



PEVoC14

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14th PAN-EUROPEAN VOICE CONFERENCE BOOK OF ABSTRACTS



14th PAN-EUROPEAN VOICE CONFERENCE

Voice beyond borders

Book of Abstracts

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KEYNOTE SPEAKERS

KS01 (Fr CoH 15:00)

CLINICAL APPLICATIONS OF SPEECH TECHNOLOGY

Heidi Christensen

Department of Computer Science, University of Sheffield, SHEFFIELD, United Kingdom

As speech technologies mature and become ever more pervasive, the opportunities for real impact for people increases. This talk will outline the major areas of clinical applications of speech technology, but also draw out the inherent challenges of doing so. An overview of recent state-of-the-art research from current projects at the University of Sheffield (UK)'s Speech and Hearing (SPandH) & Healthcare will be presented. In particular, recent advances in the automatic speech recognition of dysarthric speech and the use of speech technology to detect signs of cognitive decline.

KS02 (Th CoH 14:30)

IRREGULARITIES OF VOCAL FOLD OSCILLATIONS

Matthias Echternach

Ludwig Maximilian University of Munich, Division of Phoniatrics and Pediatric Audiology, Department of Otorhinolaryngology, MUNICH, Germany

Problems concerning vocal function are often associated with irregularities of vocal fold oscillation patterns, both in physiology and pathophysiology. The presentation tries to characterize irregularities during registration events in singing and/or associated with vocal fold mass lesions using a hybrid method including high speed videolaryngoscopy. Further, possible stabilization strategies will be discussed.

KS03 (Sa CoH 9:00)

RESEARCH IN THE FIELD OF VOICE WORK AND TRAINING

Jenny Iwarsson

University of Copenhagen, COPENHAGEN, Denmark

A typical goal of voice training is that a new behavior is effectively implemented in the person's everyday life. No matter if the practice is on breath support, reduced glottal adduction, a relaxed jaw, or something else, a challenge seems to be to ensure that exercises are carried over to new vocal behaviors in spontaneous speech. If this is not achieved, we might call it 'poor compliance', with the risk of low outcome measures or patient-drop-out as a consequence. This presentation will be based on some favorite observations regarding voice work, most of them related to the treatment of functional voice disorders. We will look at findings from research in motor learning, automatization, and behavioral voice therapy to identify principles that facilitate generalization and stable long-term learning of new vocal habits.

KS04 (Th CoH 10:00)

THE NOSE: ACOUSTIC PROPERTIES AND EFFECTS ON PHONATION

Johan Sundberg

Department of Speech Music and Hearing, School of Computer Science and Communication, KTH and University College of Music Education, STOCKHOLM, Sweden

The relevance of nasal resonance is sometimes discussed among voice clinicians and singing teachers, although often leading to no conclusions. This seems to be a typical result of access to nothing but personal experience

combined with lack of objective knowledge. During the latest decades, I have had the privilege of joining forces with friends in different research areas to investigate the effects of nasal resonance. After a brief description of the nasal tract anatomy, the results of these investigations will be presented and discussed.

Two of the studies were made with singing teacher Peer Birch and his associates. In the first we documented the occurrence of a velopharyngeal opening in 18 professional opera singers by means of nasal fiberscopy. The results revealed that more than half of the singers produced the vowels /a/ and /u/ with a VPO of different shapes and widths. Perceptual evaluation revealed that a narrow VPO does not make the vowel sound nasalised. In a following study, the effects of VPO on the vocal tract sound transfer function was measured in 20 cm long cylindrical tube connected via a VPO-type hole to a 10 cm long cylindrical tube. As predicted by acoustic theory, this model acted as a shunt, producing a sharp minimum in the transfer function of the long tube.

A sequence of later studies were carried out together with phoniatician Miriam Havel, München and her associates. Here, the source transfer function of the nasal tract was measured in ex vivo as well as in 3D models of the several nasal tracts. The results showed a great individual variation of the nasal landscape and also documented acoustical effects of the maxillary and sphenoidal cavities. Further, three models of nasal tracts were connected via coupling tubes of different dimensions to 3D-models of vocal tracts of five vowels. Results showed a dip in the transfer functions at the main resonance frequency of the nasal tract. The dip grew deeper with increasing width of the coupling tube, and only wide coupling tubes produced dips caused by resonances in paranasal sinuses. Also, connecting the vocal tract to a nasal tract increased the frequency and reduced the amplitude of the first formant peak.

Filipa Lã, Madrid and Brian Gill, Bloomington IN, and I analysed the effect of a VPO on long-term-average spectra. Nine advanced singer students sang vowel sequences into a divided flow mask under three conditions; wide open, narrow and closed velopharyngeal port. Nasal and oral airflow were recorded. The results corroborated the effects observed in the model experiments; the LTAS peak of the first formant was attenuated already by a narrow VPO, thus changing the spectrum balance in favour of high frequency partials.

It is well known that phonation through a long, hardwalled tube causes strong register breaks, due to source-filter interaction. Recently Filipa Lã, Svante Granqvist, Stockholm and I joined forces in an experiment where untrained voices produced pitch glides through such tubes. The glides were produced under three conditions, (1) with the far end of the tube open with no VPO (2) with VPO and the far end of the tube open and (3) with no VPO and the far end attenuated with a piece of cotton. The cotton significantly increased the losses of acoustic energy in the tube and attenuated particularly the first resonance. The number of voice breaks was about twice as frequent under condition (1) than under conditions (2) and (3).

These experiments show that without adding a nasalized quality to the voice, a narrow VPO can enhance high frequency components. They further suggest that a narrow VPO can reduce the risk for voice breaks.

KS05 (Sa CoH 16:00)

THE SCIENCE UNDERLYING SEMI-OCCLUDED VOCAL TRACT PHONATION

Ingo R. Titze

University of Iowa; National Center for Voice and Speech at the University of Utah, UTAH, United States of America

The purpose of semi-occluding the airway while producing moderate to high lung pressures is to (1) create an overall widening of the airways from trachea to lips, (2) lower the glottal resistance by spreading the top of the vocal folds, (3) reduce the phonation threshold pressure with an optimal vocal fold posture and optimal TA/CT ratio, (4) train the larynx canal (epilaryngeal airway) and the pharyngeal airway for maximum power transfer, and (5) lower the resonance frequencies so that higher harmonics can gain energy with increased vocal tract inertance. Not all of these effects are experienced all the time. Different semi-occlusions (e.g., thin straws, lip trills, resonance tubes, voiced consonants, tubes submerged in liquid) produce different oral pressures and different oral impedances, which then favor some of the phenomena more than others. Which effects are likely to be maintained when the mouth is opened will also be discussed.

KS06 (We CoH 18:00)

CROSSOVER BETWEEN SINGING AND SCIENCE

Allan Vurma

Estonian Academy of Music and Theatre, TALLINN, Estonia

In this lecture the author describes how conducting scientific investigations and having a background in both science and classical voice has helped him to find answers to the questions that have arisen in his activity as a professional singer and voice teacher. Two topics will be addressed in more detail. The first of these concerns the metaphorical vocabulary used by singers and voice teachers to communicate various aspects of vocal technique. The results of acoustic investigation and perception tests shows that figuratively “placing the voice forward” may refer to various aspects of voice production, such as singing with the open pharynx and lower larynx to create the “singer’s” formant, raising the frequency of the second formant of the vocal tract by arching the tongue further forward in the mouth, and/or raising the first formant of the vocal tract by opening the mouth wider. Furthermore, voices belonging to the higher voice categories are perceived by listeners to be positioned more “forwardly”.

The second topic concerns the influence of the timbral difference of two tones on decisions about their pitch relationship. Successively presented viola tone (which has soft timbre) and trumpet tone (which has bright timbre) seem to be best in tune for both musicians and non-musicians when the frequency of oscillation of the brighter trumpet tone is about 20 cents flatter than that of the viola tone. A similar timbre induced pitch shift also occurs in the tenor voice – viola comparison. During the lecture, several sound examples and animations will be presented, and the benefits of the research results with regard to music practice will be discussed.

KS07 (Fr CoH 9:00)

THE NATURE AND SIGNIFICANCE OF THE SINGING BEHAVIOUR AND DEVELOPMENT OF CHILDREN AND YOUNG PEOPLE

Graham F. Welch

UCL Institute of Education, University College London, LONDON, United Kingdom

The keynote presentation will review empirical evidence of children’s and adolescents’ singing behaviours and development through a social ecology lens. Data will be drawn from major research studies in the UK and elsewhere in the world over the past two decades. The focus will be on mapping a developmental continuum of singing and how this trajectory can be impacted, both positively and negatively, by various socio-cultural factors, such as family background, pedagogy, opportunity, musical culture(s), as well as maturation and experience. The realisation of our species genetic musicality, including our potential for singing competency, is highly influenced by an interaction between internal and external factors in our development.

Opportunity will also be taken to review empirical evidence concerning the potential wider benefits of positive singing experiences for children and young people, such as in the home, school and wider community. A final strand of the presentation will explore research evidence concerning the nature of effective mentoring by singing specialists of generalist teachers in Primary schools in order to promote singing in their children’s daily schedules.

This keynote lecture is supported by



TALLINN UNIVERSITY

SPECIAL GUEST MASTERCLASS

MC01 (Fr CoH 12:30)

MASTERCLASS FOR SINGERS

Kirsten Schötteldreier

Voice-Performance-Energy-Coach, musical direction, casting advice

Coach for singers, actors, instrumentalists & conductors with studios in Amsterdam, Berlin, Munich, Vienna & Paris

Main Coach of the new Operastudio „Opera de Lyon“

The Workshop will start with 20 min introduction and work with the whole audience to let them experience some lead-in examples from Kirsten's breathing method and gain a more relaxed state of mind for a higher level of listening to the further activities. Then, four preselected professional singers—the active participants from the Masterclass, will be introduced to Kirsten Schötteldreier's training system to work with their repertoire. The singers also learn how one can reach a focused but calm & connected state of mind for singing. The method consists of a combination of transformational breathing exercises with soft chi-kung movements and holistic vocal techniques to activate and gain more control over the fine muscular breathing system, which is a quick way to achieve a free and authentic sound. This method also helps to integrate good articulation in the musical phrases while keeping a fluent vocal resonance at the same time.

MASTERCLASS

MC02 (Th OS 11:30)

MANUAL LARYNGEAL THERAPY AND SINGING LESSONS: THE IMPACT OF AN INTEGRATED APPROACH

Teun Michiels¹, Annelies Labaere²

¹*Tenor, President European Voice Teachers Association Belgium & Founder Voice.Academy, Belgium*

²*Lecturer & Researcher, Thomas More, ANTWERP, Belgium*

Physiological components of speaking and singing can be negatively affected by tension in the systems of respiration, phonation and resonance. As research has shown that the musculoskeletal system has a big impact on voice production, it comes as no surprise that musculoskeletal tension reduction can be of great value in singing lessons and singing training. Especially manual facilitation of the larynx and its surroundings can offer an additional benefit for the singer, both on the mechanical and the proprioceptive level. During the manual facilitation, the singer further develops his skill set, adding an extra level of experience to it and enabling him to improve his vocal performance and sound quality.

Teun Michiels (voice pedagogue) and Annelies Labaere (speech pathologist) work together in this masterclass to establish a complete assessment and a tailored adjustment of the efficiency of the singing technique, in relation to muscle use, tension and relaxation.

Active participants will experience a singing masterclass in which the artistic and scientific expertise of the singing teacher is combined with a paramedical assessment by the speech pathologist, including manual laryngeal therapy during singing. By the structure of the masterclass, both active and passive participants will perceive the impact of manual laryngeal therapy, whether it is by feeling it (active) or by hearing the acoustical difference (passive).

Active participants will sing a song of their own choice, providing sheet music, from any genre.

ROUND TABLES

RT01 (Fr D501 12:30)

TOOLS FOR VOCAL REHABILITATION / PAEDIATRIC THERAPY

Norma Camilleri

Speakers:

Norma Camilleri

Dario Strangis

Meeri Kompus

In the last three decades, various manual therapy techniques have been developed. Manual therapy has been acknowledged by Speech-Language Pathologists since the 1990s and it has been integrated with increasing popularity in the voice therapy plan to target laryngeal tension more directly. The first presentation outlines the importance of a client-centred approach and how manual therapy can be implemented in different cases. Case studies from a Voice Clinic and a singing studio will be presented.

Vocal fold hydration has always been a pivotal factor in vocal health. In the past decades, there has been an attention shift from systemic hydration (i.e., oral intake of water), to superficial hydration, through inhalation of environmental humidity and the use of external instruments that can bring moisture to the surface of the vocal folds (e.g., damp gauze, humidifiers, inhalers). This presentation outlines recent findings about this topic, their clinical and pedagogical applications, and future perspectives.

There is a high prevalence of pediatric voice disorders and practice shows that children are truly affected by voice disorders, but still, there is a dispute about whether to treat pediatric voice disorders or not. Their prevalence is mainly associated with abusive vocal use and therefore specialists may think that children will outgrow them eventually, but it's not always the case. Childhood voice disorder can have a number of reasons. Moreover, children feel the negative effect voice disorder has on their lives, limiting their abilities to participate in various activities (such as choir singing). So the question is: Pediatric voice disorders – to treat them or not?

RT02 (Fr A402 16:00)

SINGING VOICE THERAPY: A MULTIAXIAL APPROACH

Ilter Denizoglu, Elif Sahin Orhon

Vocology Centre, Turkey

Moderator: Ilter Denizoglu

Speakers: Lisa Popeil, Orietta Calcinoni, Aude Julien Laferriere, Haldun Oguz, Ismail Kocak

A singer's instrument is his/her whole body. The vocal performer can be regarded as a vocal athlete and it is expected that (s)he will experience voice problems, as in sports injuries. Just like the sports medicine, singing voice therapy includes three main groups of applications: habilitation for the performance, rehabilitation for injured voice, and preventive measures from possible problems. In this aspect, many issues such as how to sing high pitches healthily, how to deal with emergencies before stage performance, how to get back to the stage after 2 years of pandemic pause, and so on.

There are many singing techniques available on stage. Each of these includes differences in terms of both hardware (anatomic composition of the source and filter) and software (how to use the source and filter). Understanding these issues by means of acoustic analysis and muscle action of comparative vocal styles is essential for a tailored treatment program.

One of the most important subjects in SVT is to understand the myofascial system and movement organization in the body. Myofascia invests the vital and kinematic tissues in the body. Any trauma including psychological origin has an impact on this system that results an asymmetry and imbalance in posture and its action that is

important for a professional voice performer. This presentation focuses on the lines effecting the voice quality and demonstrates the modes of therapy directed on this tissue for a healthy and improved voice quality.

The vocal exercises used in singing voice therapy may resemble to vocal exercises used in teaching singing. The SVT program can be designed in accordance with the principles of motor learning, physical therapy and sports medicine. There are various singing styles, and each style has certain hardware and software specs. Clinicians are supposed to prepare haute-couture singing voice therapy programs and their awareness of these differences is essential for muscle-specific exercises for habilitative and rehabilitative purposes.

In a multiaxial approach, several applications at each axis may be included. Consulting and elevating conscious awareness through explaining, and proposing a vocal hygiene program are in the first step. Applications for primal sound, posture and breathing/support which are defined as core elements of singing voice are crucial for sustainable professional vocal performance. The vocal exercise program mainly includes applications for voice source (glottal attack, vocal muscle building techniques, focusing and registration) and vocal tract (tuning the vertical larynx position, semi occluded vocal tract exercises, formant tuning, etc.). Relaxation, coping strategies and musical performance anxiety must also be considered in addition to environmental factors that may implicate the health of the performing voice.

RT03 (Fr D501 16:00)

INSTRUMENTAL EXAMINATION OF THE VOICE PATIENT

Moderator: Ahmed Geneid

Helsinki University Hospital / University of Helsinki, HELSINKI, Finland

Panelists: Andrea Ricci Maccharini, Matthias Echternach, James Thomas, Dirk Mürbe

Instrumental examination of the voice patient is one a main key for the right diagnosis and best management of voice of the patient. Different advances in the optical and acoustical examination of voice are groundbreaking tools in our hands for better voice diagnostics. The roundtable offers a thorough insight on videoendoscopy, stroboscopy and high speed voice examination as optical tools for voice diagnostics. It also provides new ideas on when and how acoustical examination of voice should be done for dysphonic patients. The types of abnormalities encountered in results of these examinations will be discussed and their clinical significance will be brought forward.

The panel discussion of the roundtable will sum up the way to go forward when a voice patient comes to our clinic seeking help for right diagnosis of her/his voice problem

RT04 (Fr ChH 12:30)

TOOLS FOR PHONOSURGERY

Moderator: Markus Hess

Medical Voice Center, HAMBURG, Germany

Panelists: Michal Zabrodsky, James Thomas, Ahmed Geneid, Andrea Ricci-Maccharini, Lauri Maisvee

The topic of this round table is on tools for phonosurgeons. Although we were all trained with cold steel instruments, other instruments are also used frequently by colleagues. The aim of this RT is to elucidate the pros and cons for instruments that are widely used in laryngology such as CO2 laser, green laser, blue laser, instruments for office-based surgery and of course cold steel instrumentation. Other instruments and techniques might also be covered, if time allows. All colleagues at the round table were asked to propose one specific instrument – as a devil’s advocat – and should highlight their special instrument with a max. 5 minute video. It is hoped that this will be a different format with hot discussions – to the audience’s delight and information.

RT05 (Th ChH 17:00)

THE VOICE ERGONOMICS SESSION #1 - WHERE ARE WE NOW? WHERE ARE WE HEADING?

Elina Kankare¹, Leena Rantala², Eeva Sala⁹, Hanna Vertanen-Greis³, Marika Muttillainen², Terhi Ansamaa⁴, Sofia Holmqvist-Jämsén⁵, Sarkku Vilpas¹, Viveka Lyberg-Åhlander³, Valdis Jónsdóttir⁸, Anita McAllister⁶, Baiba Trinite⁷

¹Tampere University Hospital, Tampere University, TAMPERE, Finland

²Tampere University, TAMPERE, Finland

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⁴Oulu University Hospital, OULU, Finland

⁵University of Helsinki, HELSINKI, Finland

⁶Karolinska Institute, STOCKHOLM, Sweden

⁷Liepaja University, LIEPAJA, Latvia

⁸Iceland

⁹University of Turku, TURKU, Finland

Abstract #1

The Voice Ergonomics Session is organized by the Finnish Society for Voice Ergonomics. The aims of the session is to put voice ergonomics knowledge into practice and learn from each other. The two-hour session includes subsessions as follows;

1. Where are we now in the field of voice ergonomics (45 min, Abstract #1)
2. Round Table: Experts are discussing a case (30 min, Abstract #2)
3. Recent and future voice ergonomics projects (45 min, Abstract #3)

Voice ergonomics: where are we now and where are we heading?

Main speaker prof. Viveka Lyberg-Åhlander (Åbo Akademi, Finland)

Since the 1980, the field of voice ergonomics has attracted an increasing interest in both research and clinical practice. The field is indeed not new; rather a reclaiming of the voice field for SLPs. Historically, there has "always" been an awareness of the vocal consequences a person with a voice/speech intense vocation might suffer.

Today, due to the extensive and intensive research in foremost Finland, Sweden, and Estonia, the field has a firm scientific base concerning the speaker's voice in interaction with the occupational environment and the prevailing risk factors. For the future, our knowledge now needs to transfer into actual practice. We want to put forward the general knowledge and awareness of voice in relation to the environment within which the speaker acts. In addition, we want to establish SLP's expertise in voice ergonomics as an essential competence in preventive occupational health. The main talk will cover the importance of the achievements in the area and, where they have brought us today.

Voice Ergonomics in Nordic-Baltic: Top achievements and main future aims in voice ergonomics; PhD Valdis Jónsdóttir (Iceland), prof. Viveca Lyberg-Åhlander (Finland), prof. Anita McAllister (Sweden), prof. Baiba Trinite (Latvia).

The chairman is Sofia Holmqvist-Jämsén.

RT06 (Th ChH 17:00)

THE VOICE ERGONOMICS SESSION #2

Elina Kankare

Tampere University Hospital, TAMPERE, Finland

Abstract #2

Round Table (30 min)

Case: A child with Developmental Language Disorder (DLD). How to support with means of voice ergonomics?

PhD Valdis Jónsdóttir, prof. Viveca Lyberg-Åhlander, prof. Anita McAllister, prof. Baiba Trinite, and MD Päivi Lindholm

The round table is a part of the Voice Ergonomic Session that is organized by the Finnish Society for Voice Ergonomics (please see a separate abstract). The chairman is Hanna Vertanen-Greis.

Leena Rantala (Tampere University, Finland), Eeva Sala (University of Turku, Finland), Elina Kankare (Tampere University Hospital, Tampere University, Finland), Hanna Vertanen-Greis (Åbo Academy University, Finland), Marika Mutttilainen (Tampere University Hospital, Tampere University, Finland), Terhi Ansamaa (Oulu University Hospital, Finland), Sofia Holmqvist-Jämsén (University of Helsinki, Finland), Sarkku Vilpas (Tampere University Hospital), Viveka Lyberg-Åhlander (Åbo Academy University, Finland), Valdis Jónsdóttir (Iceland), Anita McAllister (Karolinska Institute, Sweden), Baiba Trinite (Liepaja University, Latvia), Päivi Lindholm (Oulu University Hospital, Finland)

RT07 (Th ChH 17:00)

THE VOICE ERGONOMICS SESSION #3

Elina Kankare

Tampere University Hospital, TAMPERE, Finland

Abstract #3

Where are we heading? Recent Voice Ergonomic Projects in Finland and Sweden (45 min)

Voice Ergonomics Virtually

PhD Hanna Vertanen-Greis & MSc Jaana Tyrmi

Voice coaching is increasingly online and therefore tools to scale and individualize online teaching is needed. This development project aimed to meet these requirements. The project was commissioned by Finnish Voice Ergonomics Society and the City of Oulu (Finland).

Voice Ergonomic Interventions in Classrooms

MSc Sirpa Pirilä

Two interventions, an acoustic renovation and a voice ergonomic workshop, were carried out in two classrooms. In the workshops, teachers and pupils planned how to improve speaking and listening conditions during lessons. After the interventions, the teachers' voice symptoms decreased, and the pupils heard their teacher's voice more clearly and experienced sounds less annoying.

Artificial Intelligence (AI) Based Vocal Monitoring and Therapy

PhD Susanna Whitling

The development of an app based system for monitoring vocal change in patients with underlying disease affecting the spoken voice is currently being carried out. The system will track progression of underlying illnesses as well as work as a voice care tool with AI based feedback function for the voice clinic.

Conclusion: Future aspects in voice ergonomics

Main speaker prof. Viveka Lyberg-Åhlander

The presentations are a part of the Voice Ergonomic Session that is organized by the Finnish Society for Voice Ergonomics (please see a separate abstract). The chairman is Sofia Holmqvist-Jämsén.

