and perceived intonation, and a tuning which can differ from the intended temperament.

Our experiments consisted of two main parts. In the first, the consonance rankings for a series of intervals with the same bottom fundamental frequency were given by a group of listeners. This experiment only varied the fundamental frequency of the upper tones within each interval, before the results were compared with predicted dissonance curves. The second experiment used variations in the spectra of the notes as might be produced by singers, for example sharpening and flattening through the chosen vowel. Analysis of the results controlled for beats between harmonics which could influence dissonance rankings.

Reported consonance rankings differed notably with those predicted by the sensory dissonance curves, and these rankings could be affected by the choice of vowel sounds.

The Application of Breath Timed Phonation (BTP) in Voice Therapy for Parkinson Patients

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Breath Timed Phonation (BTP) is a holistic method of respiration, voice and speech, developed by the German professor, actor teacher Horst Coblenzer (1927 - 2014) in the 1970'es. It is based on German phoniatrics, Gerda Alexander's psycho-physiological method of movement and relaxation and his own scientific investigations together with lung physiologist Franz Muhar concerning the role of diaphragm during phonation.

Unlike traditional reductionistic voice methods BTP stresses the importance of work with subglottal pressure (the source of energy) as a fundamental and integral part of the voice therapy by means of dynamic, gross motor/phonatory exercises.

Insisting in meaningfulness the BTP therapy will progress with intentionality, intensified awareness, using imagination and valuable working texts. Drill of sub-items, isolated from the meaningful whole, will only take place to a lesser degree, and the therapy is never mechanical routine.

This workshop is based on my intensive studies of BTP (in German AAP) in Professor Coblenzer's summer courses in Switzerland 1984-2002, and my pioneer experiences during 30 years as a speech therapist in Copenhagen to voice patients, among others groups of Parkinson patients, and as a teacher for students and colleagues. Much to my own surprise this method – originally designed for actors – has proved most successful with excellent transfer to daily speech.

Hypochinetic dysarthria connected with Parkinson's disease presents multiple speech and voice problems, such as aspontaneity, insufficient subglottal pressure, reduced mimics, hoarse breathy voice, imprecise articulation, rapid speech pace due to rigidity of respiration-voice and-articulation muscles. All dynamic and psychic aspects of speech production are integral parts of BTP, which makes it suited to match the complex Parkinsonian voice and speech problems.

In this fraction of a group therapy session for Parkinson patients some typical gross motor/phonatory exercises that all sustain the subglottal pressure will be demonstrated. Participation of 4-6 interested volunteers from the audience will be needed.

Start: Song
Arousal – a march and a few gross motor exercises
"Dictation" exercise (structuring phrases – breaks)
Training mimics and gestures (facial massage, mirroring)
"Concert reading" (presentation of a short story)
Bouncing a ball (training phrases)
Rocking exercises (structuring phrases – breaks)
Hopping on big balls (nursery rhymes, rhythm, subglottal pressure)
Training the text in pairs.
"Speech drawing" (training fine motor skills, breathing control)
"Writing meditation" (Articulation exercise)
"Giving a lecture" (Read aloud or retell part of the story)

Author: Åse Ørsted, Speech and Language Therapist, certified in BTP by Prof. Host Coblenzer

Assistant: Varinka Kierulff Bosemann, Speech and Language Therapist, MA Rhetoric, Degree in classical singing, certified in BTP by Åse Ørsted.

P

Big data on one voice

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With computerized voice range profile (VRP) recording it is possible to assess a detailed and comprehensive image of the quality of an individual voice. When many acoustic quality aspects are mapped and evaluated in parallel, it recurrently becomes evident how very different and subject-specific voice metrics values distribute over the voice field. The implications of this large inter-subject variation are, that maps for different voices cannot simply be averaged or generalized. The aim to summarize the voice status by a single characteristic value is a call for an oversimplification. It is in fact the actual distribution of the quality, as observed over the voice field, that by itself is the characteristic and meaningful information.

Despite large inter-subject variation, the localizing of quality information in the voice field by the fundamental frequency (f_o) and sound pressure level (SPL) will make the recorded values very reproducible within subjects. Each voice tells a different story. Moreover, voice problems are typically 'local', that is, contextual. The scanning of the full range that is a premise of the voice field mapping will assure that 'local' problems (and possible solutions) are exposed. These factors make the VRP mapping the ideal instrument to assess the effect of voice therapy or training in manner that is specific to an individual voice and its problem.

This paper, aims to elucidate the balancing act between searching for generalizations while still recognizing individuality. One single voice is taken as an example to demonstrate how several spectral and perturbation metrics may distribute over the voice field. It will be discussed how these metrics together expose an intricate co-variation that is idiosyncratic to this voice and its associated problem. What will make this more than a case study, is the juxtaposition of the individual metrics maps to a group average. It will be discussed to what degree an average might work as a normative descriptor, and at what point an average might understate and could even hide the actual problem that in principle is well represented in the unreduced (big) data.

Ventilatory dynamics in human beatboxing: is it similar to speech and singing?

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Breathing (ventilation) constitutes the support for oral communication and human vocalization in general. The speaker, and more so the singer, are constantly optimizing the control between their vocal production and their breath support.

Only a few studies have investigated the ventilatory behavior in speech and singing (classical singing: Salomoni et al., 2016; Thorpe et al., 2001; Thomasson & Sundberg, 1999; belting: Sundberg & Thalén, 2015) via Respiratory Inductance Plethysmography (RIP). They reveal some differences between speech and singing, but overall the same pattern is observed, i.e. a breath group, with a short inhalation period followed by a longer exhalation supporting vocalization.

In this paper, we investigate the ventilatory behavior during a new artistic expression: human beatboxing. The RIP technique was used to assess the ventilatory dynamics of a beatboxer producing the same sentence in a continuum from speech to beatboxing. Our aim was to explore whether the ventilatory patterns of spoken and beatboxed sentences are similar when the beatboxed sentence results from devoicing a spoken sequence.

Our data show that the ventilatory behavior associated with beatboxing can be very different from that of speech. While speech production is associated with a continuous exhalation phase following the inhalation, beatboxing is characterized

by an alternation of shallow inhalations and exhalations all along sentence production. Importantly, during beatboxing, speech sounds can be produced even during the inhalation phase, using an ingressive airstream. This makes the notion of breath group not suitable to describe the ventilatory dynamics of beatboxing. Further, because inhalations and exhalations were so rapid and frequent, the ventilatory-volume variations usually span over a limited range. Our results, therefore, suggest that beatboxing production is possible over a relatively long period of time without long pauses for air intake, mostly thanks to this ventilatory behavior, but also thanks to the use of pulmonic ingressive phonation.

In conclusion, the ventilatory behavior of beatboxing appears very different from that of any other type of voice production described in the literature so far. It suggests that beatboxers do not only master articulatory agility but also master special breath support for sound production.

Flow and Vibration Characteristics of Flow Phonation

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Background: Flow phonation is one of the approaches used in voice (re) habilitation to reduce vibration dose and excessive muscular effort. However there are limited investigations describing the relationship between glottal airflow and endoscopically derived glottal area measurements for flow phonation.

Objective: To examine flow phonation characteristics with regard to vocal fold vibration and voice source properties across two different vocal tract lengths in vocally healthy adults using multimodality voice measurements across various phonation modes (neutral, flow, pressed, and breathy).

Methods: Vocal fold vibration, airflow, acoustic, electroglottography and subglottal pressure were simultaneously recorded in 12 untrained voices (6 female and 6 male). Participants repeated the syllable /pae/ (1-2 per second) using breathy phonation, neutral phonation, flow phonation and pressed phonation with neutral and loud voice. Glottal vibration was captured by high-speed videoendoscopy; glottal flow was derived from inverse filtering the airflow or the audio signal; and subglottal pressure was measured as the intraoral pressure during /p/-occlusion. The inverse filtered flow signal, derived from a Rothenberg flow mask attached to a Glottal Enterprises MSF-1 unit, was presented in real time to the subjects as a visual feedback of phonation types.

Results: In terms of inverse filtering, flow phonation was characterized by highest value of flow pulse amplitude ($Flow_{AC}$ = 220.75 ±104.91 ml/sec) and maximum flow declination rate (MFDR = 29200 ±177470 ml/sec^2) compared to neutral ($Flow_{AC}$ = 148.0 ±98.52 ml/sec) (MFDR = 186256 ±138414 ml/sec^2), pressed (FlowAC = 92.25 ±51.25 ml/sec) (MFDR = 129458 ±95768 ml/sec^2), and breathy ($Flow_{AC}$ = 197.21 ±131.87 ml/sec) (MFDR = 164144 ±118179 ml/sec^2)in males. Analysis of glottal area waveform from high-speed videoendoscopy revealed that flow phonation was characterized by reduced glottal gap and similar amplitude-to-length ratio, speed quotient, and relative closing velocity compared to neutral phonation in males. Similar results from inverse filtering and high-speed videoendoscopic data were also observed for flow phonation in females.

Conclusions: Flow phonation is characterized by high flow pulse amplitude and MFDR compared to neutral, pressed and breathy phonation types. The glottal area waveform parameters of flow phonation appear to be similar to neutral phonation compared to breathy and pressed phonation.

Feel it - A new perspective on the connection between body and voice

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Body perception can be the key to effortless transfer of the acquired voice function into everyday life.

Feeling yourself at first seems to be a simple affair, but it is often a big challenge in the therapy routine. Many people fail to perceive their bodies and their diverse reactions with sufficient differentiation - their brain prefers the processing of other stimuli and impulses.

The therapeutic challenge is to change habits in the use of the voice, that is ingrained motor patterns. As a result the ”neural highways”are redesigned or decoupled. This process is often very challenging and can prove lengthy and tough.

With the help of repetitive perceptual exercises in therapy, the importance of certain sensory information to the brain can be increased and anchored with a higher priority. Conscious perceptions are thus automated. The patient no longer needs to make an active effort to apply certain strategies to his voice. This is no longer just about establishing a new habit against an old one. Rather, the patient is provided with an ”automated scanner” that signals when unfavorable habits are active and, in turn, requires reversion to the improved voice image. A light, self-directed learning becomes possible and thus a more effortless transfer of a physiological voice function into everyday life.

In the workshop, perceptual exercises and anchor strategies are presented, tried and given space for exchange of experience.

New media - new vocal challenges

Hanne Smith Pedersen

University of Copenhagen, JYLLINGE, Denmark

Communicative voice
As technology has made it easier to record, edit and broadcast the spoken word, we have been given a variety of new options for producing podcasts, audiobooks, speaks for videos, e-learning and news. How do we assist more and less trained voices in overcoming challenges to adapt to genre, situation, and the recipients' expectations? What are the different criterias for a successful vocal communication? How can we help others perform with authenticity, personality and credibility in shaping the oral language for the actual media? In a rhetorical perspective the concern for voice work is divided into partly an analytical tool, reflecting on perception and influence in oral communication, and partly a practical tool enabling you to use and teach vocal communication optimally on the pulpit, in presentations or when reading, speaking texts or podcasts.