Leena Rantala (Tampere University, Finland), Eeva Sala (University of Turku, Finland), Elina Kankare (Tampere University Hospital, Tampere University, Finland), Hanna Vertanen-Greis (Åbo Academy University, Finland), Marika Mutttilainen (Tampere University Hospital, Tampere University, Finland), Terhi Ansamaa (Oulu University Hospital, Finland), Sofia Holmqvist-Jämsén (University of Helsinki, Finland), Sarkku Vilpas (Tampere University Hospital), Viveka Lyberg-Åhlander (Åbo Academy University, Finland), Jaana Tyrmi (Tampere University, Finland), Sirpa Pirilä (Tampere University, Finland), Susanna Whitling (Lund University, Sweden).

RT08 (Sa CoH 10:30)

VOICE SCIENCE – DO WE NEED IT?

Gillyanne Kayes

Vocal Process, United Kingdom

Panel members: Gillyanne Kayes (chair), Irene Bartlett, Nathalie Henrich Bernardoni, Allan Vurma, Christian Herbst, Kirsten Schötteldreier

Sometimes it seems that voice scientists and voice pedagogues are in different camps – language and definitions of vocal behaviour can vary enormously, leading to confusion and frustration on both sides. For example voice science findings seek clarity of definition and control of variables, whereas the language of pedagogical practice is multi-lexical and influenced by genre aesthetic, historical and cultural factors, and singer individuality. This makes it hard for singers and teachers to map the findings of voice science onto their own experience as craft practitioners.

Each member of the round table panel is a singer or singer-teacher, and four are also researchers or voice scientists. All members are actively interested in and engage with the pedagogical community. Our goal is to discuss the divisions between the two communities using these questions as a framework:

- Can voice science knowledge change the way we teach?
- Is it possible to teach successfully in the modern world without voice science knowledge?
- What seems to be the central problem with successful interface between voice science and pedagogy?

There will be time to invite questions and observations from the floor.

RT09 (Th ChH 11:30)

PRESENTATION OF BALANCE IN PHONATION VOICE TRAINING

Helene Lux Dryselius, Susanna Metsistö

Lecture presenting Balance in Phonation Voice Training

BiP™ (Balance in Phonation Voice Training), applicable to both speaking voice training and singing voice training in all music genres, has been developed by the Finnish speech pathologist and voice pedagogue Ritva Eerola.

BiP™ strives to find everyone's personal body-mind connected unique voice. The exercises are meant to help the person to understand how to get as sustainable and economical body function as possible and how to benefit from the body's own work to enhance both expression and interpretation.

By developing and strengthening the speaking voice at the speaking voice level, and to stay at that level even when singing, the BiP™ student will discover how the will power of the expressive words will, by itself, establish the suitable subglottal pressure. When this happens the students will find both their unique voice and their interpretation, instead of trying to do the voice and the interpretation.

Approaching voice technique from this angle, BiP™ is a well-functioning pedagogy in all kind of voice training. It's a truly workable method in voice therapy - and for speakers of any kind - and in singing with both soloists and ensemble singers.

In voice therapy the main goal is to achieve a balanced relation between the body and the throat and in that way to have easier voice production and more sustainable voice. In singing the use of the expressive text will enhance the acoustics and give the singer a tool to improve the joint work in musical collaboration.

The purpose of this lecture is to shed light on the theoretical framework of BiP™ and give a basic idea of how BiP™ theory is put into practice. We would like to add two masterclasses as part of the lecture, one in classical and one in CCM singing. Deeper introduction to the practical work will be shared separately in three workshops (speaking voice, classical singing and CCM singing).

Susanna Metsistö is a speech pathologist, poetry performer and a theater teacher. She studied logopedics in the University of Helsinki and theatrical skills in Theater Academy. She is working as a lecturer of voice production and care at the University of the Arts, Sibelius Academy, where she coaches, in addition to the voice production, also poetry performance. She also has a private voice therapy clinic for - mostly - functional voice disordered persons. She is also Certified Course Instructor of BiP™ (speaking voice and voice therapy).

Helene Lux Dryselius, classical singer and voice pedagogue, is mainly educated by Ritva Eerola, the creator of BiP™, but has also experience from work with several renowned teachers within interpretation and opera directing. As a Certified Course Instructor and Master Teacher of BiP™-Voice Training and with more than 25 years of experience she runs her own Vocalux Voice Studio. Apart from the studio she arranges Masterclasses and gives lectures and concerts at a freelance basis. Helene holds currently the position as a secretary in the board of VoTS, Voice Teachers of Sweden.

RT10 (Sa OrH 14:00)

CURRICULUM CONTENT OF VOICE PHYSIOLOGY AND VOICE HEALTH IN PROFESSIONAL SINGING EDUCATION

Moderator: Dirk Mürbe

Charité-Universitätsmedizin Berlin, BERLIN, Germany

Panelists: Filipa M.B. Lã, Ulla Raiskio, Marina Sandel, Tamás Altorjay, Allan Vurma

There is no doubt that singers benefit from being taught the theoretical basics of voice physiology and vocal health to a defined extent during their professional singing education. Accordingly, many conservatoires/academies of music have included this topic in their training curricula. However, the scope and content of these curricula vary considerably between the different university institutions. There are also great differences in the qualifications of the teaching staff. In this roundtable discussion, structural specifications on the requirements of such curricula are to be discussed in an international comparison of conservatoires and a quintessence on compulsory contents and variable components of this subject is to be found.

RT11 (Th OrH 15:30)

PHONOSURGERY IN VOICE PROFESSIONALS

Moderator: Dirk Mürbe

Charité-Universitätsmedizin Berlin, Germany

Panelists: Orietta Calcinoni, Erkki Bianco, Ahmed Geneid, Markus Hess, Virgilijus Ulozas

Adequate individualized care for professional singers and actors requires several prerequisites and is associated with various specific challenges. On the one hand, this concerns the indication for these interventions against the background of the particular professional situation and the expected ongoing high vocal load. On the other hand, this concerns the selection of the adequate phonosurgical strategy with possible specifications of the treatment concepts including laser-based options. Furthermore, the appropriate anaesthesiological procedure must be selected. Finally, the overall package for voice professionals undergoing phonosurgical treatment must include a specific post-operative follow-up care with individualized content and timelines for voice rehabilitation. Differentiated care for professional voices should therefore take into account fundamental aspects of musician's medicine and also support patients in their communication and crisis management.

WORKSHOPS

WS01 (Fr OS 10:00)

CLASSICAL SINGING VOICE WARM-UP

Tamas Altorjay

University of Szeged, SZEGED, Hungary

The leader has more than 33 years operatic and oratory stage experiences and more than 20 years voice coach experiences.

During this workshop we plan to present with two or three Volunteers a singing warm-up, expediently with female, and male locally applicants as well. For the tasks we use two minor melodies. The voice range of the first has fifth interval, with second steps inside. The voice range of the second – derivation melody - has more than one octave with bigger steps – tertiary and longer – intervals. The singing tasks we begin on the Volunteers lower middle pitch of here/his voice range, and then visit the whole voice range starting down and then up. For singing tasks we use artificial syllables with three vowels – [I, a, u] – which are commonly used in European languages, and in absolute colour – according to formant F1, F2 - and in forming mode and localisation – closed =open, front=back - sharply different.

- The first task is inhalation through the mouth and exhalation through the nose, then repetition inversely.
- humming with the first melody
- humming through the nose-pipe (by us developed and published, since years successfully used tool for voice training; parameters of the tool: outer diameter 10mm, length for females 14cm, for males 17cm, as the average length of the voice track of the traditional genders)
- [bi, ba, bu], (voiced, plosive, bilabial); [mi, ma, mu], (voiced, plosive, bilabial, nasal)
- [li, la, lu], (voiced, lateral); [ni, na, nu], (voiced, dental-nasal)
- [gi, ga, gu], (voiced, plosive, uvular); [ni, na, nu], (voiced, plosive, velar-nasal)
- [hi, ha, hu] (voiceless, laryngeal) using the second melody
- humming through the nose-pipe, using the second melody

At the end we detect the visited voice range and ask the audience to evaluate the changes in voice quality.

WS02 (Th BB 11:30)

PHONATION TYPES: RELATIONS AMONG ARTISTIC EXPRESSION, HEALTHY VOICE PRODUCTION AND VOICE EFFICIENCY

Mauro Barro Fiuza

Universidad Nacional de Educación a Distancia/UNED, Spain

Phonation types are key to control the quality of voice source and are paramount for determining voice health and singing style. They strongly influence timbre, subglottal pressure, and vocal loudness. One could argue that without controlling phonation types it not possible to achieve the desired voice quality, even when it is not the conscious target of a voice training.

Types of phonation can be understood as a continuum of changes in the degree and type of glottal adduction, from weak and incomplete (hypo functional) to strong and constricted (hyper functional). Phonation types were categorized into: (1) whisper, with no contact of the vocal folds, produces a noisy sound without harmonic components; (2) breathy phonation, without a full closed phase of the glottal cycle, producing a perceptually airy like sound but with some harmonic partials; (3) flow phonation, a voice with complete glottal cycle and a high aerodynamic to acoustic energy transfer efficiency. Often, it is a goal for voice treatment and classical singing studies; (4) neutral phonation, which sounds like a common to energetic regular speech, applied in countless modern music styles; and (5) pressed phonation, made with a long closed phase, constriction of supraglottal structures and laryngeal extrinsic muscles and perceived as a squeezed like sound. In addition, Dr. Johan Sundberg addressed an intermediate kind of phonation between neutral and pressed, mentioned as common for belters and rock singers, such phonation is sometimes labelled erroneously as pressed phonation. Here referred as firm phonation.

Phonation types have also been related to different types of adduction of the vocal folds (i.e., membranous, and cartilaginous adduction). It has been argued that the complete cartilaginous adduction (i.e., complete closure of the cartilaginous part of the vocal folds) is used for neutral and pressed phonation, thus, for firm phonation. Such variations can be considered as the key for mastering the phonation types, but other parameters should be addressed, such as subglottal pressure and vocal loudness.

Despite being a usual feature in voice practices, for both artistic and clinical purposes, phonation types can still confound voice teachers and therapists, especially concerning perceptual characteristics, pedagogical strategies to achieve them and health-related limits for each vocal mode. In this workshop, perceptual characteristics, and approaches for teaching different phonation types will be discussed. The relations among phonation types, vocal loudness and voice amplification will be explored and connected with voice styles and musical genres. Real-time visual feedback tools (e.g., the flow ball device and the Voce Vista Video software) will be applied for better understanding differences among phonation types. Common speaking gestures and semi-occluded vocal tract postures will also be explored. Participants will experience speaking and singing in different types of phonation and will learn to see, feel and listen its differences.

WS03 (Fr CoH 16:00)

VOCAL PERFORMERS; SPEECH AS A CONNECTING SUBJECT IN MUSIC THEATRE

Hanneke Bax, Tessa van Beek
Codarts University of the Arts

At the Codarts Music Theatre department we train autonomous vocal performers: performing and co-creating professionals who are able to combine singing, making music, acting and motion. With at least 10 voice-related subjects, the students train their voices intensively in all dimensions. During the last ten years the course of speech technique and expression became a more connecting subject within the curriculum. As speech has an important link with the courses of singing and acting, we've created a similar vocabulary in both directions. Where in the past every teacher worked on their own island, we are now a team: all working together to let the voices of our students grow.

During the workshop we will explain our voice programme and we'll do several exercises with the participants.

WS04 (Sa ChH 15:00)

SOUND AND AIRFLOW DIRECTIVITY. THE “POUSSÉ-TIRÉ” OR “FRONT-BOW BACK-BOW” OF THE VOICE TECHNIQUE

Erkki Bianco
France

In my workshop, I am going to explain and show the participants how to control the directivity of the air flow independently of the pitch or intensity. Like the upbow or downbow for string instruments.

They will also learn to listen to the harmonics of the sound more than the vowels, which are analysed in different lobe of the brain (mentioned by Wolfgang Saus in Pas7 in may 2022.)

They will learn the simultaneous control for voice quality of: directivity of air flow and pressure (Back-Front effect), and directivity of sound: intensity and adjustments of harmonics and formants (Up-Down effect) without changing the vowel.

The participants will learn to sing high notes without cracking the notes nor injuring the vocal cords.

They will learn to sing piano sounds that can be heard and touch the public because they are directed towards public and not towards the singer himself.

They will learn to make in choral works beautiful *pianississimo* sounds touching the public because of its directivity.

A score will be sung by voluntary participants and analysed in view of the "poussé-tiré" (Front-bow Back-bow).

Exercises will be sung by the group on very simple musical phrases to acquire the technique and then applied to real musical pieces.

It is important the participants bring scores on which they can write the *direction* of the sound.

We use the signs used by the string instruments

WS05 (Sa CoH 14:00)

WHISTLE REGISTER WORKSHOP

Erika Biavati

Bologna University, BMST musical Academy, BOLOGNA, Italy.

The whistle register, also known as Mode or Mechanism 3 (M3), can be achieved with two different laryngeal mechanisms: "reed whistle" and "stop-closing whistle." Both mechanisms can be taught, developed, and used for educational and expressive purposes by singers and actors.

In the workshop many details about M3 are clarified, in particular the characteristics that can facilitate the production of this sound, the risks and also the use of the whistle for vocal warm-up, including through slides.

In the workshop, voice teacher Erika Biavati presents her "whistle training" that she created, consisting of four phases:

- 1) the deactivation of the body
- 2) the production of the whistle notes
- 3) the control of intonation
- 4) the connection between head voice and whistle register.

It's safe to say that if the whistle is done correctly, it's not only harmless, it's actually useful! This is what Erika Biavati demonstrated during her experimental studies related to the extreme voice and during the presentation she shows the results obtained by her students.

During the workshop participants will be able to distinguish the reed whistle or stop closure from the high pitched emissions, learning to emit the sounds without harm.

WS06 (Sa A402 10:30)

HOW TO EASILY HYDRATE AND LUBRICATE THE VOCAL FOLDS FOR IMPROVING PHONATION

María Borrigan Salcines (Speech Therapy researcher), **Marco Fantini** (Otorhinolaryngologist and Voice Pathology Specialist), **Andrea Ricci-Maccarini** (Otorhinolaryngologist and Phoniatician), **Alfonso Borrigan Torre** (Phoniatician)

In recent years research on voice pathology has revealed that the viscoelasticity of the vocal folds (VFs) is one of the most important factors for optimal vocal function, providing greater pliability of the VFs edge. Viscoelasticity is related to the combination of polysaccharides and proteins of the lamina propria. Furthermore, those molecules need water to be in the best shape and in the best environment.

Here we propose a quick and effective method to humidify the VFs using a damp gauze (Borrigan et Al., 2021).

The damp gauze promotes an immersion in a great humidity environment. The use of the damp gauze is easy, since it consists of placing it around the nose to act as a humid filter to moisten air passing through it. We showed that voice quality improves after 10 minutes of surface hydration and that the mucosal waveform improves too. Nasal hydration produces a great sensation of vocal well-being, a decrease in effort when speaking, a better glottic closure and a greater mucosal wave. With well-hydrated VFs we can make large vocal overloads without suffering injuries. The duration of the hydration effect varies between 30 minutes and several hours.

The goal of this workshop is to show the changes before and after hydration. To do so, we aim to carry out different experiments both on speaking and on singing voice of some of the participants. First, we are going to teach how to use the damp gauze and we are going to see what kind of changes occur. Second, we will observe the effects of combining hydration with a damp gauze with the use of ions. Third, we will use surfactants as they reduce the superficial tension of the water and make the moisture layer more stretched and diffusible. We will also use lubricants (hyaluronic acid, galacturonic acid) to make the modifications produced by hydration more durable.

People attending the workshop will experience a nice experiment and they will be able to practice VFs humidification and lubrication procedures with their patients or students. Furthermore, the topic of this workshop represents a field of research that is still open to experimentation of new effective and fast formulas to improve the hydration of the VFs.

We suggest attendees to download a spectrum viewer app on their smartphones. We use the "Spectral Audio Analyser" for Android in the free version and the Spectrum Viewer for iOS. The goal is to see the changes occurring in voice quality.

Experiments to be carried out:

1. Moisturization with damp gauze.
2. Moisturization with damp gauze + ions (stuffed olives).
3. Moisturization with damp gauze + phosphatidyl choline surfactant (soya lecithin).
4. Moisturization with damp gauze + lubricant (galacturonic acid or pectin).

References

1. Borrigan M, Gomez Mediavilla B, Agudo Leguina M, Gonzalez Fernandez MJ, Strangis D, Fantini M, Ricci Maccarini A, and Borrigan Torre A: Nasal breathing through a damp gauze enhances surface hydration of the vocal folds and optimizes vocal function. *J Voice*. 2021; x: xxx-xxx.

WS07 (Sa ChH 12:00)

SUPRAGLOTTIC EXTREME VOICE WORKSHOP

Eleonora Bruni

Bologna University, Associazione Voices, ROME, Italy

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

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

In the workshop, participants will be able to see supraglottic structures in their function to produce noise, through slides. The workshop will be mainly practical, with shared exercises, from the basics to sounds with mixed optic and supraglottic sources. Some noisy passages in singing will also be tried out, in relation to styles. At the end of the workshop participants will have learned the first steps of Bruni® training. The training is of

great interest also for speech therapists and is used for the rehabilitation of partial laryngectomies, chordectomies and chordal paralysis. These aspects will be briefly explained.

WS08 (Th BB 15:30)

A VOICE BEYOND THE EDGE – EXPLORING THE BORDERS OF VOICE

Felicita Brusoni

Malmö Academy of Music, MALMÖ, Sweden

Lund University, LUND, Sweden

The workshop I would like to propose is situated within the topic of exploring new fields in the scenario of extended vocal techniques.

I will provide both theoretical and practical information about methods to handle and improve new techniques playing with the borders of a non-common use of the voice. I will discuss the importance of nonlinear vocal phenomena as vocal behaviors that deviate from common periodic phonation.

Among the topics that I will address, there will be the exploration of some ways to convey the extended techniques into contemporary music practice, and, relevant for composers, I will show some examples of notation.

The final aim is to enrich the cultural baggage of both singers and composers, or anyone interested. More awareness of the hundreds of possibilities of unusual sounds hidden inside the vocal instrument, together with the consciousness of the practice of it, can enhance the variety of timbre qualities in a voice.

Special attention will be devoted to the investigation of some vocal multiphonics. The method used is more intuitive than systematic, due to the differences in the physiology of the vocal instrument, but also to the fact that this method is still developing.

Working with the overlapping of different sound sources layers will be a strategy of inquiry, and for this purpose, we will analyze some excerpts of “Anaphora”, a solo voice piece by Michael Edgerton focused on 56 classes of vocal multiphonics, that lists nonstandard vocal gestures which are categorized according to the degree of voicing present as either voiced or unvoiced.

The workshop will have a practical approach, and it is open to anyone, with the possibility to choose between being an active participant or an auditor.

Active participants will be invited to try out but also propose some extended vocal techniques, in a peer-to-peer dialogue. Non-singers are also welcome.

The workshop will be recorded for research purposes and will become part of a study.

WS09 (Th OH 18:00)

OCCUPATIONAL VOICE TRAINING

R. Eugenia Chávez Calderón

Centro de Foniatria y Audiología, MEXICO CITY, México

The voice professional users need to have an optimal vocal function for their work.

The capacity of column of air, the vocal fold flexibility, the changes in voice loudness and timbre and vocal endurance are important.

1.-Respiratory exercises with inspirometer, therapeutical band for improving inspiratory strength and expiratory capacity and sustained column of air.

2.-Therapeutical band and dynamic vocal routines for voice production help the flexibility and endurance with different body movements. Humming exercises, triads, staccato and legato arpeggios with soft consonants like B,F,S and explosives consonants like K P T Ch.

- 3.-Pianissimo exercises with therapeutical band. Crescendi and diminuendi vowel exercises.
 - 4.-Placing exercises with therapeutical band using NG, M, N
- Posture of body and head, support, correct articulation and resonance are crucial.
- 5.-Vocal exercises with masking are important for teachers, salesman, call centers, industries among the most frequent voice users.

WS10 (Fr OH 11:00)

JOINTS AND VOICE: DO VOICE PRODUCTION REACTS TO JOINTS DYSFUNCTIONALITY FAR FROM VOCAL TRACT? SOME CASES AND AN HYPOTHESIS

Lucia Cossu

In this workshop I will present and make experiment some of the exercises I have developed and modified for strictly use in voice development, training and to rehabilitate or solve voice issues (those last being contacted by their therapists and under medical control of my proceeding) that have shown a favorable and often not expected point of discontinuity in their voice production, career, satisfaction, easiness, resolution of issues and efficacy. Usually my students are defined as natural voices of exceptional quality, meaning that the intervention is so functional not to be perceived as a technique or system of controlling the voice, of course they usually were not in the same functional state when first arrived. Below a little of my approach.

From static alignment and managing the breath air to compensate for a not naturally gifted voice to a rationale and an hypothesis of how asymmetries, defensive stiffnesses and joints dysfunctionality or underdevelopment can be directly worked and change directly voice production. Many methods exist to help the body connection and the alignment and to relax stiffnesses; they are often helpful and sometimes (in a little percentage) find a way to solve completely limits and issues in voice production in non singers and singers. What lacks now is a systematic and rationale to understand how those interventions are connected with voice production and if there is a sort of direct mechanism and how it is voice related. A presentation with some examples in which have been worked mostly on SI (sacroiliac) joint and its functionality and transversus abdominis, examples that present a discontinuity in voice production, some with medical control of it and a couple with level of performance achieved. I will make my hypothesis of this relation using the joint by joint approach of Michael Boyle and Gray Cook, the functional findings on SI joint and Gluteus maximus role in Bret Contreras and Gray Cook view, and the rationale is based on the Charlie Weingroff direction in using workouts as stressors to determine not only a desired adaptation but also a soft tissue evolution (and in this very interesting the recent findings even for now just empirical of Ben Patrick that I am now investigating as application in voice production), the findings on inverted role of muscles function directly determined by position of the relative joint and range of movement (Dostal, Soderberg, Andrews in *Physical Therapy* 1986;66351-359). I cite coaches and physical therapies because the literature and the work on the subject is more complete than in voice literature; the body is one and the rules of joints and muscle kinetics are the same, some of our singing can be seen as a close chain or open chain exercise and some vocalisations and intervention using those kind of logic have in my experience been a turning point in voice production. I use the joint by joint approach because pretty reliable even if not complete of how joints are affected reciprocally. The defensive system will be here presented as a blocking system, a sort of veto system, and it is presented in its muscular effects that can be corrected with positions and using its specifics of kinetics.