Vocal and paraverbal workshop
In this workshop we will be analysing sound samples from areas, in which communication relies solely on the voice, e.g. e-learning, podcasts, audio books, radio advertising, audio guides and news reading. We will listen to vocal examples, hence conveying how different voice qualities and paraverbal techniques are suitable in specific genres and situations.

We will also work with practical text presentations, e.g. speak for an audio guide at a museum, news broadcast, or a commercial on the radio. We will discuss the rhetorical perspectives of how vocal success is achieved differently in each situation:

What do you want to achieve with the communication?

Which requirements and options are available for the voice?

Which paraverbal signals would you emphasise? Why these?

How would you approach the task yourself? Try it!

How would you advise someone else to approach the task?

Risk factors for voice disorders among Fado singers

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Introduction: Fado is an urban Portuguese musical style with deep roots in popular culture. The previously found data on the prevalence of self-reported voice disorders, types of laryngeal alterations, voice parameters near the pathological threshold, among other hazard factors, makes us believe that *Fado* singers may have an increased risk of developing voice disorders.

Aim: To determine the risk factors for the development of voice disorders among *Fado* singers.

Methods: A cross-sectional study was conducted through the administration of a questionnaire containing questions related o voice disorders in singers. The relation of personal and social data, musical background, performance demands and habits, vocal health and well-being, and the strategies to overcome voice problems are reported here. Beyond a comprehensive characterization, odds ratios (OR) and their 95% confidence intervals (CI) for the association with voice disorders were calculated through univariate and multivariate logistic regression analysis.

Results: Significant risk factors for voice disorders were found: nose related disorders, decongestants or antihistamines (OR=5.5; 95%CI:1.581-20.8); oral contraceptive or hormone replacement therapy (OR=4.9; 95%CI:1.2-20.3); previous smoking habits (OR=4.0; 95%CI:1.5-10.5); and vocal fatigue after performances (OR=2.9; 95%CI:1.2-7.1).

Conclusion: This activity significantly increased the risk of developing voice disorders. Some predictable factors – mentioned later – commonly associated with folk music and active untrained singers were not identified here. The evidence from this study and the relative low prevalence of self-reported voice disorders suggest that these singers may develop a kind of protective combination of factors beyond the scope of this research.

Laryngeal EMG

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Laryngeal electromyography (LEMG) evaluates the integrity of the neuromuscular system of the larynx. The LEMG can either be performed by an endolaryngeal or transcutaneous approach in order to record action potentials, generated by the laryngeal muscles, during voluntary and involuntary activity. The LEMG signals are particularly useful for differentiation between neuromuscular disorders, paralysis, paresis or ancylosis as possible etiologies of vocal fold movement disorders. The authors will give an introduction into LEMG investigation (approaches, LEMG needle, techniques) and signal interpretation (qualitative and quantitative LEMG interpretation).

Voice changes in patients with Laryngeal Intraepithelial Neoplasia and Non-Neoplastic Leukoplakia following implementation of a common national treatment strategy for small glottic cancers and Laryngeal Intraepithelial Neoplasia

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Introduction: Small glottic cancers (T1a), Laryngeal Intraepithelial Neoplasia (LIN) and Non-Neoplastic Leukoplakias (NNL) cannot be distinguished from each other with certainty before surgery. Therefore, the three categories are treated in the same way, using a one-stage surgical procedure based on hydrodissection, cordectomy type I – III and transoral CO2 laser-

microsurgery (TLM), according to a Danish national treatment strategy, initiated Sept. 2012. However, it is unclear to what extent the surgery may damage the vocal folds and voice, a consequence which is especially important for the NNL patients, who perhaps could have been treated with a more limited approach.

The aim was to measure voice changes induced by TLM hydrodissection and cordectomy in patients with LIN and NNL and subsequently use this information for adjustment of treatment intensity and preoperative patient information.

Methods: NNL and LIN patients were included consecutively from the five Danish national hospitals in the years 2012-2018. Voices were compared before and after surgery (6 months and three years postoperatively). Assessment included voice range profiles, speech range profiles, phonation quotients, self-evaluated voice handicap, and voice quality analyzed by auditive perceptual rating, and acoustic cepstral analysis.

Results: National data are presented from on voice changes after transoral CO2 laser-microsurgery, including perceptual data of voice quality.

Discussion: Implications for the current clinical practice, and future clinical recommendations are discussed.

Can experts hear physiology behind vocal sounds? - Formalising the language on cross-cultural vocal production

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The aim of the study was to formalise the vocabulary about vocal production in singing to build computational models – to teach computers to automatically distinguish between various kinds of vocal production. An ontology of vocal production was compiled based on vocal source physics [Sundberg 1987], vocal physiology [Estill et al 2005, Hirano 1981, Harris et al. 1988, Kayes 2013] and vocal registration debate [Henrich 2006, Roubeau et al. 2009, Kob et al. 2011]. Expert knowledge elicitation was employed to produce annotations for ontological terms for a set of culturally diverse recordings of singing.

13 experts (larynx surgeons, phoniators, singing teachers, voice scientists) analysed vocal physiology in 19 samples of audio recordings of singing from a range of musical cultures. Semi-structured interviews were conducted in which the participants used our ontological terms for the analysis, reflected on their appropriateness, completeness, pointed out possible difficulties and contradictions and suggested improvements.

Quantitative analysis, employing Krippendoff's alpha [Krippendorff 2012], established a tendency to agreement between experts' ratings for only two out of 11 ontological descriptors (or 17 dimensions). Qualitative analysis of 33 hours of interviews was conducted to extract common themes and confounding issues pointing to the reasons for disagreement [Proutskova 2018].

We conclude that, when limited to auditorily-perceptual analysis, experts do not agree about vocal physiology they hear. This finding confirms that absence of commonly understood vocabulary about vocal production is a reflection of a true knowledge gap about the phenomenon. It also follows that expert annotations cannot be used as ground truth for computational models of vocal production in singing.

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The Science and Practice of LSVT LOUD

Lorraine Ramig

LSVT Global, NEW YORK, United States of America

As many as 89% of the seven million individuals with Parkinson's disease globally have a speech or voice disorder that can limit functional communication and diminish quality of life. Historically, these disorders have been generally unresponsive to medical or traditional speech treatments. Development and research on the Lee Silverman Voice Treatment (LSVT LOUD®) has generated the first data from three randomized controlled trials (RCTs) supporting short and long-term treatment efficacy. Today, this treatment is being delivered by over 10,000 LSVT clinicians in 70 countries. This presentation will summarize the treatment rationale, physiological and neural mechanisms underlying treatment outcomes, the impact on functional activities, distributed effects to other systems including facial expression and swallowing. Implementation into real world clinical practice globally will be discussed as well as LOUD for LIFE follow-up groups. Data on application of LSVT LOUD to other neurological disorders (e.g., ataxia, multiple sclerosis, stroke) and pediatric disorders (e.g., cerebral palsy and Down syndrome) will be presented. Technology-supported treatment delivery (telepractice and assistive-technology) will be discussed. Application of treatment principles to physical and occupational therapy (LSVT BIG) will be presented. Ongoing and future research directions will be discussed. Funded in part by NIH-NIDCD R01 DC01150 and LSVT Global, Inc.

An Assessment Tool for Childhood Dysphonia

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The "*Skema til udredning af dysfoni hos børn (STUAD-B)*" was developed in 2016, after identifying a need for an easy-to-use assessment tool for children with dysphonia in Denmark.

We had two main ambitions for creating this assessment tool:

That the assessment-tool should be child–friendly, easy to use, and be applicable to the Danish childhood SLP practice, where it was to be used.

That the tool would contribute to a common and uniform practice when assessing childhood dysphonia in Denmark.

To accommodate our first goal, we have put a lot of thought into the layout and easy noting during the assessment and also included lists concerning vocal care and acid reflux care within the assessment tool, to make the transition into this guidance as easy as possible. We have also created visual cues for assessing the child's vocal abilities, to help support the child's participation during the assessment process and to make it more fun!

To accommodate the second ambition, we have built this assessment tool for children upon the acknowledged Danish assessment tool for adults with dysphonia. The "*Skema til udredning af dysfoni (STUAD)*". The two tools have the same general elements (history, vocal function and auditory analysis) and use the same terms to describe the voice and vocal functions. These terms are the general terms used when teaching SLP students in Denmark.

The *STUAD-B* is a nonprofitable project, that was released to the general SLP community in Denmark as well as donated to FUA (an organization for university level SLPs in Denmark), where it currently is available for free download for members and 50 kr. for nonmembers.

Within the past years the *STUAD-B* has spread out across Denmark and is now an integrated part of many SLPs' practice concerning childhood dysphonia.

During this talk the participants will get a presentation of the assessment tool and the thoughts behind it, including the images created to assess the child's vocal functions.

Modified GRBAS scale: a comprehensive perceptual evaluation of dysphonia

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Investigation's objective: Perceptual evaluation of dysphonia (PED) is one of the basic investigations for the assessment of dysphonia. The most commonly used methods for this examination are the GRBAS Scale, proposed by the Japanese Society of Logopedics and Phoniatrics in 1981 and adopted, in a simplified shortened version, by the European Laryngological Society (ELS) in 2001 and the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V) proposed by the American Speech-Language and Hearing association (ASHA) in 2002. In the same year (2002) the Italian Society of Phoniatrics and Logopedics (SIFEL) introduced a Protocol for the assessment of dysphonia that follows the ELS guidelines.

Method: The SIFEL Protocol includes the PED according to the GRBAS Scale, with the parameter "Instability" ("I") proposed and added by Dejonckere in 1996 and other perceptual parameters similar to those contained in the CAPE-V. In this "Modified GRBAS Scale" the parameters "Instability", "Pitch" and "Loudness" are rated as the other parameters of the GRBAS Scale on a 4 point severity scale (0 Normal, 1 Mild alteration, 2 Moderate alteration, 3 Severe alteration) and not on an analog scale as in the CAPE-V. In this way the investigation can be performed by two examiners (usually one phoniatrician and one speech pathologist) who jointly and independently rate the various perceptual parameters, followed by a discussion with each other and then coming to a consensus on the degree of deviation to assign to each perceptual parameter. This leads to improving the clinical relevance of this subjective investigation.

The "Modified GRBAS Scale" also includes the evaluation of other useful perceptual parameters: the "Vocal Onset", the "Vocal Register", the " Voice Resonance", the "Vocalic Articulation" and the "Fluency of Phonation". We propose a more detailed version of the Modified GRBAS Scale, in which the various perceptual parameters are described in a clear and applicable way

Results: The "Modified GRBAS Scale" has been used in Italy for more than 15 years in daily phoniatric clinical practice and we consider that it contains all the basic parameters for a comprehensive PED.

Conclusion: The "Modified GRBAS Scale" allows a comprehensive but easy and fast PED.

The Grieving Singer: When Psycho-Emotional States Set the Stage for Medical Issues of the Voice

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Voice scientists and pedagogues acknowledge that singers facing medical issues with their voice can experience psycho-emotional side effects; but what happens when a singer's psycho-emotional state leads to medical issues of the voice? Specifically, what type of physical side effects might be expected during the grieving process? Could voice practitioners use current research to anticipate how certain psycho-emotional stressors impact the voice? How could anticipating such impacts allow voice practitioners to individualize treatment for grieving singers?

Research into *somatic grief* – i.e. the physical manifestation of psycho-emotional grief – has identified physical symptoms that are likely to occur in grieving individuals across the general population. By analyzing the literature for standard somatic grief symptoms and considering these symptoms through the lens of singing physiology, this session suggests that grief affects the singer's body in profound yet foreseeable ways. This session includes the results of a survey of seventeen singers who have experienced grief regarding their perceptions of how grief affected their singing physiology.

In this interactive workshop, attendees will: review potential medical implications of grief on the voice; identify ways to incorporate grief awareness into their professional practice; and experiment with strategies for addressing the topic of grief with clients.

Building and Maintaining Vocal Technique: understanding and creating vocal exercises with the use of the innate resonatory properties of vowels

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Vocal exercises are at the core of our daily work as singers, voice teachers or choral conductors. In the experience of the authors, as teachers of voice and vocal pedagogy in an University setting, exercises are often used without a deep understanding of how they work and what they should be used for. Teachers must design exercises for the individual needs of their students and connect them to the repertoire.

Our objective is to fill the existing gap between readily available knowledge and practical application of said knowledge. We also advocate learning from tradition and imitation, yet we want to promote the use of recent research. We want to help create independent, selfassured vocalists and teachers, who have a full understanding of the reasons for using specific vocal exercises.

Our research method is based on previous studies by Dr. Bozeman, Dr. Sundberg, Dr. Leborgne and Dr. Rosenberg, among others. Beside comparing the available literature, we will incorporate practice from our daily pedagogical work which includes more than forty years combined experience in the United States, Brazil, Germany and Austria.

Our results will offer a practical basic, yet informed, approach on how to use this knowledge in our daily routines as singers and teachers. We will give an overview of relevant knowledge about the innate properties of vowels, referring to relevant literature of the field. We want to make aware of the available scientific findings to support and explain elements we know from our tradition in voice pedagogy in building and preparing young college level voices to sing the classical repertoire. To fill the gap between knowledge and practical use, we will offer examples for different often occurring vocal difficulties related to poor undestanding of exercises objectives, and how to approach them in a structured way using the knowledge we provided earlier.

We conclude that it is of great importance to build a bridge between tradition and science and to implement it into modern voice training. With our poster we hope to add relevant information and guidelines on the daily preparation of voice students.

Objective measurement of voice changes in healthy adults over 50

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Purpose: Our voice changes as we age, but the nature and size of these changes after the 5th decade of life isn't well understood.

Aim: To describe and compare the voice acoustic parameters of healthy adult voices over 50 years old.

Methods: One hundred and fifty one healthy participants (69 males and 82 females, between 50 and 92 years old) speech productions of sustained vowels /a/, reading passage and sentences were acoustically analysed to assess voice parameters perturbations. Participants were stratified by sex and age (decade).

Results: Results: Adults over 80 year old had higher spectral noise and amplitude perturbation compared to adults bellow this age. 60-69 year olds presented with higher frequency perturbation measures than 50-59 year olds. When accounting for sex, males aged 50-59 had higher amplitude and frequency perturbation compared to females, such as ShdB (shimmer

in decibel), Shimmer percent, APQ (Amplitude perturbation quotient) and sAPQ (smoothed amplitude perturbation quotient). Higher frequency and amplitude tremor index (FTRI, ATRI) were observed in males 60-69 year olds compared to females at the same age. Older females (80+) presented with a larger values of amplitude perturbation parameters (APQ, sAPQ, vAm, shimmerapq11) compared to males.

Conclusion: Changes in voice are often considered inevitable sequalae of aging. Here we objectively describe rate of decline in voice function as a function of aging and discuss the impact on their quality of life.

How does our voice change as we age? A systematic review and meta-analysis of vocal function of healthy adults over 50 years of age

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Purpose: Approximately 30% of adults over the age of 50 present with voice impairment. How those deficits manifest is not well understood. In addition to disease or disorder, subtle and/or noticeable voice variations can arise from age related physiological changes. Here we review and synthesize data on vocal function of healthy adults over 50 years of age.

Method: Literature were systematically searched. 746 abstracts were reviewed; 47 studies were included in the review. A meta-analysis of included studies compared voice acoustic parameters between a) males and females b) age groups (by decade), and c) sex when stratified for age. 16 acoustic parameters collected from 1,475 participants were analyzed in the meta-analysis. d) males and females with same acoustic analysis software.

Results: Perceptually, older individuals received higher overall scores of dysphonia as well as higher scores of roughness, breathiness, strain and instability. Acoustically, males have significantly higher measures of perturbation including noise-to-harmonic ratio and absolute jitter. Participants aged 80-89 years produce significantly higher *f*0, jitter percent (Jitter%), shimmer percent (shimmer%) and shimmer in decibels (ShdB) compared to participants aged 60-69 years and a significant increase in relative average perturbation, Jitter% and ShdB compared to participants aged 70-79 years. Limited data were available comparing acoustic measures using the same acoustic software.

Conclusions: Findings indicate that variations in fundamental frequency and frequency and amplitude perturbation increase as healthy adults age. It was difficult to draw definitive conclusions based on existing literature due to variability in hardware used, limited descriptions of study cohorts, or missing data from statistical analysis.

Auditory-perceptual measurement of voice changes in healthy adults over 50

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Purpose: The normal aging process is associated with voice changes and can vary in severity and time of onset. Common perceptual characteristics of an older speaker include roughness, breathiness, strain and instability as a consequence of age-related physiological changes. There is a paucity of data relating to age-related voice changes in an older adult population (> 50 years old).

Aim: To profile auditory-perceptual parameters of voice in healthy adults over 50 years old.

Methods: The auditory production of one hundred and fifty-one healthy participants (69 males and 82 females, between 50 and 92 years old) was scored by two expert listeners using an auditory-perceptual analog scale. Scoring was conducted on productions of sustained vowel /a/ and spontaneous speech. Both age (grouped by decade) and sex were investigated.

Results: Voices over 80 years old had higher breathiness, strain, tremor, asthenia, and diplophonia. Males presented with higher roughness than females. When by sex, females over 60 years old had higher dysphonia overall and roughness, while females over 80 years old presented with higher roughness, breathiness, strain, tremor, fry, asthenia and diplophonia.

Conclusion: Advanced age is associated with voice issues. Auditory-perceptual measurement maybe useful in early detection of vocal-disorders, leading to tailored therapy.

The complex relationship of the Anaesthesiologist and the Surgeon in the Artistic Voice patient

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MIcrolaryngoscopy under a general anaesthetic in patients with artistic voice problems requiring surgery requires the harmony of Surgeon and Anaesthesiologist. Patient safety is paramount. However, the two specialties have differing requirements and as such have the potential to be at odds with one another. For the Surgeon, key requirements include excellent visualisation, an immobile larynx, a Laser- safe field, For the Anesthesiologist, the patient's vital signs must be available at all times, with access to constant O2 and CO2 readings. Airway protection and control is uppermost in his/her consideration. This paper reviews methodologies available to the Anesthesiologist, with pros and cons from the standpoint of the Laryngologist.

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Vocal tract assessment: a hands-on approach

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The purpose of this workshop is to evaluate aspects which are often considered outside the domain of traditional voice assessment. Specifically, we will conduct a hands-on vocal tract evaluation with an emphasis on tongue function examination. Such disorders as improper tongue motility or non-normative tongue tension may not only change the vowel formants but also may have a harmful effect on other parts of the vocal tract (e.g. soft palate, suprahyoids or pharyngeal sphincters).

The attendees will gain practical experience in several areas such as assessing tongue tension, tongue structure, tongue root posture, tongue-palate coordination, tongue-hyoid relations and articulatory assessment of vowels. We will also pay particular attention to the mimetic muscle system as well as to the temporomandibular region.

First we will conduct a self-examination of common vocal tract disorders. Then we will cover a wide selection of case studies (audio and video recordings) and discuss them in detail. Finally, audience members will work in pairs and compare obtained results.

Effects of fundamental frequency, voice intensity, sample duration and syllable stress on Smoothed Cepstral Peak Prominence in connected speech vowels of pathological voices

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Smoothed cepstral peak prominence (CPPS) evaluates the degree of harmonic organization in an acoustic voice signal. CPPS has been described as a reliable acoustic measure of dysphonia recommended for standard voice assessment, with connected speech representing a promising context for CPPS analysis.

Objective: We aimed to evaluate the effects of fundamental frequency (F0), intensity, syllable stress (SS) and sample duration (SAD) on CPPS in vowels from connected speech of pathological voices.

Methods: We manually excised the vowel /a/ from four CAPE-V sentences of voice recordings from 27 voice disordered Portuguese speakers (16 women, 11 men) with a mean age of 47 years (*SD* 14) assessed in a Brazilian University Hospital. All sentences were recorded in a silent booth (44 KHz, 32-bit), using a headset microphone (5cm/45º distance) and the software PRAAT. Excised vowel (EV) exclusion criteria were Signal-to-Noise Ratio (SNR) below 26 dBA, SAD below 65 milliseconds (ms) without transitions and peak clipping. Acoustic analysis of the 202 selected EV was done using PRAAT. The effects of median F0 (Hz), median voice intensity (dB), SAD (ms) and SS (stressed, pre-stressed and post-stressed) on CPPS were investigated with General Linear Model, Spearman's rank correlation coefficient and Kruskall-Wallis Rank Test (significance level $p < .05$, IC= 95%).

Results: Voice intensity, F0 and SAD had significant effects on CPPS [F (1,155)= 18.3, 34.1, 5.2 respectively; $p < .05$]. We observed highly significant positive correlations for intensity, F0 and SS (r= 0.38, 0.58, 0.24 respectively, $p \leq .001$), and negative for SAD (r= -0.28, $p < .001$). Additionally, there was a highly significant negative correlation of SAD with SS (r= -0.53, $p < .001$), and significant differences between the three types of SS [H(2)= 57.1, $p < .001$].