The examples presented and the hypothesis are a first step to open the discussion and the discussion about a more precise way of the minimum terms in body structure and its kinetics to have a not impaired voice production or to improve voice production.

Here the links for a general view of some exemplary results, some other clips not publicly disclosed will be available for the participants of the Conference.

https://youtu.be/CLcL_buf9tch

[://luciacossu.com/2016/09/13/cossu-method-sister-i-organic-damage-solved/](https://luciacossu.com/2016/09/13/cossu-method-sister-i-organic-damage-solved/)

<https://youtu.be/OUH9sXqKjRw>

WS11 (Sa BB 15:00)

BEYOND RELAXATION: UNLOCK FROM DEFENSIVE VETO, A RATIONALE ON VOICE AND DEFENSIVE KINETICS.

Lucia Cossu

This workshop could also have had the title How to get beyond the defensive veto on voice production without taking away energy and rhythm or the individual defensive attitudes.

We all know how much an hyperactive or hyperactivated defensive response is a real veto in voice production, as some structured stiffnesses of the defensive system. To gain even a bit of access to a more functional gesture can be a true game changer. Many strategies and techniques have been developed to gain this access and the main answer have been on relaxation (practises, exercises, meditations, drugs, etc.) and positive/collaborative strategies. Defensive and constrictive system is not just a veto system, it is the brake and decelerating system, it is the words and fraseggio and control mechanism, it gives interpretative nuances and emotional flavours. The veto can come from a physical readaptation of muscles after an injury or a trauma, an underdeveloped joint, an inflammatory system that has yet a defensive response, from individual defensiveness or attitude toward singing and some others (as we know in our experience). We all know singers with part of these causes and yet they have adapted and they sing, they have part of this response but not the veto. The relaxation can help and being formative but does not work on just gaining enough functionality; it works by taking away the defensive response and for musical purposes and of individual voice can be detrimental and create confusion in the correct energy and rhythmic physical expression of it. Here I propose exercises that 1.target directly some precise gestures that create the veto; 2. creates enough functionality in joints and chains involved; 3. put an accent on a hierarchy of development of joints so to have some rationale of maladaptations we find in voice. I will propose exercises that work with a joint by joint approach (from Michael Boyle and Gray Cook) and a vision (from Charlie Weingroff) of training as creating a context in which the stress applied develop the desired adaptation. In here you can find some results of this approach <https://luciacosu.com/cossu-method-program/>

WS12 (Sa CoH 15:00)

SEMIOCCLUDED VOCAL TRACT EXERCISES

Ilter Denizoglu

Vocology Centre, Turkey

Semi occluded vocal tract exercises (SOVT) are well known in singing pedagogy for centuries. They have been used to improve ergonomic output by the singer and to produce most efficient voice for artistic interpretation. SOVT exercises are not only used by singers for sportive purposes, but also become effective methods in the treatment of voice disorders.

SOVT exercises may be applied with or without devices. The devices vary from simple drinking straws, glass and silicone tubes or specific devices. The SOVT exercises may be applied without devices by using trills, humming, semi vowels or voice stop consonants as well as using the hand-over-mouth exercise. The main mechanism of SOVT exercises is to provide a backpressure to the voice system in order to enhance the inertance of the vocal tract. Massage effect on vocal folds, enhanced resonance capacity, proper abdominal diaphragmatic respiration, relaxation, and biofeedback (auditory, visual, and kinesthetic) are other possible mechanisms. Artificial elongation of the vocal tract by using tubes is another factor in SOVT exercises.

Types of backpressure during SOVT exercises may be classified according to temporal and spatial characteristics of physical effect. SOVT exercises can be classified according to the duration and amplitude of impact of the backpressure. If there is a constant backpressure, we can call it DC-SOVT, and it can be applied in two levels of backpressure. Narrow drinking straws, hand over mouth exercise and voiced fricative consonants may provide a high constant (DC) backpressure whereas nasal consonants and semivowels provide a low backpressure on the system. If the backpressure impact is very fast and short, we can speak about transitory backpressure with voiced stop consonants such as [b], [g], [d]. In alternating backpressure current, the secondary system works in an oscillatory fashion as in so called trills. The last SOVT type is known as phonating into tubes in water that provides both AC and DC backpressure together at the same time.

When applied correctly, the SOVT exercises may affect all subsystems of voice mechanism: vibration, resonance, and breathing/support. Various SOVT applications will be explained and classified in this workshop with hands-on exercises.

WS13 (Sa OS 12:00)

THE CORRIDOR EXERCISE: A COMBINED APPROACH FOR REGISTRATION

Ilter Denizoglu, Elif Sahin Orhon
Vocology Centre, Turkey

Developing and blending the vocal registers in singing pedagogy is a long and demanding task. This process is usually based on kinesthetic perceptions and imagination. What is tried to be explained by different teachers in different ways and methods is usually the same goal. Corridor exercise, which is one of the DoctorVox Voice Therapy (DVT) applications used in singing voice therapy may be a supportive approach for the voice teacher. It offers a physiologically-based practice that includes SOVT (semi occluded vocal tract) tools.

It is usually the result of a narrowing corridor-feeling in high-pitched voices, elevation of the larynx, and supraglottic narrowing in untrained singers. This is especially evident in high-pitched and loud sounds in which the straining reflex is stimulated. Towards the low pitches, on the other hand, the larynx is pushed down and a supraglottic compression occurs again. One of the ways to get out of this deadlock is to keep the vertical larynx position under control as much as possible and keep the false vocal folds open alternately against the reflexive impulse.

The two main register muscles, thyroarytenoid and cricothyroid, are developed separately in the DVT program. Registrational blending that takes place, especially in the passaggio region is practiced with the help of formant adjustment and SOVT simultaneously and carried out within the new imaginary corridor.

In this course, imaginary perceptions will be explained by revealing the physiological and physical equivalents of muscle contractions and configurations corresponding to vocal exercises.

WS14 (Sa ChH 10:30)

DOCTORVOX VOICE THERAPY TECHNIQUE

Ilter Denizoglu
Vocology Centre, Turkey

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. Based on Sihvo's LaxVox tube exercise, a comprehensive treatment system with well-defined muscle-specific exercises and three-dimensional four-level framework. Various devices have been devised (doctorVOX, pocketVOX, maskVOX, high pressure valves) 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: the 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 the 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.

In this workshop, participants will have introductory knowledge and hands-on experience on DVT exercises.

WS15 (Th CoH 11:30)

INTIMACY, POWER, CONNECTION, COURAGE IN BUSINESS VOICES

Elizabeth Ebbink

Proposal: Vocal ingredients and recipe for speakers in politics, business and education
Elizabeth Ebbink, speaking voice coach, psychologist, opera-singer

Expertise: For a speaking voice coach in a business environment there is usually no time to develop the whole voice to its full potential. I propose 4 vocal dimensions and their impact on the audience to describe the speaking voice. The 4 vocal dimensions help to determine what the speaker needs to create intimacy, power, connection, courage etc.

Workshop: Vocal ingredients and recipe for speakers in politics, business and education

A speaker's charisma and impact is for a large part determined by the tone of voice. The voice creates an impression on the senses of the listener, and psychological impact, regardless of the verbal content. This is not about health or beauty of the voice, but about what the voice projects on the audience.

This impression determines whether the listener will feel secure, scared, attracted or repelled by what is said. Whether it is easy for the listener to accept the verbal content, or whether they don't want to hear.

I propose 4 vocal dimensions for the speaking voice:

loud vs soft: large, oppressive vs small, modest

Muffled vs sharp: intimacy, sensual vs distancing, controlling

High vs low: contact, joy vs content, seriousness

Slow vs fast: content, wise vs energy, sports

For the voice trainer it will be easier to focus vocal training to the dimension most needed for the speakers intention. During the workshop Films of well known speakers are used, for instance Morgan Freeman, Scarlett Johansson, Jacinda Ardern, Boris Johnson, etc. to highlight how they use the vocal dimensions and what they accomplish in their audience. I will show that your influence can be enhanced with your own vocal apparatus using the 4 vocal dimensions. In my experience most speakers use only a fraction of their vocal possibilities and a voice coach can be a huge help for the speakers success.

Voice Trainer

Elizabeth Ebbink has for the last 20 years been working successfully as a voice trainer/coach with speakers in a business environment. Her client list contains a wide variety: CEO's, teachers, medical professionals, politicians, lawyers, policemen, animal trainers...

Elizabeth Ebbink was trained as a psychologist (University of Amsterdam 1986) and opera singer (Rotterdam Conservatory 1992). She worked as a soprano/singing teacher for 20 years, and sang in the Dutch National Opera Choir for 10 years.

In Copenhagen, Pevoc 2019, she gave a workshop about the voices of Obama, Trump, Merkel and Thatcher.

WS16 (Th OH 17:00)

SOV-TRAINING: A MULTIDISCIPLINARY APPROACH TO VOCAL TRACT SEMI-OCCLUSION FOR VOICE TRAINING

Marco Fantini, MD, Otolaryngologist, co-founder of the SOVTraining project, Koelliker Hospital, Turin, Italy - San Feliciano Hospital, ROME, Italy

Claudio Fabro, MM, Freelance Vocal Trainer and co-founder of the SOVTraining project, TURIN, Italy

Vittoria Carlino, SLP, Speech and Language Pathologist, Voice Pathology Specialist and co-founder of the SOVTraining project, Buona Voce Formazione, NAPLES, Italy

Andrea Ricci-Maccarini, MD, Otorhinolaryngologist and Phoniatician, ORL Unit, Bufalini Hospital, CESNA, Italy

Alfonso Borragan, MD, PhD. Phoniatician, Phoniatrics and Speech Therapist Centre, SANTANDER, Spain

Background and Objective: Semi Occluded Vocal Tract (SOVT) postures can be obtained and performed through many exercises and devices, with different effects on voice. The rationale and theoretical underpinnings for SOVT postures have been described by Titze. Today, semi-occluded vocal tract exercises are widely used in the fields of voice therapy and didactics, aiming at improving vocal economy and efficiency. Semi occlusions promote an increase in vocal tract impedance, resulting in changes in the inertive reactance, with favorable effects on voice production. According to impedance and electroglottographic features, SOVT exercises have been classified in steady and fluctuating. Furthermore, different devices (such as straws, tubes and masks) can be used to boost semi occlusions and to obtain different goals.

SOVTraining is a multi-disciplinary project focusing on voice training and didactics based on semi-occluded vocal tract postures. The aim of the project is not only to show how to perform semi occlusions, but also to teach how to choose between different semi-occlusions according to the needs.

Methods/Design: In this workshop a Singing Teacher, a Speech Therapist and an Otolaryngologist will put together their knowledge about semi-occlusions to give the audience – through an interactive and hands-on experience – some useful tips and tricks to “SOVTrain” their voice and to use some semi-occlusions in their everyday practice, according to their needs. Through an interactive presentation, group practice and individual practice, the attendees will experience the different features and effects of some SOVT exercises. In particular, a focus will be given on the new Semi-Occluded Ventilation Mask techniques.

Results and Conclusions: This workshop will give the audience some useful indications and strategies about how to choose between the different semi-occluded postures, according to the performer’s goals and needs. Participants will leave the workshop with specific strategies to help them warm-up and to use several SOVT exercises in voice training.

WS17 (Fr CoH 17:00)

GET ON, SING, GET OFF! PHONATION AND MUSICAL NOTE ONSETS AND OFFSETS AS EMOTIONAL CUES IN SINGING

Jeremy Fisher

Vocal Process, United Kingdom

Specific phonation onsets have long been considered important in singing voice training. Using a variety of onsets and offsets can change the audience’s perception of vocal effort for dramatic purposes without necessarily increasing the singer’s vocal load.

In this sense we might say that both the onset and offset of a sung musical sound can be used as an expressive device, as well as a tool of vocal function.

In this fully practical workshop we will explore at least nine different phonation onsets/offsets and note approaches. The onsets and note approaches will be taught using vowels and words and then contextually within song material. These are excellent for eliciting tonal variety, changing the 'emotional temperature' of a phrase and are also fun to do.

Participants will be invited to articulate their sensory and emotional responses to the different onsets and approaches.

Participants will gain insight into the multiple uses of onsets and note approaches:
To address habitual onset and offset use of students by offering alternatives to ‘contrast and compare’;
As a quick route to style changing, especially when a singer has trained extensively in one genre
To address issues of genre authenticity;
To change the perceived ‘effort level’ of a sung vocal performance for purposes of audience response.

A handout will detail each of the changes used, including referencing commercial recordings for further study.

WS18 (Fr D501 10:00)

IN AN UNSPOKEN VOICE, TRAUMA AND VOICE THERAPY

Heleen Grooten- Bresser

The Netherlands, Speech and Language Pathologist, body- oriented traumatherapist, co-founder of the voice and trauma research and connection group (see voiceandtrauma.com) SLP, trauma therapist

Functional and psychogenic voice problems have in common that there are no deviations seen on the level of the larynx. However, on the background of the voice problem very often other symptoms are seen, related to a dysregulated autonomic nervous system and vagal tone. Knowledge about this and about body oriented trauma therapy might help voice therapists to support patients in their recovery. In the workshop symptoms of autonomic dysregulation are discussed and also suggestions for trauma sensitive therapy will be given.

WS19 (Fr OH 10:00)

A PARAMETER MODULATION TECHNIQUE IN TEACHING EMOTION EXPRESSION IN SINGING

Tua Hakanpää

Tampere University, TAMPERE, Finland

Emotions change the habitual coloring of the voice to enhance communication and help the individual adapt to different situations, but it is also possible to deliberately change one’s voice color to make the message one is trying to send clearer. This 50minute workshop introduces a research-based model for teaching emotion expression in the singing voice through changing voice qualities.

The parameter modulation model has been developed from practical grounds through observations and dilemmas pertaining to teaching emotion expression and voice quality changes in singing, to novice students. The technique tries to give guidelines towards establishing a common vocabulary to acoustic and physiological phenomena in the singing voice through a taxonomy of research-based findings. It aims to facilitate easy conceptualisation of emotional voice qualities that can be turned into simple exercises that “anyone” can pick up on.

The effect an emotion has on voice production is that it changes it, and if we want to mimic this biological tendency, we must allow for a little staggering in the voice quality. There are two things to consider: 1) Does the emotional voice quality comply with the aesthetic demands of the music style? 2) Is the emotional voice quality safe to perform?

In this workshop you will get an overview of the parameter modulation technique through easy and fun exercises pertaining the use of different voice qualities in singing. You will participate in doing exercises that address the implications emotions have on teaching and learning and you will learn how to begin to facilitate a safe learning environment for emotion expression. Some of the exercises in the workshop are done using the singing voice, but you don’t have to be a singer to participate. Exercises are easy and you won’t get sweaty doing them.

WS20 (Sa BB 12:00)

I SING THE BODY ELECTRIC - IMPROVISATION AND BODY WORK FOR SINGERS

Sølvi Elise Halvorsen

Bårdar Academy, Kristiania Professional College, OSLO, Norway

Finding genre appropriate and liberating body work are at times an obstacle for performers. For many teachers, one of the true challenges can be to help the student become aware of their own body and how it works. We all have unique experiences, preconditions and build. What feels right for one person, might not always be easy to teach, nor to learn.

One common way of exploring body work is from the perspective of an ideal posture, or from the point of view of manual therapy or Feldenkrais, Alexander technique or other techniques. This active workshop, however, will rather have a focus upon how the philosophy behind musical improvisation can be a tool for achieving desired body work for any style of music.

With an approach based upon ideas about improvisation, body awareness, and with a theoretical platform based on W. Timothy Gallwey's ideas about The Inner Game, we will explore how we can reach for freedom in our voice, through freedom of the body and mind.

Disclaimer: This is an adaptation of a workshop that was accepted for the Eurovox 2020 congress. Because of covid-19 it was cancelled, thus has this workshop never been presented.

WS21 (Fr ChH 17:00)

FROM STAGEFRIGHT TO STAGE-DELIGHT

Birte Heckmann

SLP (freelance)

Stage fright is an ancient physiological body program triggered by anxiety. From an evolutionary biological point of view, the recognition and circumvention of dangers ensured human survival. During today's performance situations, this protective overall program only makes limited sense. In presentations, the increased flow of energy helps us to increase concentration and alertness and increased performance. However, various stage fright symptoms stand in the way of an optimal performance: dry mouth, articulation inaccuracies or non-fluid speech- and singing processes due to limited fine motor skills as well as shortness of breath and the dreaded "blackout" are feared and can set a vicious circle of fear and symptoms in motion.

Through appropriate cognitive and physical exercises, the resulting energy can be positively converted. In this interactive lecture, the phenomenon of "stage fright" is briefly explained and distinguished from the pathological form of speech or performance anxiety. Birte Heckmann gives insights into the possibilities of stage fright coaching and hands-on exercises as well as self-help-techniques in preparation for important performances.

WS22 (Fr A402 12:30)

VOICE BUDDY: THE USE OF APPS IN VOICE THERAPY

Ilse Heus¹, Hanneke Bax²

¹*Het Stemhuis Logopedie en trainingen, Bestemming Bereikt Logopedie, Utrecht University of the Arts, UTRECHT, The Netherlands*

²*Bestemming Bereikt Logopedie, Ruysdael Voice Clinic, Codarts University of the Arts, The Netherlands*

For many people with voice problems it is difficult to do their exercises on regular basis. While practice is a key to the solution of the voice problem. In the Netherlands a speech therapist usually treats a voice client for half an hour a week. The voice client must therefore do most of the work at home by themselves. This requires a lot of discipline, a good mindset, high motivation and great confidence in one's own abilities with exercises that might

be completely new to them. To help clients to practice their skills and therefore resolve or reduce their voice problems several apps are available. But do they actually help and if so: which ones should you choose?

In this 60-minute workshop we will show (through literature research) how an app can have added value in the treatment of voice clients. We will share several apps and will demonstrate one in particular. Participants will work with this app, do exercises themselves and will see from client perspective how an app can be applied in voice therapy.

WS23 (Fr BB 11:00)

KINEMISSION - THE ROLE OF INVERTED AERIAL-YOGA POSITIONS IN THE VOICE RELEASE

Izabela Jezowska

Academy of Theatre Arts, WROCLAW, Poland

The workshop is based on the authorial method of voice release through movement named KinEmission (which refers both to speech and singing), produced in collaboration with a physiotherapist. Numerous exercises with active participants will prove that the movement significantly affects the voice.

One of the most important elements of work in this conception are accessories: rubber expanders, fit-balls, weights, and a novelty: Aerial-Yoga hammocks.

Many positions of traditional yoga work excellent in voice training, but effects of antigravity yoga are even more spectacular. This applies especially in inverted positions, because gravity helps to the respiratory (appoggio) or to muscle relaxation. The author is a professor at the Academy of Theater Arts in Wroclaw, where she teaches vocal technique and voice impostation. I. Jezowska is also a certified trainer of Aerial-Yoga.

As a concerting singer she performed in many cities in Europe (Poland, Italy, Austria, Sweden), and in the world (Mexico, USA). She also lectures at the Polish Academy of Sciences. KinEmission method was presented at numerous scientific conferences (Prague, Salzburg, Riga, Florence, Milan, Stockholm, The Hague) and at the Sibiu International Theatre Festival in Romania.

Number of active participants: maximum 5. Loose sports outfit required, active participants will be able to try hanging on scarves. Workshop for singers and actors. Participants willing to practice are asked to prepare a fragment of a poem or a song.

WS24 (Fr BB 10:00)

VOCAL THERAPY OF BESERMYAN KREZ'

Maria Korepanova, folksinger, PhD

The Besermyans are a small Finno-Ugric people of Russia. They live compactly in the north-west of Udmurtia.

Krez' (originally "крезь") is an ancient vocal genre that exists only in the north of Udmurtia between the Besermians and northern Udmurts. The characteristic features of krez' are improvisational texts with asemantic vocabulary.

A unique phenomenon in polyphonic krezes is that each performer improvises her/his own unique text which is unique and never repeated. It depends on the emotional state of the performer and the reality that is surrounding the singer.

At the master class, there will be a practical approbation of the author's vocal-therapeutic technique created on the basis of the traditional existence of krez'. The author of this technique has more than 20 years of scientific and performing experience.

During the master class, participants will hear what the Besermian krez' sounds like. Also, they will create their

own spontaneous asemantic texts, expressing their own current feelings and emotions. At that stage, they will already feel an internal change of state and at the end they will perform their own tunes.

WS25 (Th BB 12:30)

MINDFUL LISTENING - AN APPROACH TO IMPACTFUL VOCAL EXPRESSION

Ville Laaksonen

Lauhustudio Ville Laaksonen, HELSINKI, Finland

Being present, focused and mindful is essential for all singers. Generally in vocal pedagogy, there is often a strong emphasis on technique, bodywork and lyrical interpretation. Sometimes singers can get a little stuck with these aspects and find it hard to move on to others. Musical interpretation is more difficult to describe with words so there are perhaps less precise and efficient tools for singers to work with it.

Mindful listening is an approach to tune into musical expression. In order to know how you want to express yourself you have to know where you are at each moment. Thinking about for example technique will disturb this process. Mindful listening helps us to stay present, express ourselves in a way that feels meaningful and also be more accepting of where we are with our voice right now.

During this workshop we will go through a set of exercises which improves the ability to listen mindfully. Everyone can join in doing the exercises. After this, a couple of singers will work with their expression while rest of the participants can watch the teaching process. The workshop will end with a short discussion to allow participants ask questions and share their ideas on the subject.

WS26 (Th OH 11:30)

PURENTO -LEARN NEW TECHNIQUES FOR EASING YOUR CLIENT'S MUSCLE TENSIONS!

Kirsti Leppänen

VoiceWell®

Demand for occlusion treatments has increased sharply, and this course has been tailored to meet the need. Purento® - digital course offers you the opportunity to learn new manual techniques at your own pace.

Purento - digital course on manual techniques is developed for treating head, facial & jaw area tensions on clients. The course includes teaching of massage grips and anatomy in the mimetic, mouth floor and occlusion areas. The videos guide you on treatment techniques and areas. Module 1 covers the mimetic muscles in the facial area. Module 2 moves on to the mouth floor muscles below the jaw and how to palpate the hyoid bone. Module 3 studies the occlusal muscles and techniques in the face and inside the mouth. You'll get the access to module 1 right after purchasing the course and rest of the modules open every two weeks.

When you have completed the Purento Digital Course, you will:

1. be able to name the muscles used in occlusion and know their neurophysiological function
2. recognise and be able to "diagnose" the most common occlusion problems and symptoms
3. know the basic manual techniques to help ease tensions around the jaw in massage clients
4. be able to guide and advise clients on preventing pain and tension caused by occlusion

From former students: "The course was very thorough, a lot to learn! The guided videos & anatomical theory was easy to follow."