Conclusion: In pathological voices, CPPS was significantly better in higher F0 and intensity and lower SAD. These findings may also apply in combined indices. F0, voice intensity, SS and SAD reflects speech characteristics that are influenced by language, pragmatics, and dialect. A larger clinical study should confirm how these factors may be controlled for in clinical voice diagnostics.

Can dysphonia be mimicked authentically? An acoustic and perceptual evaluation of imitated dysphonic speech samples

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The purpose of this study was to investigate whether a healthy speaker can authentically imitate dysphonia. Mimicked dysphonic speech samples were assessed acoustically and perceptually. Evaluation was based on recordings of sustained vowels and connected speech produced by a female voice therapist. The speaker first used her normal voice and then mimicked a dysphonic voice. Acoustic assessment was performed with Praat (AVQI, Jitter, Shimmer, and HNR). Perceptual assessment was conducted by five Speech Language Pathologists. After listening to the speaker's normophonic and mimicked dysphonic samples, they performed GRBAS ratings as well as authenticity and consistency ratings using a four-point scale. Results showed a moderate to severe degree of voice impairment for the mimicked dysphonic voice, with an AVQI score of 6.8. The mimicked dysphonic voice was predominantly perceived as rough (Median = 3) and asthenic (Median = 3). Authenticity and consistency were rated as acceptable and high respectively. This indicates that the speaker's imitation of dysphonic voice was realistic and that she successfully maintained the same voice quality throughout the recording. Regarding the applications, we argue that imitation of dysphonic voice performed by a voice expert may be a useful method for investigating the effects of dysphonic voice on listeners' spoken language processing. Speech samples validated in this study shall be used for future listening experiments and may improve our understanding of how speakers' voice quality affects the listening experience.

The Dialect Project: Developing a specific method in Danish dialect acquisition for actors.

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The objective of this project was to produce a specific method for Danish actors to acquire any given Danish dialect, for use in character development on stage and in film, which Danish speech- and voice teachers can use when teaching actors, with the end goal of the student being self efficient in dialect acquisition, without voice strain and with credibility. The project was funded by the Artistic Research Project program of The Danish National School of Performing Arts (DDSKS). I used questionnaires to assess how dialect acquisition is currently taught. I then set up three laboratory workshops with acting students from DDSKS, testing methods and frameworks for the sequence of speech and voice exercises, and level of auditory training. I continuously adjusted the methods and framework to the results of the questionnaires, and with logbook and video material from the previous workshop. I further tested the results on a group of students, with an external voice teacher applying the method, subsequently evaluating and adjusting the method for efficiency. During the lab-workshop evaluation stage I realised that scriptwriters can also benefit from parts of this framework, so I also ran and evaluated a lab-workshop with scriptwriters. I developed the final product of the project into what I call the 5+5-method, that is five stages (Self-analysis, Source analysis, Full Immersion, Flexibility & Language-mask, The 60/40 % principle) and five tools (Intonation notation, Individual phonetic transcription, The parrot, Parody sentence, Muscular mask). Through the developing of the project it became clear to me that the lack of source-recordings of modern dialects is a challenge. The specific method and framework are effective and usable, but reveal a strong need for accessible source-recordings. This led to the ”Dialect Resource Recording Project”, in collaboration with actor Ulla Vejby, and to the development of a ”Dialect Bank for Actors and Scriptwriters”, expected ready in 2021.The following people contributed to the project: consultant actor Ulla Vejby, peer advisors Dorte Koch and Lene Kleinschmidt, and additional language consultants Michael Ejstrup and Marie Maegaard (Dialekt, KU).

Surface electrostimulation in patients with unilateral vocal fold paralysis

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Background: unilateral vocal fold paralysis (UVFP) generally stems from a dysfunction of the recurrent laryngeal or vagus nerve, and is characterized by breathy, hoarse voice, swallowing problems, increased cough reflex, and the sensation of shortness of breath. In the last decades, electrical stimulation has been investigated as potential, non-invasive treatment for this disease

Aim: this study evaluates the effectiveness of bilateral surface electrostimulation in restoring the medialization of the ailing vocal fold and improving phonation

Methods: 27 patients have been so far included in our monocentric study at the Dept. of Otorhinolaryngology of the Medical University of Vienna. UVFP duration varies from less than 1 month to more than 1 year. Voice quality before stimulation is evaluated by means of voice range profile and questionnaires. The patients undergo a session of electrostimulation in which different amperage [0.1-20 mA], and pulse durations [1-500 ms] are combined keeping constant the frequency [1 Hz], and the waveform [triangular]. The effects of stimulation on VF medialization are observed via videolaryngoscope. Adverse events such as swallowing, M. platysma activation, coughing are recorded

Results: the current data evaluation on 20/27 patients confirmed the highly negative impact of UVFP onset on the patient’s voice quality and social interactions. In 17/20 patients the stimulation causes at least a partial medialization of the ailing VF. The amplitude required to obtain such medialization with the VF at rest was significantly lower than that required to obtain the same effect during phonation. The threshold amperage required to observe the VF response at rest or during phonation increases in patient suffering from UVFP for more than one month compared with patients suffering from UVFP for a shorter time than that.

Conclusion: our preliminary results support the use of surface neck electrostimulation for the control of UVFP symptoms. Evaluation of these expected training effects should provide the first evidence on the clinically relevant effect of this new approach.

Do you speak Podcast?

Thea Sejr

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In literary criticism ”the implied author” describes the story’s authorial author who is different from the narrator as well as the actual author (Booth). It is a construction or image created as a product of the communication proces. Similarly a podcaster creates a persona shaped by and serving the subject/ text (its genre, mood, intended listener etc.), and this persona is different from the actual speaker. The persona is a version of the speaker but rarely completely identical to the private speaker.

New podcasts are born and published every day but only the best survive. Their popularity is largely defined by the podcaster’s voice and her ability to demonstrate presence, engagement and relation to the subject as well as the listener. A good podcaster knows how to vary her voice and make the subject come alive. Just as most of us would rather listen to a good speaker talking about a random subject than an interesting subject communicated by a monotonous and unengaged speaker.

As a rhetoric voice coach I regularly work with speakers at Discovery and the Danish National Broadcast Company, DR, as well as podcasters working to communicate the UN sustainable development goals. This workshop will draw on experience from this work and focus on how to create a speaker persona in the proces of making a text come alive. The adapted tools are mainly the five oral components: pace, dynamic, pitch, pronunciation and sound.

These five components are thoroughly described by the founder of Rhetoric at University of Copenhagen, Jørgen Fafner. He used these to work with the rhetorical voice, intentionality and the text’s inherent orality; his idea that written texts mirror speech and therefore only reveal their true meaning when they are read out loud. In this workshop we will work on communicating texts of different genres by varying the voice in accordance with the text’s inherent orality and the desired podcast persona.

Booth, W. (1961): The Rhetoric of Fiction. University of Chicago Press.
Fafner, J. (1977): Retorik. Klassisk og moderne. Akademisk Forlag.

Human Voice is Modulated by Hypoglycemia and Hyperglycemia in Type 1 Diabetes

Ewelina Sielska-Badurek, Leszek Czupryniak, Agnieszka Niebisz, Maria Sobol, Magdalena Kmiecik, Katarzyna Jedra, Elektra Szymanska-Garbacz, Kazimierz Niemczyk

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Anecdotal evidence suggests that high pitched voice may be a clinical symptom of hypoglycemia. We conducted a pioneer study aiming at assessing voice acoustic analysis during hypoglycemia and hyperglycemia. We recruited 10 non-smoking individuals with type 1 diabetes (4 women, 6 men; mean [±SD] age 40.2±10.4 years, diabetes duration 21.4±9.9 years, HbA1c 8.0±1.8%) who were using real time continuous glucose monitoring system (rt-CGM, Guardian Connect, Medtronic) for mean 5.2±0.6 days in controlled hospital setting. At regular intervals during normoglycemia and additionally at blood glucose <70 mg="" dl="" or="">200 mg/dl each patient was instructed to record with a professional voice recorder (LS-14, Olympus) a standardized sentence and the sound of vowel ‘a’ for 3 seconds. The voice samples (n=177) were analyzed against CGMS data with the DiagnoScope software (DiagNova, Wroclaw, Poland). Number of fundamental PERiods (PER), time of fundamental PERiods (PERTime), fundamental frequency (F0), energy (E), amplitude of fundamental frequency (AF0), indicator of voiced/phonation probability (Voiced), simple voice quality (SimpleQ), relative average perturbation (RAP), shimmer (Shimm), amplitude perturbation quotient (APQ), four formant frequencies (F1-F4), harmonic perturbation quotients (HPQ), residual to harmonic ratio (R2H), unharmonic to harmonic ratios (U2H), subharmonic to harmonic ratio (S2H), noise to harmonics ratio (NHR), 1st to 4th harmonic to all energy ratio (Fx1-Fx4) were analyzed. In women during hypoglycemia E, AF0, Voiced, F1, F4, R2H, Fx3, Fx4, while in hyperglycemia - RAP and F2 were significantly altered when compared to normoglycemia. In men in hypoglycemia the differences were found in PER, PERTime, Voiced, SimpleQ, Shimm, APQ, F2, U2H, S2H, Fx2, NHR, while in hyperglycemia - PERTime, F1, HPQ, U2H, Fx2 (all $p<0.05$). We report for the first time that hypoglycemia and hyperglycemia modulate human voice. This phenomenon may offer potential for early detection and prevention of hypoglycemia.

Contemporary Commercial Music singing students - voice quality and vocal function at the beginning of singing training

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Objective: The purpose of this study was to assess the voice quality and the vocal tract function in popular singing students at the beginning of their singing training at the High School of Music.

Methods: The study consisted of 45 popular singing students (35 females and 10 males, mean age: 19.9±2.8 years). They were assessed in the first two months of their four years singing training at the High School of Music, between 2013 and 2016.Voice quality and vocal tract function was evaluated with videolaryngostroboscopy, palpation of the vocal tract structures, perceptual speaking and singing voice assessment, acoustic analysis, maximal phonation time the Voice handicap index (VHI) and the Singing voice handicap index (SVHI).

Results: 22% of Contemporary Commercial Music singing students begun their education in the High School with vocal nodules. Palpation of the vocal tract structure showed in 50% correct motions and tension in speaking and in 39.3% in singing.Perceptual voice assessment showed in 80% proper speaking voice quality and in 82.4% proper singing voice quality. The mean vocal F0 while speaking in females was 214 Hz and in males – 116 Hz. DSI was at the level of 2 and maximum phonation time – 17.7 sec. The VHI and the SVHI remained within the normal range: 7.5 and 19, respectively. Perceptual singing voice assessment correlated with the SVHI (p=0.006).

Conclusions: Weneed to spread the education on CCM singing voice in the population to argue for the health of popular singing production.

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The cross-training that crosses borders: voice pedagogy for Latin-American styles

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Nowadays, with the increasing acceptance of non-classical (or CCM, commercial contemporary music) voice pedagogy in music schools and colleges, it is the right time to find interesting options to the most taught CCM genres (musical theater, pop and jazz). The objective of this workshop is to show the rich variety of Latin-American vocal styles, also bringing exercises and vocalizes to help the pedagogue to overcome the resistance that many unknown commercial urban genres face from outsiders (language, unfamiliar rhythms) and insiders (the belief by local musicians that an outsider is not capable of grasping the ”feeling”

Initially, we will focus on listening and discussing a few seminal examples of some important Latin-American genres, including, but not restricted to, *bossa nova*, *MPB*, and *tango*. Afterwards, there will be a focus on exercises and practical tips on how to approach a CCM repertoire that is a. not in English, and b. outside the borders of the regular American/ British pop and musical theater, in which the participants will vocalize and sing short phrases in Spanish and Portuguese. The methodology also includes highlighting connections between known and unknown genres, such as jazz and *bossa nova*, pop and *MPB*, romantic song and *guarania*, so we as a group can focus on the bridges and not on the differences. Specificities in style will be given in tandem with technique and practical exercises. This workshop will show voice teachers and singers the possibilities of Latin-American vocal styles in the classroom, and the immensity of an underexplored repertoire in this vast and musical region.

The concepts of ”hybridity,” used by Garcia Canclini, ”hybrid singer,” developed by LeBorgne and Rosenberg, and ”cross-training,” matured by Saunders-Barton and Spivey, are used in this workshop as the philosophical and technical basis for what kind of adjustments a singer needs to learn to prepare to interpret different styles. They are complemented by this author’s last five years teaching cross-training to students from all over Latin America.

National Quality Register in healthcare for the transgender population in Sweden

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In 2013 planning of a National Quality Register for transgender patients started in Sweden. A multiprofessional steering group, including a patient representative, has worked to develop an infrastructure for data collection. Data includes information about waiting time, assessments, outcomes and complications after different gender-confirming treatments, and lifelong follow-up regarding quality of life. The speech language pathologists (SLP) were the first professional group that started to register data during 2017. Till now, approximately 400 registrations from six SLP-units at University hospitals have been made. The purpose of the present paper is to give overall information about data registered from patients assigned male at birth (AMAB) and those assigned female at birth (AFAB).

Data was collected at the first visit to the SLP, after voice therapy, and at follow-up for patients AMAB and before and during hormonal treatment with testosterone up to 12 months for patients AFAB. Information about the gender incongruence diagnoses, hormonal treatment, background factors relevant for voice use e.g., employment, vocal loading, hearing and previous voice training were registered. Furthermore information about recording routines in the voice clinics, and computer programs used for acoustic analyses were collected, as well as results from questionnaires and acoustic analysis.

Preliminary results show a large variation from 1 to 10 months regarding waiting time from referral from the psychiatrist to the first SLP-visit. A majority of the patients were diagnosed with Transsexualism (F64.0) according to ICD-10, others with ”Other gender identity disorder” (F64.8) or ”Gender identity disorders, unspecified” (F64.9). A majority of the patients were recorded in a sound treated booth. Less than half of the patients AMAB had filled in the Transsexual Voice Questionnaire^{MtF} with an average score of 71 at the first visit. Mean fundamental frequency (Mf_o) in habitual voice was 132 Hz (f_o-mode 126 Hz) for patients AMAB and 176 Hz (f_o-mode 167 Hz) for the patient group AFAB at the first visit.

In conclusion: The national quality register will be a valuable source of information for acoustic data and patient reported outcome measures before and after interventions such as voice therapy, pitch-raising surgery, and hormonal treatment.

Phonatory airflow and voice source properties

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Subglottal pressure and glottal adduction are the important physiological control parameters of the voice source, which is crucial to vocal health. It can be analysed in terms of flow glottogram, that show glottal airflow versus time. The study aims at presenting measurements that shed more light on the relationship between phonation type and the waveform and acoustic spectrum of the voice source. - Male subjects with trained voices produced samples of different types of phonation, ranging from hypo- to hyperfunctional, with systematically varied subglottal pressure. Using the custom-made Sopran software (Svante Granqvist) for inverse filtering the audio signal, the voice source is analysed in terms of flow glottograms. The amplitude of the voice source fundamental and the slope of the voice source spectrum are analysed as function of subglottal pressure. Preliminary results suggest that amplitude of the voice source fundamental is strongly correlated with the peak-to-peak amplitude of the flow pulse while the slope of the voice source spectrum is associated with the maximum flow declination rate, i.e., the amplitude of the negative peak of the derivative of the flow glottogram. - The total airflow depends on the peak-to-peak amplitude of the flow pulse, which increases with subglottal pressure and decreases with increases of glottal adduction. Hence, for a given subglottal pressure, airflow can function as a feedback of glottal adduction and type of phonation. This suggests that the use of vocal exercises with lip and tongue tip vibration aim at promoting decrease of glottal adduction and thus reduction of phonatory pressedness.

Resptrack. A System for Real-Time Display of Breathing Movements

Johan Sundberg

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The Resptrack system, developed at the Department of Linguistics of the Stockholm University, uses two elastic respibands to record the cross-sectional areas of the ribcage and the abdominal wall and displays these DC signals in real-time on a computer by means of a custom-made software. It also can display the sum of these signals which reflects lung volume, provided their sensitivities have been equalized. The balance between these sensitivies can be visualised during iso-volume manoeuvres, i.e., contracting and relaxing the abdominal wall with a closed glottis and it can be adjusted by means of a knob. The system can also record and display a fourth DC track, e.g. subglottal pressure, captured in terms of oral pressure during /*p*/ occlusion. The signals can be recorded and stored in a wav file. In addition, two audio tracks can be simultaneously recorded in a separate wav file. For analysis, synchronization of the wav files is feasible by means of pulses that are recorded in both files. The system thus allows visualization of breathing behavior during phonation and is useful for increasing subjects' awareness of breathing behaviour. It will be demonstrated and participants will be offered the opportunity to try it.

From the Ground Up: Exploring and Optimizing the Elusive Foot/Voice Connection

Robert Sussuma

Vocal Learning Systems, BROOKLYN, United States of America

As singers, voice teachers and clinicians, we tend to have a more localized, symptom-based focus while working with the voice. If the tongue is tight, we release the tongue. If the shoulders are tense, we release the shoulders. If resonance is lacking, we work on resonance, etc. Usually, these interventions come from either an acoustic or muscular paradigm. However, if we begin move away from fixing symptoms, and think more globally, from the point of view of the skeleton, we might start to see that there is much more to the story.

As the bones are the foundation of our physical structure, how they are arranged in space (especially in standing), can greatly impact the tone of the muscles throughout the body. Where the bones are not well-organized, relative to each other, the system unconsciously responds by over activating the muscles to compensate and, of course, vocal use can be affected.

Take the feet, for example. Other than how the feet are generally positioned (parallel or turned in or out, or whether one foot is in front of the other, etc.), and how tight or loose they might feel, most of us tend to pay little attention to the arrangement of the bony structures of the feet themselves, their connection and orientation relative to the rest of the skeleton, and their role in vocal production.

In this workshop, Robert Sussuma (singer, voice teacher and movement educator) will guide you through a movement lesson that incorporates sound to experientially illuminate just how important the organization of the bones of the feet truly is, and how the feet can influence, quite directly, the alignment and position of both the internal and external structures of the the vocal mechanism. Exploring such concepts and principles as skeletal awareness, homologous relationships, kinetic linkage and proportionality, you will discover, first hand, how your feet and the vocal apparatus are in constant, active (and, ideally, harmonious) communication with each other.

This workshop is appropriate for beginners and advanced singers in any style, voice teachers of any tradition, and clinicians.

Evaluation of Mucosal Waves Through Sharpness of Lateral Peaks in Videokymographic Images

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Introduction: Sharpness of lateral peaks is a visually helpful clinical feature in high-speed videokymographic (VKG) images indicating vertical phase differences and mucosal waves on the vibrating vocal folds and giving insights into the health and pliability of vocal fold mucosa. Sharp lateral peaks indicate that the mucosa is pliable whereas rounded peaks indicate the mucosa is stiff. This study aims at investigating parameters that can be helpful in objectively quantifying the lateral peak sharpness from the VKG images.

Method: Forty-five clinical VKG images with different degrees of sharpness of lateral peaks were independently evaluated visually by three raters. The ratings were compared to parameters obtained by automatic image analysis of the vocal fold contours: Open Time Percentage Quotients (OTQ) and Plateau Quotients (PQ). The OTQ parameters were derived as fractions of the period during which the vocal fold displacement exceeds a predetermined percentage of the vibratory amplitude. The PQ parameters were derived similarly but as a fraction of the open phase instead of a period.

Results: The best correspondence between the visual ratings and the automatically derived quotients were found for the OTQ and PQ parameters derived at 95% and 80% of the amplitude, named OTQ95, PQ95, OTQ80 and PQ80. Their Spearman's rank correlation coefficients were in the range of 0.73 to 0.77 ($P < 0.001$) indicating strong relationships with the visual ratings. The strengths of these correlations were similar to those found from inter-rater comparisons of visual evaluations of peak sharpness.

Conclusion: The Open time percentage and Plateau quotients at 95% and 80% of the amplitude stood out as the possible candidates for capturing the sharpness of the lateral peaks with their reliability comparable to that of visual ratings. These quotients provide the means to quantify the properties of mucosal waves on the vocal folds.

T

Real-Time Visual Feedback of Vocal Fold Contact

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Objective: Phonation can be highly variable across the voice range, which poses a challenge when we try to analyze voices in a representative way. To cope with this inherent variability, we demonstrate a tool that automatically identifies different regimes of phonation.

Methods/Design: FonaDyn displays in real time how the electroglottographic (EGG) waveshape varies across the voice range. It produces colour maps over fo and SPL of the contact quotient, the contacting speed, and several other metrics. In addition, the system 'learns' and automatically categorizes incoming or recorded EGG pulses on the fly. Several modes of visual feedback of the EGG pulse shape are given, including a multicolored VRP-like plot from soft-to-loud and low-to-high. For research work, all outputs of FonaDyn can be exported to files of text tables, images or multichannel time-series. Technically, the categorization is based on data-driven statistical clustering of spectral features of every EGG cycle, normalized in both duration and amplitude.