This workshop is a demonstration of manual treatment of occlusion are for manual therapists working with clients who suffer from tension in their head, facial and jaw area.

WS27 (Fr BB 17:00)

RECLAIMING A NEW IDENTITY THROUGH THERAPEUTIC VOICEWORK AND SINGING FOR PEOPLE WITH NEUROLOGICAL DAMAGE

Eve Lukk

Astangu Vocational Rehabilitation Center; Tallinn University, TALLINN, Estonia

This interactive workshop is designed to inform and demonstrate the approach of therapeutic voicework and singing to improve speech and communication in cases of neurological damage.

Neurological damage caused by stroke, traumatic brain injury or other neurological diseases often leads to severe communication impairments and alterations of the sense of self and identity. Therefore, improving functional communication for people with such impairments even in the chronic phase of slow recovery is imperative to their long-term quality of life and reintegration to the community or labor market.

For this target group, unique rehabilitating training courses with psychosocial and vocational purposes are provided by Astangu Vocational Rehabilitation Center in Tallinn over than 15 years. The individual therapeutic voicework is a part of interdisciplinary treatment for clients with impairments of speech and communication. The intervention set of voicework consists of different therapeutic methods and techniques, i.e. embodied respiratory, rhythm-, intonation- and song-based exercises according to the client's specific needs but the core of the intervention is based on therapeutic intervention triad including auditory (sound and voice), tactile (touch) and kinesthetic (breath and movement) channels of perception.

Participants of workshop will get a brief overview of intervention and learn more about how the voicework is implemented for improvement of self-contact and vocal self-control via video/audio-recorded examples of clients with aphasia, apraxia and dysphonia. Everybody is also invited to perform and experience a set of basic exercises of the therapeutic triad used in assessment and therapy. The part of reflection in workshop, sharing and exchanging experiences, is also very important.

WS28 (Fr ChH 11:00)

BiP™ VOICE TRAINING WORKSHOP CLASSICAL SINGING

Helene Lux Dryselius, Susanna Metsistö

Workshop with practical demonstration of Balance in Phonation Voice Training in classical singing, following the theoretical BiP™ lecture.

The workshop will practically involve the participants and give them the opportunity to examine and explore the bodily sensations of BiP™ voice pedagogy.

BiP™ (Balance in Phonation Voice Training), applicable to both speaking voice training and singing voice training in all music genres, has been developed by the Finnish speech pathologist and voice pedagogue Ritva Eerola. BiP™ strives to find everyone's personal body-mind connected unique voice. The exercises are meant to help the person to understand how to get as sustainable and economical body function as possible and how to benefit from the body's own work to enhance both expression and interpretation.

By developing and strengthening the speaking voice at the speaking voice level, and to stay at that level even when singing, the BiP™ student will discover how the will power of the expressive words will, by itself, establish the suitable subglottal pressure. When this happens the student will find both his unique voice and his interpretation, instead of trying to do the voice and the interpretation.

Approaching voice technique from this angle BiP™ is a well-functioning pedagogy in all kind of voice training. It's a truly workable method in voice therapy - and for speakers of any kind - and in singing with both soloists and ensemble singers. In voice therapy the main goal is to achieve a balanced relation between the body and the throat and in that way to have easier voice production and more sustainable voice. In singing the use of the expressive text will enhance the acoustics and give the singer a tool to improve the joint work in musical collaboration.

Susanna Metsistö is a speech pathologist, poetry performer and a theater teacher. She studied logopedics in the University of Helsinki and theatrical skills in Theater Academy. She is working as a lecturer of voice production and care at the University of the Arts, Sibelius Academy, where she coaches, in addition to the voice production, also poetry performance. She also has a private voice therapy clinic for - mostly - functional voice disordered persons. She is also Certified Course Instructor of BiP™ (speaking voice and voice therapy).

Helene Lux Dryselius is a classical singer, voice pedagogue and owner of Vocalux Voice Studio. She is mainly educated by Ritva Eerola, the creator of BiP™, but has also experience from work with several renowned teachers within interpretation and opera directing. As a Certified Course Instructor of BiP™ Voice Training and with more than 25 years of experience she teaches both classical singers and CCM singers and give further training to voice pedagogues. Apart from the studio Helene arranges Masterclasses and gives lectures and concerts at a freelance basis.

WS29 (Fr ChH 10:00)

BiP™ VOICE TRAINING WORKSHOP CCM SINGING

Helene Lux Dryselius, Susanna Metsistö

Workshop with practical demonstration of Balance in Phonation Voice Training in CCM singing, following the theoretical BiP™ lecture.

The workshop will practically involve the participants and give them the opportunity to examine and explore the bodily sensations of BiP™ voice pedagogy.

BiP™ (Balance in Phonation Voice Training), applicable to both speaking voice training and singing voice training in all music genres, has been developed by the Finnish speech pathologist and voice pedagogue Ritva Eerola. BiP™ strives to find everyone's personal body-mind connected unique voice. The exercises are meant to help the person to understand how to get as sustainable and economical body function as possible and how to benefit from the body's own work to enhance both expression and interpretation.

By developing and strengthening the speaking voice at the speaking voice level, and to stay at that level even when singing, the BiP™ student will discover how the will power of the expressive words will, by itself, establish the suitable subglottal pressure. When this happens the student will find both his unique voice and his interpretation, instead of trying to do the voice and the interpretation.

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Since the BiP™ voice training program has its base in speaking voice training, we would prefer to give three workshops successively, speaking voice, classical singing and CCM singing.

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WS30 (Sa ChH 14:00)

MERGING SCIENCE & ART: ESTILL VOICE TRAINING

Corinne Mager, Luke Steinhauer

Estill Voice International, PITTSBURGH, United States of America

Estill Voice Training leads the way across the globe in voice training and rehabilitation by providing simple tools that enable speakers and singers to achieve their personal vocal goals. Central to its mission is the balance of vocal health and aesthetic freedom. Estill Voice Training accomplishes its goals by merging science and art through progressive research, accessible technology, and innovative teaching techniques.

In this workshop, participants will:

- Explore some of the 13 vocal structures (Estill Voice Training Figures for Voice™) that influence voice quality
- Feel the muscles that move those parts
- Hear the sound change as you move the parts
- See the sound on Voiceprint

Participants will also be able to be coached 1 on 1 and implement Estill Voice Training exercises for vocal control.

WS31 (Th D501 15:30)

THE USE OF DYNAMIC BODY POSTURE IN THE BUILDING OF EFFICIENT PHONO-RESPIRATORY COORDINATION FOR SINGING: EXPLORING THE GDS, MOTOR COORDINATION AND THE BERTAZZO METHODS

Joana Mariz

Faculdade Santa Marcelina, SÃO PAULO, Brazil

This workshop aims to discuss the relationship between the awareness and efficiency of body structure and functional phono-respiratory behaviours for singing.

Through explanations about the functional muscular and articulatory chains theory, by G. Denys-Struyff, the motor coordination theory, by S. Piret and M.M. Béziers, and practical exercises extracted and adapted from the I. Bertazzo Movement Reeducation Method, the workshop will provide basis for the understanding and the practical exploration of the dynamic notion of posture as a foundational aspect of the building of phono-respiratory coordination and breath management for singing.

Participants will be invited to experiment with a series of body awareness and phono-respiratory coordination and singing exercises. They will also be provided with a series of suggestions of how to apply the principles explained in the workshop in their everyday singing studios routine.

WS32 (Th ChH 15:30)

BiP™ VOICE TRAINING WORKSHOP SPEAKING VOICE

Susanna Metsistö, Helene Lux Dryselius

Workshop with practical demonstration of Balance in Phonation Voice Training in speaking voice, following the theoretical BiP™ lecture.

The workshop will practically involve the participants and give them the opportunity to examine and explore the bodily sensations of BiP™ voice pedagogy.

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WS33 (Sa BB 14:00)

WORKING WITH THE MATURE FEMALE VOICE: A RESEARCH-BASED MODEL DESIGNED TO ENABLE THE MATURE FEMALE SINGER SUSTAIN VOCAL COMPETENCY AND HEALTHY

Rebecca Moseley-Morgan

UCL. Chair of Education BVA. Founder and Artistic Director BRAVO (British Ageing Voice Organisation)

Practical demonstration: 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. The workshop with work on the practicalities of training the mature voice either with individual volunteers or the entire group of attendees.

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

Strategies for dealing with the most common issues facing the mature singer:

- Tongue root tension
- Constriction
- Onset
- Agility
- Stamina

Equipment needed: Piano/keyboard

WS34 (Sa OH 10:30)

3D VIDEOSTROBOLARYNGOSCOPY – NEW PERSPECTIVES FOR DIAGNOSTICS AND TEACHING PHONOSURGERY

Dirk Mürbe

Charité-Universitätsmedizin Berlin, BERLIN, Germany

The development of 3D-videostrobolaryngoscopy systems (3D-VSL) has not only led to an improvement in the endoscopic diagnosis of voice disorders, but also opens up new ways of imparting knowledge and training in the field of phonosurgery. Stationary or mobile 3D-VSL devices make it possible to set up virtual teaching cabinets in which trainees can see the procedures of phonosurgery in high resolution and three-dimensional representation. The teaching demonstrations can be designed live or based on structured databases and can thus be called up repeatedly at any time. The additional knowledge gain from three-dimensionality is not only for procedures at the glottic level, but also for detailed assessment of the extent of supra- or subglottic pathologies. In the workshop, the principles and structure of the 3D-VSL will first be presented. Then, exemplary examples for different categories of the phonosurgical database will be shown. In addition to theoretical education, practical training on the model and own surgical experience, the inclusion of a 3D-VSL database is another module for improving training and the associated higher quality of results in the field of phonosurgery.

WS35 (Th A402 18:00)

PUBLIC SPEAKING: AROUSE TRUE FEELINGS WITH YOUR VOICE

Inga Paulsen

Expert for voice and communication, POTSDAM, Germany

In this workshop I share my important tools in my work with entrepreneurs and speakers for touching public speaking.

Moved to tears - inspired and motivated to the tips of your hair - belly aching with laughter. Emotions remind us to be human. When speakers express themselves in an authentic, approachable and clear manner, sympathy is generated in the audience because the vulnerability shown creates a sense of "we". The dynamic parameters of speaking and voice are crucial for 100% authenticity.

The 4 most important tools to retrieve real emotions when speaking: emotional speaking:

- Tact emotions and inner roles We dive into the world of emotions, define nuances and name inner voices of our personality parts.
- Permeability: relaxing the autonomic nervous system Based on the polyvagal theory of Stephen W. Porges, we work on authentic emotional expression, so emotions can come and go.
- Presence and sovereignty: posture, breathing & voice Basics of a classical voice training of the speaking voice.
- Sweaty training with the VR goggles Easy Speech Implementation is everything and best of all directly in front of a real audience in order to get stage fright under control and to deliver high performance efficiently.

During the workshop we want to try out the tools together, apply them and exchange experiences.

WS36 (Fr ChH 16:00)

VOICE GAMES

Anne-Liis Poll

Estonian Academy of Music and Theatre, TALLINN, Estonia

VOICE GAMES. In this workshop A.-L. Poll will present her voice improvisation teaching method Voice Games. It is about one possibility how to work with voice-instrument and one way how to communicate with it. There are two main lines: general voice training and development of creative thinking. She demonstrates how to develop improvisation with voice. Her exercise system is suitable for all teachers and artists who use voice in artistic selfexpression, for all who are interested in work and play with their voice instrument. A.-L. Poll's exercises start from very easy level and have unlimited possibilities for variants. The exercises urge spontaneous energy, train imagination, attention, concentration, memory, listening, different senses and voice technique. What is more important, they wake up aslept creativity and help to understand, human is a creator. A neologism "improvoicing" (in estonian "häikima") is used as a term throughout the exercises, signifying an abridged version of "improvising with one's voice".

In the workshop participants have a possibility to try these exercises in an easy level together with A.-L. Poll.

WS37 (Th CoH 12:30)

COMPARATIVE COMMERCIAL VOCAL STYLES

Lisa Popeil

Voiceworks® - LOS ANGELES, California, United States of America

In this workshop, participants will be able to explore some of the mechanical and stylistic differences between commercial styles such as pop, rock, jazz, and soul and how commercial styles as a group differ mechanically and stylistically from traditional classical singing.

Techniques will include laryngeal positioning; resonator shaping; vocal fold adduction differences; and register control. We'll explore stylistic differences such as phrasing; straight tone to vibrato ratios; dynamic variation; and "stylisms" such as fry, growl, falsetto flips, cry, and pitch slides.

WS38 (Th OS 15:30)

LEARNING TO HEAR DISCRETE VOCAL SOUNDS

Lisa Popeil

Voiceworks® - LOS ANGELES, California, United States of America

Recent advancements in voice science have assisted both singer and teacher in exploring a wide palette of sounds. Additionally, acoustic measuring equipment gives us a clear visual of what happens when the voice boosts or dampens certain frequencies.

However, how can we trust, in the moment of performance or teaching, in our ears and sensations?

Is that belt sound really M1 or a ringy M2 and what does that mean for volume and range possibilities? Are there various way to make a ringy sound? How can we quickly and accurately discern the difference between ring and nasality? There are a variety of nasal-sounding buzzes which may not be true nasal resonance at all.

How do these discrete functions impact vocal health, stamina and stylistic integrity? And when is a constriction

a good constriction?

Specificity in discerning what a singer or voice student is doing is a crucial skill for any singing teacher or speech therapist. In this workshop, we will examine how to determine M1 or M2 on any pitch; differentiate the resonances ring, nasality and brightness; will differentiate 5 types of vocal fold pressing; aryepiglottic vs. LCA/IA effect on vocal fold pressing; 3 types of hypopharyngeal actions; 5 types of buzz (nasality, separate pharyngeal constrictors, vocal fold buzz, hypopharyngeal constrictor; 5 vocal fold adduction differences; and varying vocalis muscle contraction.

All of these parameters can be easily learned and become a vital tool in hearing with specificity so that practical solutions, if necessary, can be provided. Solutions to typical problems will also be presented.

We have a duty as teachers to inspire singers with a myriad of healthy techniques to facilitate their creative and artistic development. So let's get specific together and help make sense of all these choices in our voices!

WS39 (Sa CoH 12:00)

DIFFERENT SINGING STYLES - HOW TO USE VOICE RESEARCH IN VOICE PEDAGOGY? USING INSIGHTS FROM THE 3D MRI STUDY (INSTITUTE OF MUSICIANS MEDICINE, FREIBURG) AND FROM ESTILL VOICE TRAINING

Stefanie Rummel

Institut Rummel & Sing-Teach.com, FRANKFURT, Germany

In voice pedagogy, voice research can be very helpful to understand more clearly how sounds are vocally produced. Especially for different singing styles, a clear anatomical and acoustic understanding of the vocal tract configurations for the different vocal styles is very helpful. Singers, actors, speakers and speech therapists can then produce sounds with more control and in a healthier way.

In this master class results of the 3D MRI study of the vocal tract configurations and acoustics in different singing styles are used. We have a deeper look at 7 different Estill Voice Qualities and their variations, which are used in contemporary commercial music as well as in classically western style of singing: (Speech, Falsetto, Sob, Nasal Twang, Oral Twang, Opera, Belting)

See also the talk of Rummel et al.: Different singing styles and 3D MRI Data analysis: Vocal tract configurations and acoustic properties derived from Estill Voice Training.

The different vocal tract configurations can be printed out in 3D. They can be touched and more directly understood. In a short PowerPoint presentation the 3D vocal tracts can be seen and can be compared. The participants will see 3D models and connect the theoretical and visual input with their own anatomical vocal tract configurations. They receive very clear anatomical guidance on how to produce different vocal styles as much the time of one hour allows. Participants will understand more clearly what impact these anatomical settings have on their vocal sound production.

It will be shown how the acoustic analysis and direct visual feedback in singing and speaking through i.e. spectrograms and powerspectrums support the singers in their voice control, especially when they sing different styles or want to stay in a certain style.

Some selected participants are invited to record a phrase, listen to it, practice it in different voice qualities and reflect the changes with the help of visual and acoustic feedback through recordings.

WS40 (Th BB 17:00)

VOCAL CARE TRAINING AND MENTAL TECHNIQUES FOR THE MIX VOICE

Danila Satragno

Ylenia Baldo Conservatorio 'Giuseppe Verdi', MILANO, Italy

Sessione teorico pratica per la voce artistica.

La voce : una carta d'identità'.

La visione globale della voce tridimensionale: voce- corpo, voce- mente, voce-anima. Il potere della mente e le tecniche veloci di integrazione per gestire le emozioni.

Il wellness delle corde vocali : la cura l'ascolto del corpo

Allenamento propriocettivo in autonomia. Training in onde alfa.

Dal pensiero-suono alla fonazione. Creare con le mental techniques.

Esercizi di Body E- motion e Brain Gym.

Percezione ed approfondimento dei meccanismi vocali e studio del mix: m 1 in mix 2 e m2 in mix 1

Prova pratica delle cinque fasi dello studio: respirazione riscaldamento, allenamento, repertorio, raffreddamento.

Improvvisazione e creazione in tempo reale.

WS41 (Sa BB 10:30)

NEUROLARYNGOLOGY

James P Thomas

Voicedoctor.net, PORTLAND, OR, United States of America

Visual Neurolaryngology Workshop

Visual diagnosis of laryngeal neurologic impairments is not only possible, but is likely the most accurate method for evaluating the neurologic status of the larynx. An endoscopic/stroboscopic examination coupled with vocal tasks reveals the action of each muscle selectively. Although electromyography is a valuable tool, it is a cumbersome examination, uncomfortable for the patient and difficult to interpret. A careful and detailed endoscopic evaluation seems at least as precise.

In this workshop, the attendee will learn techniques to:

fully evaluate the Xth cranial nerve

isolate the actions of each intrinsic muscle of the larynx

choose vocal tasks to highlight individual branches of laryngeal innervation

choose video hardware/software for recording the larynx

choose video hardware/software for reviewing laryngeal motion/findings.

Each time a neurolaryngeal impairment is suspect, a complete video recording of an endoscopic neurolaryngology examination begins in the mouth and nasopharynx, examining all of the muscles innervated by the Xth cranial nerve, not just the vocal cords. Then the addition of topical anesthesia, observation during respiration, stroboscopy during a set of vocal tasks, and post examination slowing of laryngeal movement leads to accurate findings in neurolaryngeal diagnosis.

Principles of the neurolaryngology examination include:

Each muscle has only a single action. That action can be;

elicited

isolated

visualized,

The patient always attempts to compensate and the examiner's goal is to remove compensation in order to better visualize the neurologic impairment.

The attended of this lecture will learn to distinguish endoscopic visualization of paralysis, paresis, synkinesis, dyskinesia, fixation, tremor, spasm, and reinnervation. Extensive use of video recordings support the precepts.

A color booklet accompanies this workshop. It can be downloaded for printing at <https://www.voicedoctor.net/neuro>

WS42 (Fr BB 16:00)

THE HEARING AS A PREDICTIVE TOOL FOR OBJECTIVE VOICE ANALYSIS AND LARYNGOSTROBOSCOPY

Gertie Van den Driessche, Charlotte Vande Woestyne

Voice Clinic AZ Sint-Jan hospital, BRUGGE, Belgium

Perceptual analysis is a fast and cheap way to form an opinion about voice quality. Not only does it contribute to a correct categorization of voice type and voice disorder, it also gives an indication to set up therapy goals. If we train the hearing to discriminate certain voice characteristics, we can in a way predict the outcome of objective analysis and laryngostroboscopy. This will help us to diagnose more accurately, because we are more aware of what to search for.

In this workshop we focus on the different parameters of the GRBAS scale, developed by Hirano. Each parameter has its own impact on objective voice measurements and ENT-examination. As this is well documented in literature, we have listed an overview of the most important findings, to set up an evidence-based framework.

We will present several case studies to translate the literature findings into practice. For each case we first describe a short anamnesis and then we listen to the patient's voice. Based on this information, we formulate hypotheses about the laryngostroboscopy and objective voice measurements. Then we compare our hypotheses with the patient's detailed voice report: fundamental frequency, jitter, shimmer, maximum phonation time, phonetogram, spectrogram, AVQI, DSI and laryngostroboscopy.

WS43 (Fr OS 11:00)

VOCAL JAZZ TECHNIQUE

Katrien Van Opstal

Royal Conservatoire of Antwerp, ANTWERP, Belgium

Working with anatomy and kinesthetic perception to mix the sound you want in different vocal jazz styles.

In this workshop, you learn about connecting the anatomy of the voice with typical sounds of different jazz styles. You discover how to hear, feel, train, and choose different anatomical aspects of your voice like your true vocal folds, thyroid cartilage, or soft palate using simple sounds like talking, sighing, and crying. With the visual aid of the Mixing Table Model you learn how to apply this insight to mix the sound to improve your singing in different jazz styles in an efficient way.

We will practice with group exercises. We apply the newly obtained knowledge to a jazz standard. The clear built-up makes sure the exercises are suitable for beginners in all styles as well as the advanced jazz singer. Clarifying, analytical, and effective.

This workshop is based on research conducted at Royal Conservatoire of Antwerp that combined 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 a Mixing Table proved to be an effective tool to analyze a sound and to choose different vocal behavior in different styles of jazz.

About the author: Katrien Van Opstal is a graduated jazz- and pop-singer and a researcher at the Royal Conservatoire of Antwerp. In 2017, she presented on PEVOC12 in Ghent her workshop "Effort or Tension" the first findings of her research. In 2019 she presented on PEVOC13 in Copenhagen her workshop "Style, Sound and Voice Production". She is a certified Estill Master Trainer. As a student, she was trained in Pahn-therapy, Linklater, Lichtenberger, Alexander-technique, and 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.

WS44 (Th BB 18:00)

THE SINGER INSIDE OUT

Katrien Van Opstal, Vanessa Matthys

Royal Conservatoire of Antwerp, ANTWERP, Belgium

Singing is about conveying emotions to an audience with your voice. These emotions of a singer have their effects on his or hers anatomy. A number of studies have explored the effect of the emotional state on the voice and how to avoid a conflict between the two. Fear for instance causes a tightening of the false vocal folds and the voice becomes unstable or tight. But what if we use emotions in favor of a specific setup of the voice? What if we find a way to dig deeper into the emotions in a song to help the voice production system to produce a desired sound?

In this workshop, you learn about the influence of emotions on your voice and vice versa. You gain insight into the relationship between feelings and the anatomical functioning of your voice. You will become aware of your own voice usage. You learn how to interpret music and how to let your sound reflect your interpretation. You discover how digging into emotions can even improve your vocal technique. We will practice with breath, sounds, words, and music.

Katrien Van Opstal performed research on the anatomy of the jazz voice and clarified how to produce a certain sound. That's the first part of the story, the vocal technique. The second and unexplored part goes the other way around. Clarifying the connection between emotions and the voice production system will enable vocalists to enhance artistry and train vocal technique at the same time. As these two are too often separated, this will produce a unique outcome for all vocal artists.