By training FonaDyn on different signals, the user can explore the effect of arbitrary conditions on vocal fold contact; for example, changing vocal register, the acoustic load (semi-occlusion or vowel), or the volitional posturing of the larynx or of the respiratory system. The classification feature facilitates comparisons pre-post intervention or inter-subject. Also, the system tracks the instability of phonation, so as to identify phonatory incidents such as voice breaks. The software, called FonaDyn, runs on Windows, MacOS and Linux and is available for free in the public domain. The required hardware is an electroglottograph, a good microphone, a high-end audio interface, and a fast computer.

Results/Conclusions: Does it work? Please come and try it, electrodes on, and see for yourself. We are eager to discuss how this approach might be of interest to voice teachers, clinicians and scientists.

Reference: Ternström, S., Johansson, D., & Selamtzis, A. (2018). FonaDyn - A system for real-time analysis of the electroglottogram, over the voice range. SoftwareX, 7, 74–80. http://doi.org/10.1016/j.softx.2018.03.002.

Listening to the voice is essential for diagnosis!

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Hearing a voice disorder is the most valuable tool available to the laryngologist/phoniatrist/voice therapist and yet listening remains the most underutilized test in laryngology. Vocal capabilities consists of identifying the comfortable speaking pitch, maximum phonation time, highest and lowest pitch while noting the quality of voice production. Loud and soft voice production at low pitch and repeating at high pitch will elicit audible vocal cues revealing vibratory impairment, also suggesting the pitch and volume at which to record the stroboscopic examination.

Objective 1: The participant will learn how Signal and Noise are the components of sound production important to the diagnostician.

Objective 2: The participant will learn to hear and describe the sounds of the two major types of hoarseness - air leak and diplophonia.

Objective 3: The participant will learn a visual technique for diagramming vocal disorders.

Objective 4: The participant will learn techniques for eliciting hoarseness, choosing a pitch, recording and then correlating the source of the sound impairment with the stroboscopic examination.

The participant will listen to audio recordings, making a prediction about the pathology that will be visualized. The stroboscopic examination will be viewed for comparison with the prediction. By the end of the workshop, the participant should be forming a more accurate differential diagnosis after listening to an impaired voice.

Each type of vocal cord vibratory impairment generates a specific pattern on this type of vocal capabilities pattern matching elicitation - a vocal signature. For example, weakness of the vocal cords will be exacerbated at low pitch and low-volume sound production. Vocal cord swellings such as nodules, polyps and hemorrhage will most significantly impair vocal cord vibration at high pitch and low-volume.

Can Elasticity improve the voice?
The Proprioceptive Elastic Method (PROEL) for the treatment of voice disorders

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Voice is vibration and the more elastic the system is, the better the sound and the greater the projection. Do we have efficient therapies that generate elasticity? We know that it is not simply enough to tell a patient to relax or to remove the stiffness to make the system more elastic.

For 20 years we have been using a triad that helps the patient to find greater elasticity. The first pillar is to break the rigidity by taking the body to an unstable equilibrium, for example, a Tower of Pisa posture, which removes weight from the body and makes the voice fly and become lighter. However, it is necessary to create this unstable equilibrium on the vocal tract and, therefore, it is fundamental to perform proprioceptive stimulation, and especially that of the tongue.

The second pillar is suspension with elastic systems in which the body is not only weightless, but also immersed in kinetic energy: the result is that the voice is light and full of harmonics.

The third pillar is the manipulation of the laryngeal structures to break rigid muscle patterns and return to a greater lightness and agility when resetting the established rigid motor patterns.

The best way to bring the voice to maximum elasticity is by experiencing and observing the changes. The students of the workshop will experiment with these maneuvers and see, in their own voices, the changes that occur.

Although today we cannot observe molecular changes (a greater amount of elastin and other different proteins) that occur when performing these tasks, we see in our patients a better voice, a greater sense of well-being and laryngostroboscopic results showing a better mucosal wave.

Morpho-functional changes in the glottis after breathing in air with 100% humidity for 10 minutes accompanied by mucosal wave exercises

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The hydration of the glottis always produces a vocal change and a feeling of well-being in the people who experience it. It is one of the best actions for preventing voice problems and also for their treatment.

The objectives of this study have been to determine the relationship between high humidity conditions and the performance of maximal elasticity exercises both to improve the amplitude of the mucosal wave and to optimize glottal closure.

The design of the study was a randomized clinical trial of an experimental analytical character (cases and control) whose independent variables are laryngoestroboscopy, perceptual analysis of the voice (through the GIRBAS) and acoustic analysis (using MDVP). Participants included 32 subjects aged between 18 and 35 years all with an absence of vocal pathology prior to the research study.

Method and materials: These were divided into three groups: 1. Use of wet gauze to create 100% humid environment while performing maximum elasticity exercises for 10 minutes; 2. Use of maximum elasticity exercises at high volume and during the same time to create more mucosal wave; 3.A control group interacted by talking to the researcher during the same time.

Before and after the experiment, the participants were evaluated by clinical history, VHI-10, laryngostroboscopy, GIRBAS and acoustic analysis.

Results: Both experimental groups, i.e. gauze and exercises of maximum elasticity that participated in the study, obtained significant improvements in the amplitude of the mucosal wave and in the glottal closure with respect to the control group. The mucosal wave was much better and wider in most cases.

Conclusion: It is very important to hydrate the VCs while talking or doing mucosal wave exercises because the Lamina Propria becomes turgid and works much better. We believe that the most effective and fastest hydration is the one achieved by breathing through the nose for 10 minutes.

Immersion in resonance:
An unforgettable experience that generates more ecological voices.
Proprioceptive Elastic Method (PROEL) for the treatment of voice disorders

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Resonance is what gives projection, body, presence, attraction and beauty to the voice. A voice like that of Jeremy Irons, Barry White or Barack Obama always generates excitement. Resonance is a very complex reality to understand and visualize. The voice travels at a high speed of 343 meters per second (1235 km / h) in a very small cavity of 17 cm, and one which is often occluded or semi-occluded. This structure permits sound to be retained and bounce against the walls thousands of times a second, and with each crash new sounds can be formed by the interference of waves and the formation of standing waves.

A resonant voice always produces ”attraction”, which is the basis of any personal communication. How can we improve the resonance of our voice or that of our patients? We use three lines of intervention.

The first is by widening the cavities of the vocal tract and increasing their sensations. For this purpose, we use adjustable intraoral balloons (BRIO) that stimulate the cavity very effectively when speaking.

The second uses semi-occluded or completely occluded chambers through a ventilation mask. By modifying impedance, we generate new spaces in the vocal tract and adjustment on the glottic plane, improving its functioning.

The third is undertaken by reproducing sensations similar to those generated by resonance through the use of vibrating and absorbent resonance chambers . The immediate effect is a spontaneous emission of a more resonant voice. With these chambers the resonance is not only felt in the ear, but also at a multisensory level through the pressure and vibration receptors of the skin.

Experiencing resonance always enables both patient and professional to discover new formulae to be able to reach the voice’s maximum potential.

In this workshop we will experiment with the sensations of resonance and its application to changes of the voice of each one of the participants. All changes in resonance will be measured with specific software for acoustic analysis.

After personally experiencing the effects of resonance, it is very difficult not to open a research path to improve the voice or to change.

Regenerative Support in High Performance Non-Classical Singing

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CJD Schule Schlaffhorst-Andersen, HOHNHORST, Germany

In the early years of 1900 Clara Schlaffhorst (singer 1863-1945) and Hedwig Andersen (pianist 1866-1957) developed a holistic method for breath-, voice- and speech training for singers and actors. The main emphasis of this method is to restore breath- and vocal-function based on the natural muscle-rhythm: Contraction – Elongation – Looseness. The rediscovery of the organic 3-phases-rhythm of muscle activity as a basis for any muscular performance, such as singing, connects the disciplines of artistic vocal training and voice therapy. Integrating these principles enables any movement to gain more flow, strength and regeneration leading to higher performance and sustainable development. It’s the oldest method for breath-, speech- and voice education/therapy in Germany and an encompassing concept.

The workshop will give insights into the principles of the 3-Phases-Rhythm concerning breathing, singing and speaking and how each phase encloses specific qualities. Participants will understand the principles, apply them in exercises and find a transfer into singing songs. Core theme is to learn the possibilities of vocal prevention and ongoing healthy singing under high performance requirements.

Julia Toubekis-Baumgardt is a certified Breath-, Voice- and Speech-Teacher (Schlaffhorst-Andersen). Her practical focus is on healthy vocal coaching in any genre. She worked for 7 years in Rock-Pop-School Berlin (Masterclass). Since 2009 she is a conceptional teacher in the unique Schlaffhorst-Andersen School close to Hannover (www.stimmprofis.de). Performing as a singer, actress herself as well as a vocal coach she is experienced in the possible benefits of the 3-Phases-Rhythm-Work in demanding performance situations.

Sex-related differences in diaphragm and ribcage movements during phonation of professional singers - a dynamic MRI study

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Differences in the respiratory strategies during singing phonation between male and female singers were discussed for a long time. Previous studies in this field showed controversial results; however examination were technically limited to indirect measures of the breathing system. Latest advances in dynamic MRI enable the evaluation of inner respiratory movements during phonation. A pilot study in this field emphasized the difference in the inner movement of the respiratory apparatus between exhaling and phonation. In a continuation of this investigation, this study aims to differentiate sex related phonatory breathing strategies. For this purpose 10 professional singers (5 female and 5 male) were evaluated using a 1.5 T MRI system concerning their inner respiratory movements during different phonatory tasks (maximum phonation time (MPT), pitch jumps). Measurements were acquired in supine position. In a dynamic series of cross-sectional images of the thorax in two dimensions (sagittal and coronal), distances between characteristic anatomical landmarks were measured.

Results show no sex related differences concerning the movement ranges of ribcage (RC) and diaphragm (DPH) in relation to the intra individual vital capacity (VC) during MPT. Also, for pitch jumps downwards in both sex selective DPH contractions occurred. However, male singers presented a continuous movement of the RC during MPT and used approx. 90% of VC movement, while female singers hold their RC more stable especially in the beginning of phonation and used only less than 60% of their possible RC VC movement. In contrast, during phonation of pitch jumps, DPH movement range was greater in female singers compared to male.

The results of the presented study are in agreement with previous investigations that surveyed singers and found that female singers concentrated breath efforts lower in the body than did male. While many similarities in the regulation of the breathing apparatus were found, our data suggests in some extend a predominance of respiratory control which seems more RC based for male and more DPH based for female singers. Further studies with more subjects are required to underline the assumption.

The impact of voice reinforcement systems on voice intensity, fundamental frequency and phonation time in elementary school teachers

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Objectives: Vocal fatigue is a common complaint of teachers who experience extensive vocal load. Voice intensity (SPL), fundamental frequency (F_0), and phonation time (Dt) are voice parameters characterising vocal load. The study aimed to investigate the impact of voice reinforcement systems on voice parameters in elementary school teachers.

Methods: Nine female teachers (mean age 53.1 years) were invited to wear voice monitoring system Vocal Holter Med (PR.O.Voice) during the week. The voice reinforcement system (VRS) PentaClass Runa (Certes) was instaled in each classroom. Voice monitoring was provided in everyday teaching activities without the use of VRS (1-2 days) and with VRS (2-4 days). All participants underwent laryngeal examination and voice assessment (AVQI). Classrooms acoustics and ergonomics were evaluated during the study.

Results: Early stage vocal nodules were found in three teachers, AVQI > 2.99 was found in six participants. All participants reported extensive vocal load, 7 of them reported vocal fatigue. Classrooms acoustics measurements: mean volume 175 m^3, RT60 0.81 s (range 0.73-1.0), L_{Aeq} 32.8 dB (30.7-38.6), activity noise L_{AF90} 56.4 dB (41.9-99.9), mean number of pupils in classrooms 22.8 (2-29). Mean room temperature 26.4 ^{0}C, relative humidity 46.2 %RH (35.0-62.0). Wilcoxon signed-rank test showed a statistically significant decrease of mean, median, 0.05 percentile, 0.95 percentile of SPL (dB) and F_0 (Hz) in teachers during teaching activities with the use of VRS. The statistically significant impact of VRS on voicing time percentage was not observed. The statistically significant decrease of SPL by use of VRS was not observed in teachers with vocal nodules and in teachers which AVQI was higher than 2.99.

Conclusions: The voice reinforcement systems decrease voice intensity and F0 in elementary school female teachers without voice disorders and laryngeal pathology.

The study was supported by Post-doctoral Research Aid, N 1.1.1.2/16/I/001. Research project ”The long-term effects of sound amplification systems on teachers’ vocal load and comprehension of verbal instructions of children”, 1.1.1.2/VIAA/1/16/001.

U

Combination of Acoustic Voice Quality Index and Glottal Function Index for voice pathology screening

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Purpose: The aim of this study was to explore the diagnostic value of the combination of Acoustic Voice Quality Index (AVQI) and Glottal Function Index (GFI) as a screening tool for voice disorders.

Methods: A study group consisted of 183 adult individuals including 86 subjects with normal voice and 97 patients with pathological voice. Digital voice recordings were performed simultaneously with microphones of two types: an oral AKG Perception 220 and smartphone (SP) iPhone 6s. To evaluate the diagnostic accuracy differentiating normal and pathological voice, the receiver operating characteristic statistics (area under curve (AUC), positive and negative likelihood ratios (LR+ and LR-)) and correct classification rate (CCR) were used.

Results: The AVQI cut-off scores of 3.31 for oral microphone and 3.32 for SP microphone were associated with very good test accuracy (AUC=0.857 and AUC=0.818), resulting in a balance between sensitivity and specificity (70.0% vs. 86.0% and 70% vs. 87.0%). The CCR reached 78% for both types of voice recordings. The combined AVQI and GFI cut-off scores of 6.65 for oral microphone and 7.1 for SP microphone corresponded with excellent test accuracy (AUC=0.976 and AUC=0.965) and sensitivity and specificity (93.0% vs. 93.0% and 91.0% vs. 94%). Very respectable levels of LR+ and LR- both for oral microphone (13.3 and 0.08) and for SP microphone (15.6 and 0.10) voice recordings were achieved. CCR of 93% and 92% confirmed the results of ROC statistics.

Conclusions: Combination of two different information sources (i.e. acoustic analysis such as the AVQI and GFI as glottal function symptom-based questionnaire) used in this study significantly improved diagnostic accuracy in differentiating normal vs. pathological voice and could be clearly best used as indicators of dysphonia. In clinical practice, the combination of AVQI and GFI would represent a potentially valuable and robust screening tool.

V

Effect of iOS-based app support on patient adherence to voice therapy homework

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Patient adherence presents a problem in voice therapy. In order to support daily practice of resonant voice exercises between therapy sessions, an iOS app was developed in our lab. The app provides patients with reminder notifications, voice exercise examples recorded in the treatment session, and interactive cepstral peak prominence feedback. Thirty-two adults ages 18-75 participated in three weeks of voice therapy, randomized to receive either app-based homework support or tradtional written instructions. Individuals in the app group practiced signficantly more frequently each week, with large associated effect sizes (Cohen's d>1). Practice was also predicted by patients' initial self-efficacy for practice (i.e. task specific confidence) and, in the app group, by patient-perceived usaiblity of the app. Interestingly, the app did not increase self-efficacy for practice, suggesting that its support was purely behavioral in nature. Results will be discussed in relation to extant literature as well as those of an alternate study arm (N=31) that yielded different results for SOVT exercises.

Sound, Style and Voice Production

Katrien Van Opstal

Royal Conservatoire of Antwerp, NAZARETH, Belgium

Sound, Style and Voice Production - How Are We Doing This?

This workshop is based on a research that combines kinesthetic and aural perception with spectrographic analysis to investigate choices in sound in different styles of vocal jazz. The idea of looking at the voice production system as an equalizer proves to be a helpful tool to understand a sound and to choose different vocal behavior in all kind of styles.

In this workshop you learn about the ingredients of a sound: the different parts of your voice production system. You learn how to hear, feel, train and choose different setups of these ingredients like the true and false vocal folds, the larynx, the ary-epiglottic sphincter and more. You learn how to apply this insight to mix the sound you want for different styles of speaking, acting or singing. This helps you to choose and produce your desired sound in an efficient and healthy way.

About the author: Katrien Van Opstal is a graduated jazz- and popsinger and a researcher at the Royal Conservatoire of Antwerp. In 2017, she presented on PEVOC12 in Ghent her workshop "Effort or Tension" and at the Estill Euro Summit in Barcelona the first findings of her research. Since 2013, she studies Estill Voice Training with her mentor Dorte Hyldströp (Danmark). She earned the Certificate of Figure Proficiency and is on the last track of her training to become an official Estill Master Trainer. As a student she was trained in Pahn-therapy, Linklater, Liechtenberger, Alexander-technique en Complete Vocal Technique. She is the founder of "GelijkgeSTEMd" where she trains singers, actors and logopedists with her knowledge of the voice. She shares the stage with many jazz musicians from all over the world.

Improving professional confidence and practices regarding vocal assessment through a community of practice for Speech-Language Pathologists in Quebec

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Context: Whereas speech language pathologists (SLPs) working at larger voice clinics develop expertise through their work with multiple patients per day, those working in general clinics have fewer opportunities to do so. In a world where publications are ubiquitous but time for reading is limited, the question of how to optimally transfer knowledge to bring about changes towards best clinical practices is crucial. In this project, we are studying if a community of practice (CoP), aiming at the standardization of vocal assessment, can improve the clinical practices and increase levels of professional confidence in SLPs in Quebec.

Methodology: Thirty-two SLPs and future SLPs with various levels of expertise and years of clinical practice in voice therapy participate in a five-month CoP led by a voice experienced SLP assisted by two voice scientists. All members are invited to participate in six one-hour online meetings and one four-hour physical meeting. Before and after the CoP, they answer a questionnaire documenting their practices and professional confidence. Eleven core members also participate in an interview before and after the CoP. Topics related to vocal assessment are discussed during the meetings while forum discussions take place in-between.

Results and conclusion: The CoP is ongoing and will end in June 2019. Results from the pre-CoP questionnaire show that our members' mean years of experience with voice therapy is 5,65 (min:0, max:40). The most likely to be performed assessments are the auditivo-perceptual analysis, self-assessment by the patient and acoustic analysis. These assessments were also rated as most useful. Auditivo-perceptual assessment and self-assessment also obtained high levels of confidence, but confidence levels in how to obtain the acoustic and aerodynamic measures were only moderate. Overall, the members have a moderate confidence level in their abilities as voice therapists, but they have a weak sense of belonging to a professional voice community. Our pre-CoP results show that there is room for improvement both regarding best practices and professional confidence. Post-CoP results illustrating how these variables changed after the CoP will be presented at the conference alongside a qualitative content analysis of the core member interviews.

Impact of emotional intensity on vocal pitch in relation to speakers' vocal range

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Context: Emotions have an effect on our voice, but the exact nature of that effect is still little understood. Increased knowledge in how emotional states impact individual voice production could inform our understanding underlying processes in pathologies where heightened emotional sensitivity has been suggested as a causal or maintenance factor, such as in nodules for instance. Our objective is to study how inner emotional states defined according to valence (positive-negative) and intensity (high-low) impact vocalizations in adult speakers with varying emotional sensitivity.

Method: 40 adult participants (26 females, 14 males, mean age:29, min:19, max:68) answered emotional sensitivity and regulation questionnaires. Their habitual vocal range was determined through a one-minute speaking task on a neutral topic. They watched a set of 45 images of various emotional valence and intensity and had to respond vocally in order to convey their emotion after each image. They then evaluated their emotional state (valence and intensity) on visual analogue scales.

Results: Habitual and emotional vocal range were computed in semitones with each subject minimal habitual pitch as the baseline. Valence and intensity scores were transformed into ranks and split into three categories each. Repeated measures Anovas were run to determine if a) intensity levels and valence levels have an impact on the vocal range of emotional vocalizations and b) to determine if minimal and maximal pitch of emotional vocalizations differed from habitual minimal and maximal pitch. Valence was not significant but emotional intensity levels had a significant effect on a) vocal range of emotional vocalizations ($F(2,35)=7,125$; $p=0,003$). Higher emotional intensities yielded larger vocal ranges; and b)

minimal and maximal pitch distance between habitual speech and emotional vocalizations (F(2,35)=4,59; p=0,017 and F(2,35)=11,615, p<0,001 respectively). The higher the intensity level, the larger the distance between habitual and emotional minimal and maximal pitch. No significant results were found regarding participant's emotional sensitivity levels.

Conclusion: When emotions are intense, regardless of valence, speakers use a larger vocal range situated in the higher extremes of their habitual vocal range to express them. In people prone to experience strong emotions, this could result in an increased daily vocal dose.

Voice Symptoms and Stress in Teachers

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Objectives: Stress is mentioned as one of the major hazards for the voice of professional speakers such as teachers (Vilkman 2004). However, epidemiological data on this problem are scarce. We conducted a study among primary and secondary education teachers across Finland (N=1 198). The objective of this study was to evaluate the association between different voice symptoms and stress.

Methods: Voice symptoms were assessed with a seven-item voice screen (Simberg et al. 2001). The voice symptoms occurring weekly or more often in the previous 12 months were taken into account. Stress at work was measured with a validated single-item question recorded on a 5-point Likert scale (Elo et al. 2003). The response rate was 33%.