The underlying research is conducted by Van Opstal and Vanessa Matthys at Royal Conservatoire of Antwerp and used insights of the Polyvagal Theory (Porges), Nonviolent Communication (Rosenberg) and the Mixing Table Model (Van Opstal).

About the main author: Katrien Van Opstal is a graduated jazz- and pop-singer and a researcher at the Royal Conservatoire of Antwerp. In 2017, she presented on PEVOC12 in Ghent her workshop "Effort or Tension" the first findings of her research. In 2019 she presented on PEVOC13 in Copenhagen her workshop "Style, Sound and Voice Production". She is a certified Estill Master Trainer. As a student, she was trained in Pahn-therapy, Linklater, Lichtenberger, Alexander-technique, and Complete Vocal Technique. She is the founder of "GelijkgeSTEMd" where she trains singers, actors, and speech therapists with her knowledge of the voice. She shares the stage with many jazz musicians from all over the world.

WS45 (Th A402 17:00)

WHAT STYLE OF PRACTITIONER ARE YOU?

Jenevora Williams

Vocal Health Education, Evolving Voice, GUILDFORD, United Kingdom

The workshop session is an opportunity to explore your style of interaction with a client, and to evaluate your strengths and bias. What are your strengths? How can you work to fill the gaps by developing your strengths rather than addressing your weaknesses? We will be exploring how we make decisions and using some psychometric games. This workshop will involve small group work as well as larger group discussion.

The participants will need pen and paper.

WS46 (Th OS 12:30)

NAVIGATING THE MUSICAL THEATRE FILTER(S): A VOWEL GUIDED APPROACH

Kevin Wilson

The Boston Conservatory, BOSTON, United States of America

Teaching musical theater is a complex task requiring technical understanding, nuance, and great flexibility in teaching strategies. The current industry focus is on aesthetic qualities without intention of securing a foundation of technical cultivation requiring sostenuto, breath navigation, articulatory freedom and balance, and resonance strategies. In this workshop presentation, we will work to aesthetically define the various legit, mix, and belt concepts and perception. We will discuss cultivation of a foundation of the "neutral voice" for the musical theater singing and the systematic flexibility that is necessary to functionally navigate the aesthetic needs from the various sub-genres of Musical Theatre. There will be discussion for navigation concepts of the "flexible" passaggio for AFAB and AMAB voices to organize the filter for not only aesthetic qualities but also healthy cultivation and voice access. An in-depth discussion of open and closed vowel production and their perceived influence on weight, color, and registration as well as a presentation of systematic organization of the voice for musical theater singing will occur. In addition, a discussion of tools to help your student discover what their voices and bodies already know how to do, versus what we prescribe them to do. Participants will leave with a clearer understanding of cultivation a foundation for Musical Theatre singing as well as a concepts and strategies for cultivating aesthetic qualities of contemporary and standard legit and standard and contemporary belt/mix.

WS47 (Th CoH 15:30)

VOICE CARE CORNER WORKSHOP

Susan Yarnall Monks¹, Lieve Jansen²

¹*President of European Voice Teachers Association EVTA; University of Chichester, CHICHESTER, United Kingdom*

²*EVTA Vice President, Belgium*

EVTA proposes a practical workshop based on our successful 'Voice Care Corner' that has taken place at a variety of international choral music festivals across Europe. This has been offered as a drop-in facility at these events. Singers, conductors, composers could come and ask any kind of question on vocal/singing challenges. General advice on vocal health, safe singing, good choral practice, changing from soloist to choral singer and vice versa were made available, plus exercises for warm-ups and cool downs.

For this workshop we will offer advice for real life musical situations which will be presented by two singing teachers from our EVTA associations. We shall speak briefly about the experiences collected so far and offer similar exercises during this hour long work-shop. The emphasis is on practical and enjoyable singing.

10 minutes: Introduction on the Voice Care Corners established so far in Tallinn, Aarhus, and Utrecht, led by Susan and Lieve

10 minutes: Warm up exercises for all participants

20 minutes: Common vocal challenges that have been consistent in our Corners: discussion and practical suggestions

10 minutes: Cool down exercises and general advice on voice health for all participants

10 minutes: Questions from the floor

FREE PAPERS

FP1 (Th A103 15:30)

HEALTHY EXTREME VOCALS – A RETROSPECTIVE LONGITUDINAL STUDY OF VOCAL HEALTH IN 20 SINGERS PERFORMING AND TEACHING ROUGH VOCAL EFFECTS

Mathias Aaen^{1,2}, Anna White¹, Cathrine Sadolin², Julian McGlashan¹

¹*Nottingham University Hospitals, NOTTINGHAM, United Kingdom,*

²*Complete Vocal Institute, Denmark*

Introduction: Vocal health is of utmost importance to professional voice users. Vocal health is specifically importance when performing advanced vocal techniques, such as rough sounding vocal effects. Rough vocal effects have been anecdotally considered unhealthy, however, research to support this claim has not been presented. Snapshot studies of vocal health give a good impression of acute strain, whereas longitudinal studies demonstrate the long-term effects and sustainability of vocal loading habits. Scarce research has been published documenting snapshot health of rough sounding vocal effects, and no longitudinal data has been presented. The aim of this research was a longitudinal health documentation of singers and teachers performing and teaching rough sounding vocal effects.

Methods: 20 singers participated in the study. The study reports SVHI scores, GRBAS evaluations, and endoscopic assessment using RFS and SRS scales with a 14-year interval. Endoscopic materials were collected using a flexible videonasendoscopic camera system into the laryngostrobe system, which captured and synchronised images, acoustic, and EGG signals

Results: SVHI averages in 2007 were 9,2 with an average GRBAS score of 0. The subset of singers that responded to the 2021 follow-up request had an average SVHI of 9,65. The average SVHI scores in 2021 decreased by 44% to an average value of 5,12 with an average GRBAS of 0. On endoscopic evaluation all singers were healthy with normal-looking larynxes, tissues, and mucous membranes, with healthy-looking mucosal wave vibrations of the vocal fold tissues, and no apparent pathology or structural abnormalities.

Conclusions: The study documents the health of performing using rough vocal effects when using appropriate techniques for the sounds. The participating singers were healthier on follow-up than at the initiation of the study, while having performed and taught vocal effects for a 14-year period.

FP2 (Th A103 15:45)

DEGREE OF THYROID TILT ON SAME-PITCH PHONATION AS DETERMINED BY PHONATION DENSITY – CORRELATING ENDOSCOPIC ASSESSMENTS WITH EGG MEASURES

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Introduction: Recent research document a thyroid forward tilt related to vocal fold length changes, independent of fundamental frequency, association with the perceptual parameter of 'density'. Several studies using laryngostroboscopy, CT, MRI, and inverse filtering have demonstrated the physiological and acoustic impact of singing with reduced density. Statistical correlations between vocal fold oscillatory characteristics, e.g. EGG and acoustic measures covered in multidimensional voice profiles, and laryngeal gestures have not been presented for the parameter of phonation density. The aim of this research was to statistically and systematically correlate endoscopic assessment ratings with objective MDVP measures.

Method: 20 professional singers were recorded using laryngostroboscopic examination, EGG, and a microphone at a constant distance while performing fuller and reduced density conditions of four phonation types, namely the vocal modes Neutral, Curbing, Overdrive and Edge from Complete Vocal Technique, as well as performing a falsetto condition. Singers sustained the vowel 'EH' as in 'Stay' for all modes, except Curbing, where the vowel

'UH' as in 'hungry', at C4 for males and B4 for females. Two independent assessors rated still images chosen from the endoscopic data across 31 laryngeal features, followed by a forced consensus paradigm assessment. Statistical significance differences were assessed by fixed two-factor GLM, Manova, and post hoc tests. Correlations were calculated using Spearmann's Rho.

Results and conclusions: The study finds that only thyroid tilt varies with statistical significant differences for the reduced vs the fuller density conditions for both males ($F=51,59$; P.E.S. 0,665; $p=0,00$) and females ($F=32,14$; P.E.S. 0,628; $p=0,00$). A trend of decreased Qx, SPL, and CPP was observed for all reduced density conditions, with increased HNR. Thyroid tilted conditions correlated with statistical significance with decreased Mean SPL but not Qx.

FP3 (Th A103 16:00)

DECONSTRUCTING TIMBRE INTO 5 PHYSIOLOGICAL PARAMETERS: VOCAL MODE, AMOUNT OF METAL, DEGREE OF DENSITY, SIZE OF LARYNX, AND SOUND COLOURING

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Introduction: Timbre has been related to adjustment at the source and adjustments in resonance, including laryngeal height and hypopharynx area and volume. However, it is often presented in vocal pedagogy as solely related to resonance. Very little data is available on the laryngeal adjustments at both source and resonance involved in achieving various timbres across a variety of phonation types.

Purpose: To systematically assess the independent laryngeal adjustments at the source and independent adjustments in the vocal tract necessary to obtain the lightest and darkest timbral extremes for four different phonation types.

Methods: Twenty-one professional singers were recorded by laryngostroboscopy and EGG while producing a sustained vowel "EH" as in "stay" in four phonation types ("UH" as in "hungry" for one type), varying the sound coloring to the lightest and darkest of their ability without altering pitch, vowel, or loudness. A systematic assessment protocol of 31 laryngeal gestures was developed for objective assessment.

Result: Darkening and lightening the sound color involved altering the size of the vocal tract space by lowering/raising the larynx, widening/closing the piriform sinuses, increasing/decreasing the distance between stylopharyngeus and palatopharyngeus, increasing/decreasing a-p narrowing, medialising/retracting ventricular folds, and altering supraglottic funnel depth. The phonation types could not be colored equally. Female singers exhibited less coloring variation. Classical singing exhibited both lightening and darkening colouring features.

Conclusions: The singers were able to produce different timbres within each of the investigated phonation types by coloring the sustained note darker or lighter using laryngeal adjustments. Timbre is deconstructed as a perceptual artefact defined by (1) choice of vocal mode, (2) amount of metallic character, (3) degree of density, (4) chosen sound color, and (5) natural size of the larynx and vocal tract.

FP4 (Th A103 16:15)

EXTREME VOCAL EFFECTS DISTORTION, GROWL, GRUNT, RATTLE, AND CREAKING AS MEASURED BY ELECTROGLOTTOGRAPHY AND ACOUSTICS IN 32 HEALTHY PROFESSIONAL SINGERS

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Vocal effects with the intention to sound hoarse are used as part of many genres, yet scarcely documented in research. Physiological studies detail the involvement of supraglottic structures for the production of vocal

effects, yet the acoustic impact of such involvement has not been documented systematically across phonation types.

Purpose: To report acoustic and EGG-specific measurements for the vocal effects Distortion, Growl, Grunt, Rattle, and Creaking across phonation types to demonstrate differences between notes with and without vocal effects added.

Methods: Thirty-two professional singers and singing teachers produced sustained vowels in each of the four vocal modes with alternations of with/without vocal effects. The singers were recorded with a microphone at a constant distance as well as with EGG.

Results: The vocal effects Distortion, Growl, Grunt, Rattle, and Creaking impact the acoustic spectra in separate and systematic ways across genders and phonation types. Each vocal effect impacted the spectrum in specific and particular frequency regions between 0 and 3.5 KHz as well as in higher partials after 12 kHz with statistical significance. EGG-waveforms were un-impacted by most of the vocal effects produced using supraglottic sound sources, whereas Grunt and Creaking conditions did impact EGG-waveform signals, though not consistently between participants. EGG measures confirmed sustained and unchanged Qx and Fx for most conditions, with statically significant changes in noise measures HNR, NNE, RAP and CPP, despite Mean SPL differing significantly only for a few conditions. Singers scored an average of 5,95 on Voice Handicap Index questionnaires.

Conclusion: Vocal effects added to phonation produce specific and systematic frequency region impact. Vocal effects can be added to different phonation types with differing acoustic output and singers were able to sustain and control involvement of supraglottic sound source(s) independently of phonation type.

FP5 (Fr OH 17:15)

VIBRATO DYNAMICS IN GROUP SINGING: UNDERSTANDING VIBRATO BEHAVIOUR THROUGH DYNAMICAL SYSTEMS THEORY

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Introduction: Previous studies of vibrato in choral singing have reported preliminary results of synchronization [1] and highlighted limitations of sample size and approaches to time domain analyses. An area that could bring further insights is Dynamical Systems Theory, which focuses on qualitative behavior, geometry, and complexity quantification using concepts such as entropy and chaos [2].

Objective: To apply dynamical systems analyses to the study of vibrato in duet singing using vibrato oscillations as variable states of a two-dimensional system.

Method: Coupled vibrato signals were simulated in Matlab. We used (a) sine waves with different amplitude and phase configurations, and (b) the solutions from a mathematical model that presents bifurcations between different dynamics and oscillations. The sets of vibrato signals were normalized to be bounded between 100 cents of extent and (5 Hz to 8 Hz) of rate, which correspond to the standard vibrato parameters. The trajectories of vibrato interactions were plotted in 2D projections of the phase space.

Results: In a perfect synchronization scenario, the dynamics from sine waves create a line identifying either positive or negative relationships. With the introduction of nonlinearities and more complex phase interactions—as is likely the case in group singing—the trajectories of the duet singing start to behave as orbits that can show different patterns of interaction.

Conclusions: Tools from dynamical systems such as the phase space visualization could be helpful for understanding the interaction of voices and vibrato in group singing. As future work, we will consider possible applications in vibrato synthesis, as well as further analyses from nonlinear dynamics in real voice recordings.

References: [1] Daffern, H. (2017). Blend in singing ensemble performance: Vibrato production in a vocal quartet. *J Voice*. [2] Matassini, L. et al. (2000). Analysis of vocal disorders in a feature space. *Med Eng Phys*.

COMPARISON OF TWO SPECIAL WARMING UP SECTIONS ON THE SINGING VOICE

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Aim: in generally – singing coaches - use for singing warming-up special tasks. We tried to compare two different task lines. The theoretical background of the first was the so called “Linear model” (source-filter), of the second the “Non Linear model” (interaction of the inertia within the vocal-gap and the vocal tract) describing the function of the singing voice. With analysing the acoustical parameters of the FFT figure of the recorded sustained vowels we found special differences.

Method: we recruited 24 – 15 females, 9 males - university students, who took part on several years singing voice training. We organised two different occasions for special warming-ups. The participant came for the occasions without any previous warming-up. Before and after the warming-ups we recorded 3 sustained vowels - [i, a, u] - with females at G4, with males at G3 pitches. Both of the occasions we began with breathing exercises, and used the same melodies. The applied different syllables contained only during the recordings applied 3 vowel. At the first occasion we applied only syllables formed with voiceless spirant consonants. At the second occasion we applied humming, by us developed nose-pipe and syllables formed only with voiced plosive consonants. We analysed – with the help of SIGVIEW program: the signal mean and SNR of different sections of the FFT figure, the volume of f0, H1, H3, H5, H7 and during the occasions reached voice range.

Result: both of the warming-up occasions had significant effects on the analysed parameters. For the whole group at every vowel the second occasion had more, especially for vowel [i] and [u]. For female sub-group the second occasion had more significant effects for vowel [i] and [a], but for the females the first occasion was more effective for vowel [u]. Detecting - during the occasions reached voice range - the second warming-up tasks were significantly more effective.

Conclusion: we know that the headcount of the experimental group was not too high. So we may draw careful conclusions. We may offer both of the warming-up tasks for developing the singing voice quality. After all we may state firmly that for widen the voice range – the tasks of the second occasions – are more effective.

CLINICAL INVESTIGATION OF THE EFFECTS OF SURFACE NEUROMUSCULAR ELECTRICAL STIMULATION ON SUBJECTS WITH UNILATERAL VOCAL FOLD PARALYSIS AT THE MEDIAN AND PARAMEDIAN POSITIONS

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Neuromuscular electrical stimulation (NMES) is an established treatment method for neurogenic disorders. For voice therapy, NMES is commonly applied using predetermined electrode placement with 80 Hz as the frequency of stimulation. However, a modified approach has recently been used where smaller electrodes targeting the cricothyroid muscles are used for improving glottal adduction and raising the fundamental frequency of the voice. The aims of this study were to assess and contrast the effectiveness of this modified approach on two different types of unilateral vocal fold paralysis (UVFP).

Two subjects with UVFP underwent a 12-minute-long NMES session, once a day for five days. Acoustic, electroglottographic, self-perceived assessment, maximum phonation time and relative fundamental frequency measures were carried out. Five seconds of work-rest time with 3-seconds of ramp time at amplitudes between 4.5 to 5.5 mA was used at 10 and 80 Hz. 10 Hz was used on days 1, 3 and 5 and 80 Hz used in the remaining days.

Pre versus pro analysis revealed an overall daily improvement in acoustic data and MPT for both subjects. The subject with UVFP in the paramedian position showed better results with greater improvement from baseline values. The participants' voice improved, and they reported that the treatment was not painful. They also reported a positive proprioceptive feeling of the larynx and stronger and more sonorous voice immediately after intervention.

The use of short surface NMES sessions for UVFP was shown to have a positive effect on voice quality. Likely due to the electrode placement used in this study, changes were more significant for the subject with the vocal folds paralysed in the paramedian position. The NMES method used in this study is well suited for this specific configuration of the UVFP, and additional electrode placements should be used with subjects in which the vocal folds are paralysed more medially.

FP8 (Th D501 11:30)

PRESSURE, FLOW, AND GLOTTAL BEHAVIOUR COMPARISON BETWEEN THE ACAPELLA CHOICE DEVICE AND SILICONE TUBE PHONATION

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Vibratory positive expiratory pressure (PEP) devices have recently been incorporated as a resource for voice therapy. They resemble silicone tube phonation (STP) in the sense that both involve lengthening of the vocal tract with an additional source of vibration in the vocal tract. PEP devices produce a strong modulation in intraoral pressure and flow values affecting the vocal fold vibration pattern. However, details about the behaviour of STP with regards to its impact on the voice via changes in the pressure and flow profiles in the vocal tract are yet to be investigated. This study compares the impact of phonation into the Acapella Choice (a type of PEP device) and STP on the voice.

Three normophonic subjects underwent high-speed videoendoscopy assessment while pressure, flow and electroglottographic data was collected. For STP, water depths between 2 and 12 cm were used. The data was analysed with emphasis on the low frequency oscillation component (produced by the water bubbles or flapping mechanism of the PEP device) and the high frequency component produced by the vocal folds.

Phonation into the Acapella device generates large changes in the pressure and flow profiles producing systematic changes in the impedance of the vocal tract. This, in turn, systematically modulates the vibration of the vocal folds producing moments when vibration is aided and hindered. A similar behaviour is seen during STP, however due to the lower changes in intraoral pressure and irregular releasing of the bubbles into the water, the impact on the vocal folds is less pronounced and more unpredictable.

PEP devices are more efficient in modulating the pressure and flow profiles in the vocal tract than STP. The large modulation in the vocal fold vibration pattern produced by the PEP device may be considered an important component of therapy (in specific, the massage effect) which should be taken into consideration when designing specific treatments for voice disorders.

FP9 (Fr CoH 11:45)

A NEW TWO-DIMENSIONAL SCHEME FOR ARRANGING VOICE DISORDERS

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Objective: Different schemes that have been used for arranging voice pathologies have shaped theoretical and clinical views and conceptualization of the pathologies, and of the field as a whole. However, the available

schemes reveal inconsistencies and categorical overlaps. This study was aimed to develop and evaluate a new approach for arranging voice pathologies, using two continuous scales: Organicity and Tonicity, which are then used to construct a two-dimensional plane.

Methods: Forty-five international experts in the field of laryngology and/or voice disorders were initially approached. Of them, 39 have completed a survey on an online platform, in which they rated a comprehensive list of voice/laryngeal pathologies and conditions using two continuous scales: Organicity and Tonicity. On the Organicity scale, 0 represented 'non-organic', and 10 represented 'organic', whereas on the Tonicity scale, 0 represented 'hypo-tonic', and 10 represented 'hyper-tonic'.

Results: Cronbach's alphas were high for both Organicity and Tonicity (.98 and .97, respectively). Interrater agreement was moderate to very-strong ($\text{rwg} \geq .50$) for most pathologies. Correlation between the two scales was moderate and negative ($r = -.38$, $p = .03$). The pathologies were scattered across the full range of both scales, and across the four quadrants of the two-dimensional plane, confirming continuity and bi-dimensionality of the new arrangement scheme. In addition, a Latent Profile Analysis revealed that the a 4-cluster solution is valid, roughly corresponding to the four quadrants of the constructed plane.

Conclusions: This study introduced and provided empirical support for the use of a two-dimensional scheme, based on two continuous scales, as a new arrangement scheme for voice disorders. The new approach provides a valid representation of the field, beyond specific etiologies. This simple though comprehensive scheme is expected to facilitate new insights on the nature of voice pathologies, considering inter-pathology similarities and differences.

FP10 (Th A103 12:45)

VOICE MODIFICATION - THE EFFECT OF THE TECHNIQUES TWANG AND MEDIALISING IN TRANS WOMEN

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Statped, OSLO, Norway

Objectives: This study explores the outcomes of a combination of the techniques twang and medialising in five trans women seeking voice feminization. The outcomes were measured both acoustically and perceptually.

Method: Five trans women took part in the study, and in addition five control female speakers and five control male speakers. A list of 14 monosyllabic words was created, where the vowel /a/ was embedded in various consonant contexts. All participants were asked to read the word list three times, each time presented in a different order. The trans women also read the word list before and after intervention.

Acoustic analyses of fundamental frequency, and the first, second and third formant frequency were conducted. For the perceptual analysis, 60 voice samples were selected from the entire material.

15 listeners were asked whether they perceived the voice samples as feminine, masculine or uncertain. The listeners were also asked for gender judgements of sentences which were read by the trans women after intervention.

Results: The acoustic analyses revealed an increase in fundamental frequencies, and first, second and third formants after intervention for all five trans women, approaching the values of the female control group. The perceptual judgements showed that the majority of the trans women voice samples were perceived as feminine after intervention.

Conclusions: Based on the acoustic analyses and the perceptual evaluations, the conclusion seems to show that the combination of the techniques twang and medialising enable the trans women participants to feminize their voices. Nevertheless, the study is too small for generalizations. However, a take-home message from the results, is that it will be appropriate to focus primarily on resonance, in addition to fundamental frequency, in voice modification and feminization.

THE ROLE OF TYPICALITY IN SINGING VOICE PREFERENCES

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Objective: A song can be performed by different singers, but we like some versions more than others. Research on the speaking voice shows that people tend to prefer typical/average voices. We focus here on the singing voice and investigate the role of typicality in listeners' preferences for performances in both popular and classical singing styles.