Results: The prevalence of different voice symptoms varied from 21% to 50%. The symptoms *voice becomes strained or tires, hoarseness* (defined from the symptoms *morning hoarseness* and *voice becomes low or hoarse*), and t*hroat clearing or coughing* were more likely than the symptoms voice breaks, *difficulty in being heard*, and *pain around larynx*. Rather or very much stress at work was reported by 25% of the teachers. The prevalence of each of six voice symptoms were statistically significantly higher in case of teachers having rather or very much stress. On average, the teachers with stress had three different voice symptoms when the teachers without stress had only one voice symptom.

Eighty-one percent of the teachers were female. All the six voice symptoms occurred substantially more often in the females than in the males (all p-values <0.01). Females also suffered more stress than males (p=0.0006). The females with stress had significant associations with all the voice symptoms when males with stress were associated only with the *voice becomes strained or tires* (p=0.0082). Our results confirm the earlier findings.

Conclusions. Stress may be an urgent risk of voice symptoms in teachers. It is recommended that in the occupational health care of teachers consideration should be given to the association between voice symptoms and stress, especially in female teachers. In addition, longitudinal research is needed to investigate the causality between voice symptoms and stress in teachers.

Laryngeal findings and voice analyses of the patients with voice symptoms associated to moisture damage at work

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The Investigation's Objectives: Are to describe laryngeal and voice findings of people who report voice and/or respiratory symptoms at work in buildings with moisture damage.

Method: Participants in the present study were 97 patients who were referred to specialist assessment due to respiratory and/or voice symptoms associated with moisture damage and they voluntarily participated this study (female n=80, male n=17, mean age 45,4 years, range 22-64 years). Phoniatric videolaryngostroboscopy was done and videos were analysed. Voice samples were recorded and the Acoustic Voice Quality Index 02.02 FIN (Praat) and the inverse filtering (Aparat)

analyses were executed. The patients also filled in three self-evaluation questionnaires (VAPP 18 FIN, the Newcastle Laryngeal Hypersensitivity Questionnaire and Laryngeal Reflux Symptom Score).

Results: In videolaryngostroboscopy organic laryngeal findings were found in 15.5% (15) of the participants. Many laryngeal dysfunctions were seen: Primary muscle tension dysphonia was found in 44.3% (43) of the participants, 12.4% (12) supraglottic constriction and 24.7% (24) forward pending of arytenoid corniculate cartilages during hyperventilation and one of these or any combination of them were found in 59.8% (58) of the participants. All these findings refer to the irritable larynx syndrome. 49,5% (48) of the participants had deviant AVQI 02.02 FIN.

Conclusions: The results of this study indicate that dysfunctional laryngeal reactions considered as findings of irritable larynx syndrome are common in people who report voice problems and/or respiratory symptoms at work in buildings with moisture damage. Also voice quality problems are common amongst these people. In order to make more precise conclusions we will supplement the study in future with the results of laryngeal, acoustic and self-evaluated voice findings of healthy controls with no voice and respiratory symptoms at work.

Open your mouth wider when singing louder

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Background and research question: It is well known that sopranos tend to increase their mouth opening at high pitches to tune F1 to the fundamental and thus gain in sound level. In literature, we also find suggestions to modify vocal tract shape when singing louder, regardless of pitch (Mancini 1774/1967, Appleman 1986, Brown 1996). It is not clear whether singers tend to modify the formant frequencies of their voice for louder tones at pitches where the formant tuning may not be relevant, or what the benefit of doing so might be.

Method: We asked 11 singers (5 classically trained tenors, 3 baritones and 3 basses) to sing altogether 20 versions of a melody consisting of sequential diatonic scale steps I-II-III-II-I (1) using the dynamic contours (a) *p-crescendo-f-diminuendo-p* and (b) its reverse (2) on all five basic vowels. Also (3), two tonalities were used, (a) starting from the pitch typical to the speaking voice of that person, and (b) starting a perfect fourth above that. The formants (F1, F2), their bandwidths, and several glottal parameters (CQ, NAQ, H1-H1, SQ) were measured with the help of manual inverse filtering (*Sopran 1.0.20*).

Results: F1 tended to be slightly higher and its bandwidth narrower for tones sung forte compared to piano (ANOVA for F1: $F(1, 400) = 54.6$, $p < 0.001$, $\eta 2p = 0.12$). This tendency (although fainter) was statistically significant also for F2. Some other parameters also revealed systematic differences.

The analysis by synthesis (with *Madde 3.0.0.2*) showed that such minor modifications in vocal tract resonance properties alone, without changing the voice source, allowed singers to gain several decibels in overall sound level and raise the centre of gravity of the voice spectrum, thus increasing its timbral brightness and perceived loudness in the majority of cases. No tendency of systematic formant tuning was registered.

Conclusions: Besides regulating the level of the subglottal pressure and the direct formant tuning to a partial, the slight modifications of the vocal tract resonance properties are also used by singers to shape the loudness of their voice.

W

Effects of semi-occluded vocal tract exercises on self-assessed vocal effort in voice healthy individuals

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Background: Increased vocal effort due to vocal loading is frequently reported by voice disorder patients, however measurements of vocal effort remain unconcise. Self-assessment of vocal effort is made more useful by a new version of the Borg CR-10 Scale, designed specifically for vocal effort (van Leer & van Mersbergen, 2017).

Methods: The Borg CR-10 scale was used to evaluate how Semi Occluded Vocal Tract Exercise (SOVTE) affect ratings of vocal effort in voice healthy individuals. The scale was anchored allegorically, to lifting weights at the gym. Two groups (ages 18–30) took part in vocal intervention, randomised for SOVTE (n=13) or a control group reading out loud (n=13). Both interventions were guided and short (5 min). The SOVTE protocol included pitch glides, pitch hills and a short story, read through a 10cm by 5mm open ended plastic straw. The protocol for reading out loud included reading short texts from Reader's Digest with a comfortable voice. Interventions were preceded and followed by silence periods (5 min). Vocal effort was assessed pre and post intervention as well as pre and post silence periods. Participants were presented with a vocal effort scale on a screen, making oral ratings based on scale references, where 0=no vocal effort, with steps up to 10=maximum vocal effort.

Results: Vocal effort was generally rated low throughout trials, with baseline values of 1 (very slight vocal effort) in both groups. Albeit slightly, effort ratings increased following vocal intervention in both groups. The increase within the SOVTE group, from very slight to slight vocal effort, was statistically significant (Z=-2.226, p=.026). The initial silence period did not affect vocal effort ratings in either group. The second silence period, following voice intervention, caused vocal effort ratings to drop to a statistically significant degree in both groups (Z-3.450, p<.001), SOVTE: (Z=-2.384, p=.017), Reading: (-2.555, p=.011). There were no statistically significant differences between groups.

Conclusions: 1) A short session of SOVTE may increase proprioception connected to voicing, causing the sense of vocal effort to increase. 2) Using the BORG CR-10 to track vocal effort may benefit from experience based anchors, instead of allegorical or anecdotal.

Which Sung Pitch Range is Best for Boys during Voice Change?

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The question of how and what boys should sing during adolescent voice change has challenged educators and choir leaders for the last century. The established historic and cultural practices can now be reassessed in the light of quantitative analyses of vocal function. This longitudinal case study used electroglottographic measures from two boys over a three-year period to investigate the efficiency of vocal fold adductory behaviour in both pre-change and mid-change singing. A comparison was made between the first boy who sang in his treble range up to and including Stage lll, and the second boy who sang in his new baritone range as he progressed beyond Stage ll of voice change. The observed regularity and efficiency of vocal fold adduction suggests that singing in the new baritone range enables the larynx to achieve a more healthy and efficient phonation; this is also represented in the overall perceived vocal comfort levels heard in the recordings. The implications for educators are that the longitudinal development of singing habits will be enhanced for boys who move to singing with their new baritone range as their larynx grows, rather than remaining in a treble range.

Airflow in normal subjects during resonance tube phonation in water

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Objective: The volume flow used in resonance tube phonation in water by speech language pathologists was investigated.

Method: An occluded bowl with flow resistances at the air outlet was used to determine the flow.

The functionality of the flow resistances is similar to a flow mask as the flow resistances were obtained from a such. Speech language pathologists familiar with resonance tube phonation in water were recruited as participants, and were asked to perform the exercise as they instruct it to their patients. Tube dimensions were 9 mm diameter and 27 cm length. The free end of the tube was kept 2, 4 and 6 cm below the water surface as well as without water in the bowl, and the habitual volume flow as well as oral pressure were registered. The pressure signal was also used to determine bubble patterns produced by the participants.

Results: Data collection is ongoing. Preliminary data indicate a habitual flow of approximately 0.2 L/s during normal procedure of the exercise. Bubble patterns seem to be chaotic, hence reliable data on bubble frequencies are difficult to obtain.

Conclusions: Habitual volume flow during resonance tube phonation in water using a 9 mm diameter tube seems to be in the range of airflows used during typical vowel phonation without tubes. More data and conclusions will be presented at the conference.

Z

The ribcage as 'pressure equaliser' in the singers breath support - how working with the ribcage can be the key to a more and free voice

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The body is as much the instrument as the larynx when it comes to singing. When working with singers we use a progression that takes in consideration the three main principles for a healthy and sustainable voice: **The Body Instrument, The Breath Support, and The Vocal Onset**. The principles reflects the progress and specific order between the three.

In this workshop we will focus on The Breath Support. The Breath Support understood as the balance between the inhalation muscles and the exhalation muscles. When in balance the Breath support will make an even and controlled airflow for the voice to unfold freely.

Many singers have an unbalanced Breath Support and will therefore experience challenges in adducting the vocal folds, controlling vocal volume, in having a free and wide ambitus, in keeping vocal stamina etc. When training and developing the voice we often become victims of our ears and activate compensations to help align the uneven Breath Support and create the sound we wish for. Often the jaw muscles, the infra- and/or suprahyoid muscles will be activated in trying to help balance the the Breath Support and with that not being their primary function they will not sustain the pressure and over time more problems will arise for the singer according to age, physics and stamina.

Our experience is that **far the most singers are stronger in their exhalation muscles than in their inhalation muscles.** When focusing on training, strengthening and keeping the inhalation muscles active during singing, singers experience more power, a relaxation in the compensatory tensions, a more free voice and greater voice control.

We will demonstrate simple exercises that originate in building The Body Instrument, which contains a built-in inhalation. We will look at the anatomy and work specifically with the muscles expanding the Ribcage and **demonstrate the impact The Body Instrument and The Breath Support has on the voice.**

The workshop is practice based, so please wear comfortable clothes and bring a yoga mat.

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