Methods: Seventy-nine participants with varying degrees of musical expertise were invited two times to report, in a pairwise comparison paradigm, (i) their preferences for and (ii) typicality rating of performances in classical or popular styles. They listened to and compared eight versions of the first musical phrase of "Vocalise" Op.34, No.14 by Sergei Rachmaninoff or eight versions of the entrance theme of "Don't worry, Be happy" by Bobby McFerrin. All performances were recorded by singers highly trained in either classical or popular styles, respectively.

Results: Correlation analyses between testing sessions and between participants showed limited intra-rater consistency (about 1/3 of test-retest correlations reached significance) and low agreement (only ~ 6% of the between raters correlations reached significance) when evaluating the typicality of the performances. While people differed in what they found typical, they preferred "typical" voices. Indeed, mixed effect models were significantly better when including typicality ratings as a fixed effect, particularly in the case of classical singing, and this variable explained up to 30% of the variance in preference ratings.

Conclusions: Typicality plays a role in singing voice preferences, at least when listening to popular and classical performances. However, the judgment of typicality varies across listeners. On-going acoustic analyses of the singing performances aim to clarify listeners' notions of typicality, their relation with averageness and perceptual experience, and ultimately to understand the roots of singing voice preferences.

GROWL, SCREAM AND WHISTLE. CAN EXTREME VOICE TRAINING IMPROVE NORMAL SINGING CAPABILITIES?

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This presentation discusses research on a group of 18 singers to identify the effects of training on the ability to manage extreme chest and head voice in the normal singing voice. Participants underwent instrumental examinations prior to extreme training (sonogram, spectrogram, phonetogram, phoniatic endoscopic examination) and again repeated the same examinations after training. Nine singers underwent extreme training for whistling, the other nine participants underwent extreme training for supraglottic sounds, growl, and scream. Results on passage, dynamics, formant tuning, and extension are shown. The proprioceptive results reported by the research participants are also shown. The presentation ends by showing how the ability to manage extreme mechanisms can help in management of the singing voice in all mechanisms. Bruni training for extreme supraglottic voice and Biavati training for whistle are used in the research.

PHONATION TYPE CLASSIFICATION ON THE VOICE MAP OF NORMOPHONIC ADULTS AND CHILDREN

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For the analysis of voice, much work has been done with a multitude of EGG and voice metrics, of which only a few have proven to be robustly correlated with clinical vocal status. In particular, all metrics are affected by fundamental frequency and level, making voice assessment sensitive to the sampling. It was investigated whether combinations of metrics, acquired over voice maps rather than with individual sustained vowels, can offer a more intuitive and comprehensive interpretation. In this descriptive, retrospective study, 47 normophonic subjects were instructed to phonate on /a/ over their full voice range. Acoustic and EGG signal features were obtained for every phonatory cycle. An unsupervised voice classification model created feature clusters, which were then displayed on voice maps. These maps can be more readily interpreted in terms of phonation types. For example, the typical intense voice has a high peak EGG derivative, relatively high contact quotient, low EGG cycle-rate entropy and a high cepstral peak prominence in the voice signal, all represented by one cluster centroid that is mapped to a given colour. Or, in the transition region between non-contacting and contacting of the vocal folds, the combination of metrics shows low contact quotient and relatively high entropy, which can be mapped to a different colour. The distributional features inter-and intra-subject are discussed. It is also interesting to compare the resulting regions on the map with perceptual assessments, and even to let perceptual assessments inform a supervised learning instead. The goal is to monitor changes in such voice maps across interventions, thereby to help voice professionals to assess and diagnose voices

BACK TO THE FUTURE : CURRENT VALUE OF THE TEXTS OF ITALIAN LARYNGOLOGISTS AND SINGING TEACHERS OF THE LATE NINETEENTH - EARLY TWENTIETH CENTURY

Orietta Calcinoni

Private Practice: Voice & Music Professionals Care Team – VMPCT- MILAN, Italy

From second half of XIXth and first half of XXth century, in Italy developed and from Italy spread a culture of shared experiences between main Laryngologists and Singing Teachers of those times.

Carlo Labus was the first of them. He opened in Pavia University his course of Laryngology, the third in Europe after Wien and Berlin, where he studied in 1869 to 1873. He was corresponding associate of American Laryngological Association and Archives of Laryngology of New York, foreign member of the French Society of Otology and Laryngology, correspondent with *Revue Mensuelle de Laryngologie - Bordeaux-* and *Revue Mensuelle de Laryngologie, d’Otologie et de Rhynologie - Paris-*.

In 1876, in Italian National Congress of Medicine he held the first session of Laryngology in the world - and opened in Milan one of the first public practices of Laryngology in the world-.

He promoted in Milan in 1880 the first International Congress of Laryngology, with 122 experts like Morell Mackenzie, Lennox Browne, Massei, Fournié, Stork, Krishaber, Eisberg, Zaverthal, Frua, Urbino, Schnitzler, Ramon de la Sola, Heinze, Catti, Thaon, Masucci, Barety, Rossback, Capart, Schmidt, Ariza, Gouguenheim, Ruggi, Borra, Sidlo, Porter, Bristol, Moura-Borouillou, Cazenave, Rumboldt, Koch, Battaglia, Schmithuisen, Schaeffer, Cutter, Caselli Azzio... In the congress he presented “about influence on the voice of the release of the uvula” where he was debating the importance of uvula-velar dynamics with changes of pitch in singing.

This proves he was also developing a daily confrontation with the Milan Conservatory of Music and its singing teachers and librarian, indeed:

1881 he was in the Jury of the International Music Exhibition of Milan;

1883 meritorious member of the International Society of Mutual Aid among Opera Artists and Related Teachers

1899 published "Notions of Vocal Hygiene" writing for voice professionals;

14-21 December 1908 Milan - President of the Singing Section in the Didactic Musical Congress for the centenary of the G Verdi Conservatory - reporting "On the physiological progression of exercises in the study of singing", with proposal of a 14 step physiological protocol to teach singing.

1912 published posthumously "For the Speaker and the Singer: principles of physiology and pathological physiology of the voice and of aesthetics and vocal hygiene"

After him, many other laryngologist and Singing teachers started working side by side, like Giuseppe Nuvoli and Pio di Pietro, from Rome University and Santa Cecilia Academy, to Guglielmo Bilancioni and Georges Cunelli, to Enrico Delle Sedie, Francesco Lamperti, Gustavo Magrini, Virginia Boccabadati, Teresina Coli, Mathilde Marchesi, Giulio Silva, with many of them working abroad since the end of XIXth century.

Reading the works of these forerunners "Medicorum Theatri" we may point out their often prophetic vision, still pertaining to the most recent scientific notions on the subject of voice and singing, based on knowledge and respect of physiology for physicians, teachers and singers, progressing side-by-side.

FP15 (Fr BB 13:45)

MONITORING PARTICULATE EMISSION, VOCAL AND RESPIRATORY DYNAMICS IN CHOIRISTERS PROFESSIONAL OF ITALIAN ART OF OPERA SINGING

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During COVID19 pandemics singing was compared to coughing and sneezing in spreading infectious particulate. With the help of a team of bioengineers and engineers, the Author checked the particulate emissions of seven different professional lyric choir singers, while breathing, warming-up (free vocalizing, without or with consonants) in a quiet and in a loud voice, singing two arias from Italian Classical Opera, reading at their usual score and listening to their usual musical base, then talking in a quiet and loud voice and finally coughing and sneezing. Each protocol lasted 35 mins and was repeated by the same singer four times in the same session. The particulate emission was calculated by funnels in a special BodyBox, but in the same time, the breathing dynamics were controlled by respiratory belts and vocal doses by vocal dosimeter. The aim was to evaluate the artist in a laboratory condition but as similar as possible to the "professional learnt task in voice", to let the working memories protocol control as usual the pneumo-phonatory coupling and voice projection, (appoggio, imposto and supporto) as established by Italian Art of opera singing. As expected by pedagogical principles of this art, the results in professional singing are definitely different from coughing, sneezing or screaming, and will be discussed in a proactive sense.

FP16 (Fr OH 13:15)

ELECTROACOUSTIC ANALYSIS OF VOICE AS AN EARLY MARKER OF NEURODEGENERATIVE DISEASES

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Characterization of the first (F1) and second (F2) formants in vowels represents a reliable method to describe articulatory abilities both in subjects affected by neurodegenerative diseases (Parkinson Disease, parkinsonisms, Amyotrophic Lateral Sclerosis, Alzheimer's disease, hereditary dystrophies) and in healthy subjects. In the former tongue movement range is reduced, with subsequent increase in F1 and simultaneous decrease in F2. To describe this phenomenon two parameters were used: Vowel Space Area (VSA) and Formant Centralization Ratio (FCR).

69 patients affected by neurodegenerative diseases and 137 non-dysarthric control subjects (68 euphonic, 69 dysphonic) were evaluated. All the subjects (206 in total) underwent electroacoustic analysis of voice by spectrogram and formant characterization of the vowels /a/, /e/, /i/, /u/. By computing F1 and F2 for the vowel

sounds /a/, /i/, /u/ triangular VSA (tVSA) was created, by adding the vowel /e/ quadrangular VSA (qVSA) was obtained.

Both tVSA and qVSA were shown to decrease significantly ($p < 0.0001$) in dysarthric patients compared with non-dysarthric subjects, while FCR was demonstrated to increase ($p < 0.0001$). These changes correlated positively with dysarthria progression as described by the clinical Nijmegen Dysarthria Scale (NDS), and associated with a decrease in intelligibility, especially for the vowels /e/ and /i/. Among controls no differences were recorded between euphonic and dysphonic subjects. In dysarthric patients VSA variations were not correlated with classes of diagnosis nor with age, while among non-dysarthric patients VSA was shown to decrease with age. Considering the aforementioned results and that both VSA and FCR statistically differ ($p < 0.001$) between non-dysarthric and mildly dysarthric subjects, it is possible to suggest that characterization of F1 and F2 may be useful as an early biomarker of dysarthria and neurodegenerative diseases, as with anosmia in Parkinson's disease.

FP17 (Sa OH 15:15)

ASSESSING ACOUSTIC PARAMETERS IN EARLY MUSIC AND WESTERN OPERATIC SINGING

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Classical singing is not a homogenous basket. After two centuries of silence, since 1950s has made a comeback on the stages all over the world Early Music, comprising repertoires from the VI to half of the XVIII century. The so-called historically informed performance, which aims at playing a given piece of music as faithfully as possible to the approach and manner of the musical era in which a work was originally conceived, has developed a style of singing Early Music which has gradually differentiated it from the way we now intend the more common Western Operatic singing style. Perceptual differences when comparing Early Music and Western Operatic singing regard contrasts in intelligibility, flexibility, sound power, timbre, approach to passages of register, and vibrato features.

This study focuses on differences in vibrato acoustics and formant analysis in Renaissance (1500-1600) and Western Operatic (1800) singing styles, by comparing acoustic recordings acquired from professionally trained singers specialized in the two repertoires. Possible differences will regard a less precise characterization of vowel in Western Operatic singing, resulting in an overall decrease in intelligibility, and a less pronounced singer's formant and vibrato extent in Early Music singers.

FP18 (Fr CoH 11:15)

ENDOSCOPICAL TRANSORAL OFFICE BASED PHONOSURGERY

R.Eugenia Chávez Calderón

Centro de Foniatria y Audiología, MEXICO CITY, México

The advantage of endoscopical transoral indirect office based phonosurgery is to examine during surgery the vocal function.

In the last century the advantage of having new endoscopes, stronger light sources, good recordings equipment with high definition cameras and stroboscopic light, aloud more surgical precision and better functional results.

The background of these procedures comes from 1861 with Victor von Bruns using the laryngeal mirror designed by L.Tuerck and Johann N. Czermak.

Phonosurgery allows the improvement, restoration and preservation of voice. Hans von Leden and G. Arnold called these procedures as Phonosurgery. During the phonosurgery different decisions can be made based on the glottal closure and intralaryngeal muscles movements.

Some anatomical characteristics are incompatible with direct laryngeal surgery. Local anesthesia with or without intravenous sedation has less risks of allergic reactions, of disturbances or morbidities because of intubation and the cost is lower. Other special pathologies like cardiac insufficiency, pulmonary limitations and some metabolic disturbances have higher risks when general anesthesia is used.

If the patient has multiple lesions in both vocal folds the endoscopic transoral office based phonosurgery avoids the use of tubes that difficult the complete vision. In this situation the vocal fold free edge examination is easy during the procedure.

Sometimes the patient cannot be intubated due to supraglottal pathologies like cancer or papillomas. The endoscopic transoral indirect possibility makes possible to have biopsies.

Indication for endoscopic indirect transoral phonosurgery is based on functional advantages. The preparation for this transoral office based phonosurgery is analyzed.

FP19 (Sa OS 15:00)

HOW RESPIRATORY AND FOOD ALLERGIES AFFECT VOICE PRODUCTION AND THEIR TREATMENT

R. Eugenia Chávez Calderón

Centro de Foniatria y Audiología, MEXICO CITY, México

When the respiratory mucosa has an hyperreactivity and triggers an allergic reaction, nose, sinuses, throat, larynx and lower airways system can be affected negatively.

The inflammation of nasal and sinuses mucosa can provoke polypoid degeneration besides edema and hypertrophy.

These patients can have chronic pharyngitis and tonsillitis with odynophagia that can cause irregular muscular movement by speaking or singing.

It is very common that the vocal folds and laryngeal tissue present edema, ectasias, polyps, hematomas due to these respiratory allergies. If the patient is a voice professional user or has also a functional disturbance, nodules or cysts can developed.

Food allergies can contribute to the pathology of voice production. Due to esophagus, stomach or bowel inflammation the reflux can produce inflammation of the larynx.

In a group of 962 phoniatrial patients with voice pathologies we found 62% with pathologies in airways system due to respiratory allergies and 45% also with food allergies.

The allergies tests were performed through quantitative Rast (Radio Allergo Sorbent Test) in blood. In the examination 65 different allergens 50 respiratory and 15 of the most frequent food allergens were tested.

96% of the patients had at least 3 months of desensitization treatment. Pharmacological treatment was made during 6 months to stop the influence of the inflammation due to the allergic reaction.

60 % of this group had also the necessity of endoscopic indirect phonosurgery of vocal folds and radiofrequency treatment for turbinates'. 65% of the group had one year of desensitization treatment for allergies. 70 % of the patients with reflux signs and food allergies were tested for antibodies due to *Helicobacter pylori*. 20% of them went under gastric endoscopy to look for structural pathologies.

Before and after phonosurgery 95% of the patients had voice therapy and 70% after turbinates radiofrequency treatment.

Voice placing, respiratory improvement and flexibility of voice in loudness and range were trained in voice therapy. Dynamic voice routines, semiocluded exercises were practiced by all patients.

Conclusion: The respiratory and food allergies damage voice production and they need to be examined and treated in a complete schema.

INDIRECT ENDOSCOPICAL PHONOSURGERY AND REHABILITATION IN ARTISTIC VOICE COMET SESSION

R. Eugenia Chávez Calderón

Centro de Foniatria y Audiología, MEXICO CITY, México

In the indirect endoscopic phonosurgery we have the advantage of the examination of the artistic vocal function during surgery.

The development of rigid endoscopes with stronger light sources, good recordings systems with high definition cameras and stroboscopic light provides the possibility of examine different pitches, different volumes, singing function.

Since 1861 Victor von Bruns used the laryngeal mirror designed by L. Tuerck and Johann N. Czermak to perform the first phonosurgical procedures.

Hans von Leden and G. Arnold called phonosurgery to the improvement, restoration and preservation of the voice.

During the phonosurgery of artistic voice performers, the phonosurgeon can decide whether to make deeper incisions or just stay on the inflamed edge without cutting it, if the stroboscopy shows the vocal edge in complete glottal closure in different registers. Another situation is when the complete closure is not possible due to the inflammation of the posterior third.

In this endoscopic transoral phonosurgery you avoid making harm of the vocal folds and the phonosurgeon does not have any disturbance to evaluate the complete function during phonosurgery.

Rehabilitation of artistic voice begins before phonosurgery with breathing exercises and resonance strategies. One week of voice rest and after that the patients begin with humming, semioccluded techniques and dynamic exercises.

Voice rest is relative 5 minutes talking without effort and one hour silence and every 2 days increasing the time for exercises and for talking.

The scales have to begin when the inflammation is gone. Management of different volumes, crescendi, diminuendi, glissandi and messa di voce are the next steps.

When a certain grade of endurance is obtained the singing lessons and speaking theater voice lessons are necessary.

Conclusion: The transoral phonosurgery for artistic voice users is recommended for very small and detailed lesions and rehabilitation for artistic voice is compulsory.

THE ROLE OF VOICE REST AFTER MICRO-LARYNGEAL SURGERY FOR BENIGN VOCAL FOLD LESIONS

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Purpose: To compare postoperative vocal outcomes of a voice rest regimen versus no voice restrictions following micro-laryngeal surgery for benign glottic lesions.

Methods: This was a combined prospective and retrospective cohort study on 167 patients who underwent micro-laryngeal surgery for benign focal fold lesion removal. Participants were divided into two regimens:

standard voice rest (n=92) or no voice restriction (n=75). The primary outcome was post-operative vocal improvement, evaluated using voice handicap index questionnaire (VHI-10), GRBAS scale, and computerized acoustic analysis (shimmer, jitter, and the harmonic-to-noise ratio). The secondary outcome was emergence of vocal fold mucosal abnormalities in the immediate postoperative period. Parameters were collected at baseline and at the last clinical visit.

Results: There was no statistically significant difference between the voice rest and no voice rest groups regarding baseline parameters of age, gender, laryngeal pathology, and voice use. Improvement in GRBAS scale values and VHI-10 scores between pre- and post-operative periods between groups did not demonstrate any statistically significant differences ($p=0.5303$ and $p=0.1457$, respectively). Similarly, the results of computerized voice analysis also showed no differences between groups in terms of shimmer ($p=0.9590$), jitter ($p=0.5692$), and harmonic to noise ratio ($p=0.1871$). No correlation was found between the post-operative vocal fold's mucosal abnormalities and the type of voice rest regimen.

Conclusion: Voice quality and wound healing were similar regardless of the type of voice rest regimen applied. No voice rest at all was as good as voice rest after micro laryngeal surgery.

FP22 (Fr A402 10:30)

FACTORS AFFECTING THE TIMBRAL CHARACTERISTICS OF BARBERSHOP SINGING

Peter Cookson, Helena Daffern

AudioLab, University of York, YORK, United Kingdom

Objectives: To identify measurable acoustic parameters which characterise close harmony a cappella singing, particularly barbershop.

Methods: Barbershop is ideal as a genre for studying the specific timbral characteristics of a cappella singing: the singers achieve high accuracy in just intonation, the frequency spectra of individual voices substantially overlap, and chord durations allow analysis in a steady state. In this research sung chords were studied in two ways: firstly by extracting sound samples from performances of real quartets, secondly using a synthesized quartet computer model. The metrics studied in the frequency domain are the line spectrum, cumulative line spectrum, spectral centroid, spectral spread and spectral skew for different chord structures and pitches.

Results: The predicted values from the synthesised quartet model gave reasonably good correlation with the measured results from the real quartets. The variations can be attributed to differences between the real and assumed frequencies and bandwidths of the vocal tract resonances and the volume and balance between voices. The most impactful factor was the effect on the spectral centroid of the vowel being sung and the pitch of the chord. The synthesised model sheds light on why the spectral centroid, spread and skew vary. The effect of the proximity of chords' harmonics to the resonant frequencies of the singers' vocal tracts for different vowels and chords are demonstrated.

Conclusions: Factors affecting the measurable acoustic parameters associated with timbre are accuracy of singer's intonation, balance between voices and chord structure. The greatest influences on a chord's timbral characteristics are the vowel being sung and the proximity of the chord's harmonics to the resonant frequencies of the vocal tract. Understanding the effects of vocal tract adjustments on timbre might help performers achieve their acoustic goals.

FP23 (Th D501 18:15)

JOINTS AND VOICE: DO VOICE PRODUCTION REACTS TO JOINTS DYSFUNCTIONALITY FAR FROM VOCAL TRACT? SOME CASES AND AN HYPOTHESIS

Lucia Cossu

From static alignment and managing the breath air to compensate for a not naturally gifted voice to a rationale and an hypothesis of how asymmetries, defensive stiffnesses and joints dysfunctionality or underdevelopment can be directly worked and change directly voice production. Many methods exist to help the body connection

and the alignment and to relax stiffnesses; they are often helpful and sometimes (in a little percentage) find a way to solve completely limits and issues in voice production in non singers and singers. What lacks now is a systematic and rationale to understand how those interventions are connected with voice production and if there is a sort of direct mechanism and how it is voice related. A presentation with some examples in which have been worked mostly on SI (sacroiliac) joint and its functionality and transversus abdominis, examples that present a discontinuity in voice production, some with medical control of it and a couple with level of performance achieved. I will make my hypothesis of this relation using the joint by joint approach of Michael Boyle and Gray Cook, the functional findings on SI joint and Gluteus maximus role in Bret Contreras and Gray Cook view, and the rationale is based on the Charlie Weingroff direction in using workouts as stressors to determine not only a desired adaptation but also a soft tissue evolution (and in this very interesting the recent findings even for now just empirical of Ben Patrick that I am now investigating as application in voice production), the findings on inverted role of muscles function directly determined by position of the relative joint and range of movement (Dostal, Soderberg, Andrews in *Physical Therapy* 1986;66351-359). I cite coaches and physical therapies because the literature and the work on the subject is more complete than in voice literature; the body is one and the rules of joints and muscle kinetics are the same, some of our singing can be seen as a close chain or open chain exercise and some vocalisations and intervention using those kind of logic have in my experience been a turning point in voice production. I use the joint by joint approach because pretty reliable even if not complete of how joints are affected reciprocally. The defensive system will be here presented as a blocking system, a sort of veto system, and it is presented in its muscular effects that can be corrected with positions and using its specifics of kinetics.

The examples presented and the hypothesis are a first step to open the discussion and the discussion about a more precise way of the minimum terms in body structure and its kinetics to have a not impaired voice production or to improve voice production.

Here the links for a general view of the examples, during the presentation I will present clips not publicly disclosed of the exercises done and some before of a couple of students not publicly disclosed.

https://youtu.be/CLcL_buf9tch

<https://luciacossu.com/2016/09/13/cossu-method-sister-i-organic-damage-solved/>

<https://youtu.be/OUH9sXqKjRw>

FP24 (Fr OH 16:15)

VOCAL TRACT AND ACOUSTIC MEASUREMENTS IN THE COUNTERTENOR SINGING

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The countertenor's voice is characterized by the falsetto production (a.k.a. M2 mechanism) which is comparable to the female voice range. Prior studies have explored this voice register during singing scales, leap and sustained notes across different parts of the vocal range. Other studies have also explored specific tasks in a musical context, taken from songs or opera arias. However, although some aspects of the countertenor's voice have been studied; questions still remain regarding the physiology and acoustics of the countertenor's voice. The aim of this study was to compare countertenors at different levels of professional experience during singing using videofluoroscopy and acoustic analysis.

Three countertenors at different stages of their careers (student, amateur and professional) were evaluated. The tasks, taken from an opera aria excerpt, were two leap intervals and a crescendo in a sustained note. Audio was recorded simultaneously with videofluoroscopy. Changes in vocal tract configuration were analyzed in the light of two previous studies (Welch et al 1988; Echternach et al 2010). Data from the resting position were analyzed and compared to vocal emissions in the mid and higher part of their tessitura. Image analysis was performed using ImageJ.

The results show that the higher the frequency, the greater the lip opening and jaw lowering for all subjects. Larynx lowering was observed even in the musical notes close to the top of their tessitura, however more pronounced for the professional countertenors. These changes were accompanied by pharynx and laryngeal-pharynx narrowing. The formant cluster prominence was higher for the professional countertenors, but with

values below the expected to characterize the singer's formant. Acoustic interaction $2f_0$ - f_2 was observed in the crescendo and sustained note tasks.

FP25 (Fr OH 16:30)

VOICE SOURCE AND FACIAL EXPRESSIONS IN OPERA SINGERS - A PILOT STUDY

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Opera can be considered a complex artistic genre that mixes music and theater, in which the singer also interprets a text, in addition to music. Expression and emotion must be conveyed effectively to the audience according to the narrative of the text content.

Interaction with listeners is given by body movements, eye contact, voice and facial expressions. The latter, widely studied in non-verbal communications, is directly related to the voice and both are an important part of the final result, which is the communication of the intended emotion to the audience.

Different emotions are conveyed in different ways by voice and facial expression. This paper reports a pilot study of an investigation that relates muscle action units of the face, as described by Ekman (1992), with the glottic source characteristics in different emotions (anger, joy, and sadness).

Action units were mapped by a Qualisys Pro Reflex motion capture system. Small markers were used to capture and quantify the displacement of the action units in order to characterize the intensity of the movement. A musical excerpt was specially composed for this study, based on the romantic opera style with a neutral lyric written so that the singers can, portray different emotions through the same song, without being indirectly influenced by an eventual emotional intention content of an already known aria melody or lyrics. Audio and electroglottography data were collected and analyzed to verify the correlation between vocal emission and action unit behavior. Preliminary results show that action units occur on the upper face (forehead, eyes, eyebrows, cheeks). Anger was the emotion with more contact quotient and higher harmonics components.

FP26 (Fr OH 17:00)

HUMAN BEATBOXING: LARYNGEAL ARTICULATIONS

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Human Beatboxing (HBB) is a musical technique produced with vocal tract movements. The study focuses on laryngeal articulation during phonation in HBB.

Methods: We investigated the production of electronic sounds by 5 beatboxers. Based on video laryngoscopic data we were able to observe and describe laryngeal mechanisms during HBB voice production in terms of constriction location and constriction types.

Constriction Location. Several constrictions were observed at different levels of the laryngeal articulator. At the glottal level, beatboxers use constriction of the Vocal Folds (Fig. 1); at a supraglottic level constrictions of the Ventricular Folds (Fig. 2) and Aryepiglottic Folds (Fig. 3) were observed. Above the supraglottic plan, we found constrictions achieved by means of tongue root retraction and epiglottal closure (Fig. 4) and by means of Lateral Pharyngeal Wall (Fig. 5).

Constriction Types. We observed 4 different constriction types. Fig.6 shows an aryepiglottic closure (i.e. aryepiglottic sphincter) that corresponds to a full epiglottal stop. In order to initiate the trilling (i.e. voicing), articulators need to be in contact, similar to a stop, but with less tension so air can force its way out and generate a vibratory pattern (Fig. 7). A greater distance between articulators leads to the production of a fricative (Fig. 8). Finally, Fig. 9 illustrates the configuration for whistle voice. Whistling requires specific aeromechanical

conditions that depends on the geometry of the constriction area and flow velocity. It differs from a friction configuration.

Beatboxers combine different constriction degrees with different laryngeal structures and use simultaneous constrictions at different levels. Further studies need to untangle aeroacoustic effects of multiple constrictions at the laryngeal level. HBB offers new perspectives on fundamental problems in phonetics, laryngeal mechanics and potential application for speech therapy.

FP27 (Fr CoH 11:30)

MUSCLE SPECIFIC STRATEGIES IN MANAGEMENT OF GLOTTAL GAPS IN PROFESSIONAL VOICE.

Ilter Denizoglu

Vocology Centre, Turkey

Glottic valve function is one of the main factors for the efficiency of phonation. Especially in professional voice performers, functional / technical inadequacies threaten career for stage performance. Glottic closure pattern is determined by the contraction composition of the intrinsic laryngeal muscles each of which is a physical vector. Vector analysis for the glottic gap actually determines the strategy to be structured for treatment. If the arytenoid vocal process is considered as a pivot point, glottis can be divided into two parts longitudinally; 2/5 anterior part is the membranous glottis and posterior 2/5 is the cartilaginous glottis. Vertically, 1/3 superior glottis is formed by the vocal ligament and cricothyroid muscle is the dominant vector, while the 2/3 inferior glottis is managed by the medial thyroarytenoid.

The cricothyroid muscle stretches the vocal ligament and adducts the upper third of the glottis symmetrically. Vocal exercise with naive falsetto can be used as a method for developing this muscle. In line with the principles of exercise physiology, an overload to be applied to a muscle and subsequent progression lead to the development of the muscle. The method of overloading the vocal muscles is semi-occluded vocal tract exercises. Gradual increase of semi occlusion creates progression. Muscle specific vocal exercises, as in sports medicine, creates conscious awareness in singing voice therapy that directly enhances the treatment outcome.

FP28 (Th OH 12:30)

VOCAL NEUROMECHANICS: EMBODIED MOTOR CONTROL OF THE ANIMAL VOICE

Coen P.H. Elemans

Sound Communication and Behavior group, Department of Biology, University of Southern Denmark, Denmark

Communication by sound, or vocal communication, is the fastest, most accurate, and information-rich modality and essential to vertebrate survival and speciation. How the developing body and brain interact to produce vocal signals critically depends on the biophysical mechanisms that vertebrates employ to produce sounds. Over the last ten years, my lab has studied and elucidated sound production mechanisms across the vocal vertebrates. Next to remarkable adaptations, we have also shown that the myoelastic-aerodynamic theory for human sound production underlies sound generation in many vertebrates including birds, primates, bats, and most recently also toothed and baleen whales. This is crucial groundwork for defining and quantifying the parameters that modulate vocal signals to causally link motor control to sound in major animal model systems.

FP29 (Th A402 15:45)

AERODYNAMIC PHONATORY PATTERN. A NEW SIGN OF EBSLN INJURY

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Introduction: Reduced quality of life after thyroid surgery is multifactorial and may include the need of lifelong

different treatments. About 1 in 20 patients experience voice changes, and it is very frequent that these changes may not be caused by neural lesions. The purpose of this study is to describe aerodynamic phonatory features in thyroidectomized patients in order to determine what mechanisms are involved in voice changes in these patients and what are the best rehabilitative options.

Material and methods: We studied 76 thyroidectomized patients with neither apparent neural cause of thyroidectomy-related dysphonia nor recurrent laryngeal nerve injury nor external branch of the superior laryngeal nerve (EBSLN) injury. The patients were asked to produce sustained vowels, syllables, and sentences. Afterward, acoustic and aerodynamic measurements were made: fundamental frequency, jitter, shimmer, intensity, harmonic/noise ratio, spectrographic analysis, subglottic pressure, mean transglottic flow, and laryngeal resistance. All measurements were made using Voice Plus from Alamed Corporation software. Prism 9.0 software was used to analyze variables.

Results: We describe 2 different groups of patients with different aerodynamic pattern in voice production that correlate with voice quality. In 69% of patients there was no change and in 31% the glottal pressure and laryngeal resistance decreased as a result of lower tension in the vocal fold as a consequence of an injury of the EBSLN. Typical voice symptoms after surgery were easy fatigue during phonation and difficulty with high pitch and singing voice. Acoustic analysis revealed that the phonation time and fundamental frequency were not changed after surgery, but the speaking fundamental frequency, range of speaking fundamental frequency, and vocal range were significantly diminished after surgery in the group with glottal pressure and laryngeal resistance decreased. These data allowed us to suggest that the cause of voice dysfunction is not seen in neural lesions, but in a disturbance of the laryngeal biomechanics.

Conclusions: This aerodynamic phonatory pattern that may be understood by objective aerodynamic measurements could be another new sign of EBSLN injury.

FP30 (Th D501 11:45)

SIGNIFICANCE OF THE RELATIVE FUNDAMENTAL FREQUENCY IN BIOMECHANICAL PHONATORY DISORDERS

Sol Ferrán, Ana Martínez, Beatriz del Río, Octavio Garaycochea, David Terrasa, Secundino Fernández
Universidad de Navarra, NAVARRA, Spain

Introduction: To adequately evaluate phonatory disorders due to alterations in laryngeal biomechanics, it is necessary to evaluate subglottic pressure, transglottic flow, and laryngeal resistance using aerodynamic analysis techniques. These analysis techniques are not available to all professionals who assess and treat voice disorders.

The objective of this work is to assess the possible association of an acoustic parameter that is easy to obtain and measure, the relative fundamental frequency (RFF), with the values of certain aerodynamic parameters and, therefore, with pathologies that are associated with different alterations of the laryngeal biomechanics.

Material and methods: Retrospective cohort study. A total of 90 patients who attended the Otorhinolaryngology Service of the University Clinic of Navarra during the period between 2019 and 2021 have been studied and were distributed into 3 groups according to their laryngeal pathology: Muscle tension dysphonia (TMD); patients with organic lesions (nodules, polyps); laryngeal paralysis. In all of them, an endoscopic laryngeal exploration was performed in the consultation, and later, in the voice laboratory, a complete acoustic study, the calculation of the FFR, as well as an aerodynamic study in which, among other parameters, the pressure was measured, subglottic flow, mid-transglottic flow, and laryngeal resistance. The statistical analysis used to evaluate the association was the parametric correlation test (Pearson's coefficient) and the logistic regression test.

Results: FFR values have been characterized in each group of pathologies and the association between FFR and different pathologies has been studied. It has been possible to establish a statistically significant association between the value of the FFR and the subglottic pressure ($p < 0.05$) and a positive trend between the degree of alteration of the aerodynamic parameters and the FFR.

Conclusions: The FFR parameter is an indicator that provides relevant information on the biomechanics of the phonatory pattern. It is an affordable and accurate indicator that allows the detection of biomechanical disorders

without resorting to complex aerodynamic analysis techniques. It will be interesting to study, in future research, its usefulness to check the behavior in other types of phonatory pathologies and the changes that occur in this parameter in response to different treatments.

FP31 (Fr BB 13:15)

SHEDDING LIGHT ON THE COUPLING OF ACOUSTIC AND FLUID DYNAMIC ENERGY FOR VOICE PRODUCTION

Mario Fleischer, Dirk Mürbe

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Modeling acoustic sources and their transmission into the vocal tract is frequently limited to a simplified particle velocity source at the glottal level. This approach ignores that the fundamental mechanism of voice production contains at least two parts: I) the periodic changes of the glottal airflow and II) their interaction with the vibrating vocal folds.

To investigate these effects and their interaction, we derived midsagittal 2D models for different vowels. We combined fluid-dynamical simulation with an acoustic wave solver to simulate the traveling acoustic energy through the vocal tract. Among others, we found that below 2 kHz, most of the emitted acoustic energy originates from the interaction of the airflow and the vibrating vocal folds. Above 2 kHz, supra-laryngeal sources within the air dominated the emitted sound.

FP32 (Th A402 12:00)

TOWARDS ACCURATE MODELING OF SPEECH SOUND RADIATION USING A REALISTIC HEAD GEOMETRY

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The radiation of speech sounds from the opened mouth to a microphone is commonly modeled as a spherical source in an infinite space.

Already in the 60s of the last century, James L. Flanagan found a slope in the magnitude of the transfer characteristic that differ from that of a monopole. To verify his findings, which were obtained with a life-size mannequin at nine frequency points between 250 Hz and 4000 Hz, we built a detailed 3D Finite element model that considers a realistic head geometry and an acoustically absorbing environment. We analyzed the radiation characteristic of this model at 480 frequency points from 25 Hz to 12000 Hz. We obtained a transfer function that not only differed in slope from the value of 6 dB/oct of the monopole radiation, but we also found a frequency-dependent gain. We will further discuss how this transfer characteristic changes the perception of the emitted sound.

FP33 (Fr A402 10:45)

EFFECT OF TRAINING WITH A SIMPLE OVERTONE FLUTE ON THE VOICE PRODUCTION

Marek Frič, Johana Passerin, Martin Kučera, Pedro Amarante Andrade

Musical Acoustics Research Centre, Academy of Performing Arts in Prague, PRAGUE, Czechia

Objective: Breath management is one of the basic foundations for controlling voice production, voice quality and loudness. The aim of this study was to investigate the effects of training with an overtone flute on the voice.

Method: Ten vocally untrained normophonic women participated in an overtone flute training program over a period of 3 to 5 weeks. The subjects received no additional voice training. Voice range profiles (VRP) and maximum phonation time (MPT) were measured before and after training. Changes in VRP parameters as well as Singing Power Ratio (SPR), LTAS and contact quotient from the electroglottographic signal (CQ) were compared using pairwise comparisons statistical tests.

Results: The MPT significantly increased on average by 3.4 s. The results confirm the subjects' ability to achieve higher SPLs in speaking (stage) and when singing a glissando. They were also able to achieve higher pitches during calling. After training, there was an overall significant increase in SPL, particularly in the mf-dynamic range between F4 and D6. In the ff- dynamic, increased loudness was observed only in the highest part of the tonal range (A5-D6). EGG showed a significant decrease in CQ for the loudest call, and similar reduction in CQ when singing in fortissimo dynamics in the transition region between the M1 and M2 vibratory mechanisms (G4-C5). The SPR values increased essentially in the M2 mechanism and in the highest pitches (F5-D6) of the voice in ff-dynamics and in the middle range (D5-F5) in mf-dynamics.

Conclusion: The ability to maintain the same SPL with reduced CQ for the ff-dynamics and increase SPL without changing CQ in the mf-dynamics can be attributed to an improved efficiency in voice production in which amplification is not only achieved at the glottal level by adduction. An increase in SPR may have been caused by the involvement of epilaryngeal resonance. Results demonstrated an improvement of the breath support.

FP34 (Fr A402 11:00)

COMPARISON OF VOICE PROPERTIES BETWEEN OPERA AND POP FEMALE SINGERS

Marek Frič, Iva Podzínková, Jana Jelínková

Musical Acoustics Research Centre, Academy of Performing Arts in Prague, PRAGUE, Czechia

Singing genres differ not only in their musical characteristics, but also in the technique of voice production and the subsequent acoustic quality of the voice. The aim of this work is to compare perceptual, acoustic, electroglottographic and radiation properties of voice classical and pop female singers.

Six opera female singers and 5 pop female singers participated in study. Sound radiation properties were measured using 44 microphones. Synchronously audio and electroglottographic signals were taken while singing scales ranging from C4 to C6 using 4 dynamic levels and gradually increased intensity from 9 chosen tones. The analysis was done for the vowels /a/, /i/ and /u/ and was performed on 0.5 s long samples.

Classical singers have more omnidirectional sound radiation patterns than pop singers. Opera singers generally reached higher maximum SPL levels in C5-C6 octave. Pop singers achieved maximum SPL levels in the middle of C4-C5 octave for vowel /a/ only. The most significant EGG difference concerned mf and ff dynamic levels in the range of one and a half octaves, where the voice of pop singers showed higher values of contact quotient. Moreover, systematic differences were found for the shape of EGG pulses (from wavegrams) with increasing pitch. Pop singers gradually reduced the amplitude in the decontacting part of wavegram, while opera singers gradually increased it. Spectral analysis showed that opera singers enriched the sound particularly in ranges of the first formant or the first harmonics (200 - 800 Hz) and between 2 and 5 kHz by bringing the positions of third, fourth and fifth formants slightly together. Pop singers had significantly higher energy values in higher parts of vocal range.

FP35 (Fr CoH 11:00)

HOW I DO SURGICAL INTERVENTIONS IN ARTISTIC VOICE

Ahmed Geneid

Helsinki University Hospital/ University of Helsinki, HELSINKI, Finland

The presentation will include different example of problems in artistic voice that can be treated surgically or in combination of conservative and surgical methods.

The presentation brings a new insights on the possible combinations of cold steel and laser in phonosurgery. Different types of lasers like Co2 and Blue laser will be addressed in terms of their applications in phonosurgery for artists. The new possibilities of addressing mild edemas of the vocal fold or vascular ectasias will be covered in examples showing the results of interventions. The presentation is not only for surgeons doing phonosurgery but also for anyone with interest in voice and singing.

FP36 (Th A103 12:30)

PITFALLS AND TRICKS IN GLOTTOPLASTY AND LAVA: HOW I INCREASE THE PITCH OF VOICE?

Ahmed Geneid

Helsinki University Hospital/ University of Helsinki, HELSINKI, Finland

Increasing the voice pitch through glottoplasty or LAVA is an act of surgical art. The presentation covers different angles of hardships that can be encountered and how to respond to them. It also covers tricks to get best results. The presentation will include different examples on pitfalls and tricks and how to do them. It is expected that audience will be introduced to the challenges of glottoplasty and LAVA and how to overcome them.

FP37 (Th OS 17:30)

VOCAL FOLD AUGMENTATION - MATERIALS, APPROACHES AND RESULTS

Ahmed Geneid

Department of Phoniatrics, Helsinki University Central Hospital, HELSINKI, Finland

Vocal fold augmentation plays a magnificent role in helping patients with glottal gap due to atrophy, paresis or paralysis of the vocal folds.

In this presentation, I will tackle on the different materials available for augmentation ranging from short-, long-term and permanent ones. I will also go through the pros and cons of different materials and kind of results associated with them.

The presentation will also address the differences of doing augmentation in local vs. general anaesthesia.

FP38 (Th OH 12:45)

PROSPECTS AND PROBLEMS OF COMPARING FUNCTIONAL LARYNX MORPHOLOGY IN HUMAN PRIMATES

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This contribution to the bioacoustics session seeks to discuss previous and ongoing comparative work on the morphology of the larynx in chimpanzee (*pan troglodytes*), bonobo (*pan paniscus*), gorilla (*gorilla gorilla*), and human (*homo sapiens*) in terms of hypotheses and prospective outcomes from a phonetic perspective. Whereas basic evolutionary questions addressing transparent concepts like pitch and size find more gravitas in the general discourse on the origins of language and speech, they often lack a full discussion of potential factors limiting the possible interpretation of available data, like e.g. individual-specific variation in very small and possibly 'weird' samples or ecological validity. In addition, based on examples of the current data collection some other inquiries on more fine-grained details are presented, trying to translate them into functionally relevant questions for phonatory (voice) modulation.

FP39 (Th A402 12:45)

ADVANCES IN THE OPTICAL DESIGN FOR LASER-BASED 3D HIGH-SPEED IMAGING OF VOCAL FOLDS

Benjamin Haas¹, Clemens Roider¹, Michael Schmidt¹, Michael Döllinger², Marion Semmler²

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Introduction: In clinical practice, 2D imaging of the vocal folds is still the state of the art, providing only qualitative information. Quantitative diagnostics, on the other hand, are also possible when the vertical dimension is calculated by laser-based 3D reconstruction. Today's laser-based 3D-endoscopes can only be used for a subset of the population because people have different sizes of vocal folds and the laser grid works best for an average vocal fold size. The goal is to construct a generally compatible laser endoscope for almost every person – without moving parts.

Methods: We present an optical zoom design inside the endoscopic rod with liquid lenses in order to adjust the laser grid size and laser spot size independently of each other. Considering laser safety regulations, this allows for individually adjusting the illumination to each patient. In parallel, the calibration and reconstruction processes have to be adapted to the new variable design. We simulate our optical design with ray-tracing and conduct experiments to verify the simulations. We compare the point coverage from a fixed laser grid and from our variable laser grid on vocal folds ex vivo.

Results: A laser endoscope design is being developed which allows adjusting the size of the laser grid as well as the spot-size without any moving parts. A clinician will therefore be able to use a denser laser grid with a larger number of points. We expect that this optimal point coverage and optimal point resolution will lead to ideal conditions for the 3D-reconstruction of the vocal folds' surface regardless of vocal fold size and depth of the pharynx.

Conclusion: The developed design is an important step for the integration of laser-based 3D imaging of vocal folds into daily clinical routine. The adjustable laser endoscope will allow a larger percentage of the population to benefit from 3D imaging. The next step is to create a prototype and to perform extensive in vivo testing.

FP40 (Th D501 12:45)

POSSIBLE LONG-TERM EFFECTS OF A VOICE PREVENTION PROGRAM IN FORMER STUDENT TEACHERS

Kathrin Heeg, Regina Götz

University of Würzburg, WÜRZBURG, Germany

Investigation object: Researchers have emphasized the need for voice prevention measures in student teachers (e.g., Ohlsson et al., 2012; Richter et al., 2016). In the present case the prevention is part of the teacher training program and contains embedded direct and indirect measures, an assessment of the voice and further

interventions. Hence, different levels of prevention are included. The objective of this investigation is to evaluate to what extent the preventive efforts can make a long-term contribution to the vocal health of teachers.

Method: The study is designed as an ongoing long-term case-control study. The intervention group consists of former students (IG, n=49), the control group of special needs teachers who didn't experience voice prevention (CG, n=38). The participants (N=87) of this online survey filled out the German version of the VHI (DGPP, 2003) and a questionnaire regarding their voice in a work-related context. In addition, the IG gave feedback on the voice prevention measures during their teacher education.

Results: The results show differences between the two groups regarding their vocal-health-behavior. Voice exercises are performed regularly by 68% of the IG whereas 11% of the CG indicated this ($U=304.0$, $p<.001$). Also a correlation was found between the variable group and the undergoing of an examination of the larynx ($p=.019$).

There are no significant differences in the amount of VHIs with an experienced handicap (24% in the IG vs. 19% in the CG), but the perception of severity seems to differ. This may be supported by the fact that the criteria of two or more symptoms at least once a week is found more often in the CG ($X^2(1)=5.885$, $p=.020$).

Conclusion: The findings reveal that the proportion of teachers with a perceived handicap is similar in both groups, but differences are found regarding the severity of voice problems. Also, the results indicate that teachers receiving voice prevention seem more aware of keeping their voice healthy.

FP41 (Th CoH 17:30)

STANDARD AND EXTREME MIX VOICE IN MODERN SINGING

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Among the world of singing-voice registers, the notion of «mixed voice» is one of the most puzzling. Both classical and non-classical singers use this particular register to avoid vocal breaks during passaggio and reach high pitched notes in a kind of "like-chest voice". Yet most scientific studies have focused on lyrical singing. In this context, a collaborative work started between a singing teacher and professional singer practising the mixed voice in modern pop-rock singing and a scientist who had developed an approach to laryngeal characterisation of registers. Sharing their expertise and knowledge, they aim to get a better understanding of what mixing means both physiologically and in the singing technique.

A session of recordings was organized in San Salvo, Italy. Six female and five male singers participated to the recordings. Several physiological and acoustical signals were simultaneously recorded: muscular activation of face (zygomatic), neck (sternocleidomastoid) and abdomen (oblique major) ; movement of the chest and abdominal wall by means of respiratory inductance plethysmography; vocal-fold contact area by electroglottography; oral and nasal airflow by means of EVA2 station; oral and nasal endoscopy. The sessions were video-taped.

Voice range profile of these modern singers will be illustrated for their different singing registers including standard and extreme mix voice in comparison to the "non mixed voice". The assessment of the underlying laryngeal mechanism will be discussed. The glottal characteristics of extreme mix voice will be analysed on singing examples. Endoscopic imaging will illustrate glottal and supra glottal characteristics of this vocal emission, in relation to ventricular activity and specific VT adjustments.

TOWARDS A BIOMIMETIC MECHATRONIC TESTBED FOR VOICE AND SPEECH

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To reproduce phonation in vitro, vocal-fold testbeds have been refined over the last thirty years, gaining in complexity and biomimicry. However, most testbeds explore the physics of phonation on geometrically-fixed replicas capable of self-sustained oscillations in fluid-structure interaction. These testbeds are not necessarily coupled to vocal-tract cavities. Where they are, testbeds rarely allow for movement of the articulators of speech, such as the jaw, tongue, velum and larynx. They usually rely on 3D-printed vocal tracts to reproduce a resonant cavity linked to a fixed vocal configuration scanned by CT or MRI. This project aims to design a complete testbed that would integrate all phonatory and articulatory aspects important for voice and speech production. Such a mechatronic testbed is under development. It consists of a silicone laryngeal envelope, a 1:1 scale vocal-fold replica coupled with a geometrically-realistic vocal tract.

The vocal fold replica can be adducted/abducted and stretched. They can self-oscillate over a wide range of flow rates and for different degrees of stretch. Glottal vibratory behaviour was assessed for single and double layers in the vocal folds, for different layer stiffnesses, for homogeneous and fibre-reinforced layers. The vocal tract can reproduce several primary articulatory gestures : mandibular motion and shaping of the oral cavity with the movement of the tongue body. The applications of such testbed will be discussed.

FP43 (Sa OH 15:00)

FROM SOUND INTENSITY TO LOUDNESS – A PERCEPTUALLY ORIENTED AUGMENTATION OF THE VOICE RANGE PROFILE

Christian T. Herbst

Austria

The voice range profile (VRP) has been used to assess the long-term vocal development of singers during their singing training. In a VRP, the achievable combinations of fundamental frequency (typically expressed logarithmically as musical pitch) and sound intensity (indicated as sound pressure level, SPL) are displayed on a two-dimensional graph. Pabon recently proposed a 3D-extension to that approach, displaying a deliberately chosen voice quality parameter as the color-coded third dimension.

The end point of vocal communication in singing is a human audience and not an SPL meter. Because human perception of loudness is frequency dependent and thus non-linear, the usefulness of the „classical“ VRP approach (only providing information on SPL) is limited. Here, this is addressed by introducing loudness-augmented voice maps. For each SPL-calibrated data point within the voice map, the respective loudness is estimated using an ISO532 loudness model, expressed in units of phon. A novel metric termed the Excess Loudness Over Intensity (ELOI) is introduced, indicating the difference between estimated loudness and given sound level (phon minus SPL, with units of dB) for each data point within the voice map.

The ELOI metric is expected to provide information about the carrying capacity (German: „Tragfähigkeit“) of the voice. In this pilot investigation, the novel approach will be tested with a classically trained and an amateur baritone. It is hypothesized that the trained singer's vocal technique allows him to achieve larger ELOI values in comparison to the untrained singer, because classical vocal training aims at optimizing vocal loudness while keeping vocal effort (and thus subglottal pressure, a main determinant for SPL) low.

This is an ongoing investigation. Preliminary data for the untrained baritone show a non-linear distribution of ELOI across the voice range, reaching maxima of about +10dB in the high-SPL range of chest voice phonation.

FP44 (Sa OH 12:15)

**ACOUSTIC CHARACTERISTICS OF SPOKEN AND SUNG VOWELS IN CORSICAN:
COMPARISON OF TEXTS INTERPRETED IN 1916 AND IN 2020**

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Among documents present in archives concerning the First World War, there is an exceptional sounds collection classified by UNESCO as part of the Memory of the World Register. It consists of numerous sound recordings made by the Royal Prussian Phonographic Commission. Documented by notes, scores and phonetic transcriptions made between 1915 and 1918, it's a major ethnolinguistic and musicological survey carried out in German prison camps. Russian, English, Belgian, French and Italian prisoners, colonial troops from India and Africa participated in this study and include nine recordings by Corsican combatants in 1916/1917. The aim of the study was to make a comparative study of the phonetic vowel modifications between the spoken voice and the singing voice of that period to those of today. We measured the fundamental frequency (F0), the first four formants (F) and the correlation F0/F1 of vowels extracted from four spoken and sung texts from eight old and current recordings. The recent recordings were made by amateur and professional singers who mastered the Corsican language by oral tradition.

Results showed : the increasing of F1 value (first formant), decrease of F2 and F3 values suggest an expansion of the mandibular opening, a centralization of the vowel space and a strong degree of labialization in Corsican compared to the French reference values. The F1 of the vowels is higher on the 1916/1917 recordings, suggesting a strengthening of the open vowel character. The F2 and F3 of the old recordings are not usable. The F1 of singing vowels increases for the whole corpus when switching to singing voice. The F4 decreases. There is an F0/F1 correlation for singers from the center of the island. The results are in the direction of a limitation of vowel sounds showing a reduction in the differentiation of the acoustic features distinguishing vowels.

FP45 (Th A103 12:00)

FEMINIZATION OF VOICE / GLOTTOPLASTY

Markus Hess

Medical Voice Center, HAMBURG, Germany

In this presentation, our Hamburg concept of voice feminisation as a multidisciplinary therapy and counseling will be addressed. Glottoplasty is a part which is frequently added because of patient's inability to eliminate or suppress low pitched voice expressions. Within this presentation, the surgical technique of glottoplasty is highlighted and examples of pre- and postinterventional voices are given.

FP46 (Th A402 11:30)

RECENT UPDATES TO THE VOCAL TRACT ORGAN

David M Howard

Department of Electronic Engineering, Royal Holloway, University of London, LONDON, United Kingdom

Objective: To develop further the capability of a new musical instrument, the Vocal Tract Organ, for musical performance and intonation research.

Method: The Vocal Tract Organ, which utilises 3-D printed an oral tract atop a special loudspeaker and is played via a MIDI keyboard was originally developed for a special after-dinner flash-mob opera performance in front of royalty. Since then it has been used for the performance of specially composed music on various occasions and to produce a vowel sound from a 3,000 year-old Egyptian Mummy (<https://www.nature.com/articles/s41598-019-56316-y>).

That first version of the Vocal Tract Organ used a single 3-D printed vocal tract. This paper will present the

latest version of the Vocal Tract Organ, which is 8-note polyphonic, can be played in just or equal tempered intonation and incorporates 8 organ 'tab' stops to select which of 4 female vowels and 4 male vowels are in use (singly or in combination). For each stop the output is routed to the relevant 3-D printed vocal tract (female or male and one of the vowels /i:/, /ɜ:/, /ɑ:/, /u:/) sits atop a loudspeaker that provides the larynx source mixed for up to 8 notes being played on the keyboard. The Vocal Tract Organ software is written in Pure data, or Pd which enables (during setting up) modification of the excitation waveform shape.

Results: The new Vocal Tract Organ is laid out in a familiar way for organists as a one manual instrument (chamber organ) with one keyboard, 8 organ tab stops and a swell (volume) pedal. It plays like a chamber organ but the naming and the sounds of its stops are unique. Whilst there is a 'Vox Humana' stop available on some church pipe organs, this sounds (in the author's view) nothing like the human voice. The Vocal Tract Organ on the other hand makes use of 3-D printed vocal tracts to set the output sounds and these vowel sounds are clearly distinguishable. The approximate equivalent of a pipe organ 'tremulant' (pitch undulation) stop is replicable on the Vocal Tract Organ via MIDI vibrato wheel and in addition, there is MIDI pitch bend that can be employed.

Conclusion: The Vocal Tract Organ is a novel musical instrument for performance and research. It has been used for tuning experiments relevant to choral singing where control of vowel sound has been important. It is now being used to explore tuning in multiple part choral music.

FP47 (Fr OH 16:45)

RELEVANCE OF VOCAL TRACT AND SUBGLOTTAL IMPEDANCE IN VOCAL TRAINING

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³Technical University of Munich, University hospital rechts der Isar, Department of Otorhinolaryngology, Phoniatrie, Germany.

Objective: The respiratory process is important in vocal training and in professional singing, the airflow is highly important. The objective of the study is to elucidate the influence of the resonances including vocal tract and the subglottal region and evaluate whether the data enable a daily work routine for singing students.

Method: The study included a professional singer and 18 singing students. We use impedance data and vocal spectra to extract vocal tract resonances as well as resonances including the subglottal airways. The sound source acts as a measurement and as a training tool. The latter introduced sinusoidal frequencies to be amplified by the students. Standardised and individual resonances of singing students were used in resonance training without phonation using up to six combined frequencies during 21-34 days of training. The vocal spectra before and after the exercises were recorded. A questionnaire addressed the perception of the students.

Results: The novel lightweight, low cost and mobile impedance measurement and training tool can be applied in vocal education. The impedance measurements in the range from 200 to 4000 Hz show an accuracy of 2-5% of the respective frequency. We compare vocal tract resonances and impedance based resonances during phonation with impedance measurements with the glottis closed and during respiration. The impedance spectra show vowel dependent resonances with closed and open glottis and during phonation. The impedance spectra match the vocal resonances.

Conclusion: The instrumentation allows measurement of resonances as well as voiceless training with open glottis. Exercises using an adjustment of the vocal tract to sinusoidal frequencies resulted in an increase of resonance sensation. The data indicate that the impedance of the subglottal region influences the vocal spectra in high performance singing.

FP48 (Th A402 11:45)

DO ACOUSTIC CHARACTERISTICS OF VOICE AND SPEECH INDICATE EVENTS OF LEARNING PROCESS?

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²*Speech and Voice Research Laboratory, University of Tampere, TAMPERE, Finland*

Object: Research in interaction in learning and teaching processes often uses video recordings and transcripts to find significant events in the learning process. However, transcripts can overlook the intentional or unintentional use of voice in the utterance. Our aim was to investigate if moments of confusion, understanding, and explaining can be recognized through voice parameters in learning dialogues.

Methods: Nine university students (5 male, 4 female, mean age 23.8 years) with healthy voices (VHI score under 12) were recorded in three learning dialogues. Samples indicating confusion (n=95), understanding (n=147), and explaining (n=86) were extracted as well as samples of conversational speech for reference (n=26). The samples were acoustically analyzed by Praat for fundamental frequency (F0), sound pressure level (SPL), voice quality reflecting Alpha-ratio (level differences between 50-1000 and 1000-5000 Hz extracted from long-term average spectra). Also, degree of voice breaks was measured. Differences between the categories and conversational speech were calculated in percentages.

Results: Confusion was manifested by lower SPL and alpha-ratio, suggesting softer voice quality than understanding ($p=.000$) or explaining ($p=.007$ and $p=.000$). Also, SPL was higher in understanding than in explaining ($p=.001$). Additionally, understanding had less voice breaks than confusion ($p=.001$) or explaining ($p=.002$).

Conclusion: The results show that instances indicating confusion, understanding, and explaining were expressed differently in the speech samples. Activity level may be higher in understanding than in confusion leading to increased loudness and firmer voice quality. Smaller degree of voice breaks can indicate that understanding has less pausing than confusion and explaining. In the former it may reflect hesitation, in the latter they may be used as a tool for clarification. It seems that voice research may be a promising addition to the study of learning.

FP49 (Th D501 18:45)

THE SIGNIFICANCE OF IMAGINATION AND ELEMENTS OF VISUALISATION IN SELECTED VOICE EXERCISE METHODS

Izabela Jezowska

Academy of Theatre Arts, WROCLAW, Poland

I shall briefly present some examples of using imagination and elements of visualisation in voice exercises using two seemingly different approaches - my own KinEmission and Kristin Linklater's methods.

'Imagination' and 'visualisation', sometimes used here interchangeably, are not strictly aligned with their definitions (especially 'visualisation') - I do not mean setting a student's brain on to alpha waves or putting them in a state similar to hypnosis. I have only used the definition of visualisation to borrow some elements speaking of its power to motivate, activate the creative forces of the subconscious, focus the mind and expedite achieving the goal. When I write of visualisation, I mean imaging activities in the mind's eye in order to activate processes in the brain that would happen during performing the imagined activity in real life.

I shall start with imagination in singing voice exercises since this issue is slightly less complicated. Examples for activating the imagination will be given, based on the most common difficulties encountered by students of the vocal art (not holding the sound on long or high notes, murmuring noises in the voice, breathlessness at the end of a phrase, fear of high notes, stage fright).

I will describe several voice projection exercises from my KinEmission method, based on imagination and mainly using Aerial-Yoga hammocks.

What sets the Linklater method apart from my approach is the criterion for progress assessment. In the Linklater method, progress is assessed by answering the question 'How do you feel about this?' and not 'How does it sound?'. My method is more training-oriented (however, it does appreciate and employ imaging) and places the progress assessment on both sides - the teacher (as the master) and the student (and their feelings experienced

during exercises); moreover, since the exercises are performed in a group, other students can hear and notice the progress.

Another difference is the approach towards breathing stimulation: my method uses kinesthesia (proprioception), while Linklater uses the power of imagination:

Both methods stress the importance and role of the spine (spine - tree - stream of upward-moving energy). However, in the Linklater method 'the effectiveness of the voice instrument largely depends on posture and minimal use of the energy required for its operation' (maximum effect with minimum effort); in my method - repeatability, regularity of physical exercises (sometimes with imaging).

Common elements also include sighing and yawning, but Linklater definitely uses them more.

FP50 (Th OS 17:00)

HOW TO APPROACH THE GLOTTIC SCAR

Yakubu Karagama,
Guy's and St Thomas's Hospital, LONDON, United Kingdom.

Vocal cord scarring commonly present as hoarseness. This is often as a result of stiffening of the vocal fold which then prevents normal vibration. The scar may include a small area of the lamina propria or the entire vibratory surface of the vocal cord. Involvement of the posterior or anterior glottic area may lead to additional breathing difficulty due to restriction in vocal cord abduction. This is more so if the posterior glottis is involved leading to posterior glottic stenosis with or without crico-arytenoid ankylosis. Extreme care must be taken when managing vocal cord scar as any additional surgical trauma may exacerbate the scarring further. Often, adjuvant therapy for instance steroid or mitomycin may be necessary. A temporary stent like silastic or filler such as hyaluronic acid or autologous fat may use. Angiolytic lasers, for instance blue laser or KTP may be use in selected cases. Speech therapy and vocal hygiene and lifestyle plays an important role. The aetiology varies from trauma, vocal abuse, smoke, reflux, intubation injury, iatrogenic, neoplastic, radiotherapy, idiopathic, the list is inexhaustible. The speaker presents vocal cord scarring/sulcus and suggested management. Regenerative medicine and tissue engineering, stem cells, growth factor anti-inflammatory cytokines antifibrotic agents, gene therapy may be promising but these are not yet use routinely in clinical practice.

FP51 (Fr A402 11:30)

SING HEALTHILY AND CONSCIOUSLY-THE DILATON (DIAPHRAGMA, LARYNX,TONGUE) METHOD AND ITS APPLICATION IN CLASSICAL SINGING

Anna Karlsson
University of Jyväskylä, Department of Music, Art and Culture Studies, JYVÄSKYLÄ, Finland

Classical singers are generally taught that the tongue should lie relaxed behind the lower teeth and the larynx should be free. However, if misunderstood, this teaching approach can be detrimental to a singing student. The word "relaxed" is often understood as "flabby", which is not correct and can be very misleading. Only a muscle that "works", properly relaxes.

To address this problem I have developed The Dilaton (diaphragm, larynx,tongue)Method. It is a vocal teaching method based on the proper physical function of the tongue and larynx both in breathing and in forming vowels. From this point of view it can be understood, how voice, breath and muscles work together in a balanced and healthy way.

I examine how professional classical singers have experienced the method in the process of learning how to sing. I used twelve open-ended interviews, in which the singers describe their progress both before and after the use of the method. According to the preliminary results of the data-driven analysis the subjects have experienced an improved, in some cases even decisive, physical understanding and conscious control of their singing instruments.

A healthy and conscious singing technique is the goal of all professional singers. The conclusion can be drawn, that the concrete teaching of the work of the tongue and larynx is an effective way to achieve this goal: how to get a balanced and healthy way of singing.

keywords: tongue-larynx, vowel formation, breathing, posture, support in singing, classical singing

More information www.dilaton.fi

FP52 (Th D501 17:30)

EXAMINING VOICE TEACHER PROFESSIONALISM: A CASE STUDY ON POPULAR MUSIC VOICE TEACHER EDUCATION IN SWEDEN

Katri A. Keskinen

The Sibelius Academy, University of the Arts Helsinki, HELSINKI, Finland

This presentation draws from a case study that investigates one voice teacher education program in Sweden. Specifically, it examines how popular music voice teacher professionalism is addressed and taught to the students in a “cross-training” context (e.g., Bartlett 2020). The studied data includes semi-structured interviews of voice teacher educators, observations of teaching, as well as curriculum texts and course material used in the Swedish higher education institution.

Due to societal changes, the notions of professionalism, expertise, profession, and professional education have expanded (e.g., Westerlund & Gaunt 2021), even for voice teachers. Thus, for as to better prepare students for the unknown future (Barnett 2004), higher education has been challenged to develop their curricula to cover not only the traditional understandings of voice pedagogy, but topics such as societal responsibility, policy knowhow, entrepreneurship, and agency. This presentation inspects both the traditional and the so-called expanded notions of professionalism for popular music voice teachers. The case study forms part of a doctoral dissertation project that examines voice teacher education programs in different countries.

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FP53 (Th OS 17:15)

ANTERIOR GLOTTIC WEB - TREATMENT OPTIONS

Teemu J. Kinnari

Department of Otorhinolaryngology - Head and Neck Surgery, Helsinki University Hospital / University of Helsinki, HELSINKI, Finland

A trauma of anterior commissure may result an anterior glottic web. Its origin is most commonly iatrogenic. The secondary healing of the anterior commissure reduces the length of the vibrating vocal folds by uniting them. This usually leads to symptomatic dysphonia or airway restriction.

Major risk is taken when operating anterior commissure tumors or laryngeal papilloma.

Anterior glottic web may be treated endoscopically with web release or flap surgery, however, a larger web often requires a laryngeal keel. The treatment options of anterior glottic web will be reviewed.

WENDLER-GLOTTOPLASTY, HELSINKI EXPERIENCE SINCE 1995

Teemu J. Kinnari

Department of Otorhinolaryngology - Head and Neck Surgery, Helsinki University Hospital / University of Helsinki, HELSINKI, Finland

A minority of the M to F transgenders require a surgical intervention to change the pitch (fundamental frequency) and voice harmonics to adopt the feminine type of communication skills. They are not satisfied with their voice mostly due to the fact that male voice still occurs in uncontrolled situations like yawning, laughing, coughing, and shouting. A number of surgical methods have been developed to raise the pitch including glottoplasty introduced originally by Donald and Wendler in 1980's. In this method the anterior part of the vocal folds is de-epithelialized and sutured together. The idea is to shorten the functional length of the vocal folds. This results in changes of the voice box causing a rise in the fundamental frequency of the voice. This presentation will review our experience on glottoplasty since 1995.

ELECTRICAL SURFACE STIMULATION IN EARLY UNILATERAL VOCAL FOLD PARALYSIS

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Investigation's objective: Selective electrical surface stimulation (SES) of the larynx is not yet considered as standard therapy in patients with early unilateral vocal fold paralysis (UVFP). Goal of this monocentric study was to compare standard voice therapy (VT) with SES.

Method: 51 patients with UVFP after thyroid surgery were allocated to either VT or SES (VT=26 patients; SES=25 patients) based on the doctors/patients choice. All patients were followed-up up to 3 months post-operatively regarding UVFP persistence/recovery.

Symmetric triangular-shape, charge-balanced pulse widths (PWs) of 1, 10, 25, 50, 100, 250, and 500 milliseconds (ms) were tested with increasing amplitudes (AMPs). The stimulation was delivered as a train of five pulses using square surface electrodes. Selective laryngeal responses were examined by flexible laryngoscopy.

Results: Restitution of UVFP with regular respiratory vocal fold mobility of both vocal folds occurred in 53.8% of the VT group, and in 40.0% of the SES group after 3 months of therapy. The most effective PWs for the selective eliciting of selective bilateral vocal fold adduction are comprised between 50 and 100 ms in combination with an average AMP comprised between 7.1 and 7.2 mA.

Conclusion: SES can achieve similar vocal fold recovery in early UVFP patients compared to standard VT. A PWs comprised between 50 and 100 ms in combination with a median AMP between 7.1 and 7.2 mA are expected to deliver an effective, and safe bilateral adduction of the vocal folds.

COVID19 COMPULSORY FACEMASK USE AND ITS IMPACTS ON VOICE HANDICAP INDEX ON PORTUGUESE AND SPANISH SPEAKERS

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COVID19 outbreak required the compulsory use of a facemask during day-life activities. This study aimed at comparing Voice Handicap Index (VHI), as a function of facemask use. VHI items were answered twice, the first referring to no facemask use (Without condition), and the second to facemask used (With condition). Answers were collected online for both Portuguese (n = 261) and Spanish (n = 297) speakers. A Wilcoxon test was applied to compare Without and With conditions, for each speaker's group. A Mann-Whitney test was carried out to compare VHI scores between Portuguese and Spanish native speakers. Comparisons of Portuguese and Spanish speakers revealed higher VHI scores for both functional and emotional dimensions for the With condition. One may conclude that, when wearing a facemask, self-perceptions of voice handicap are higher, independently of speaker's sociocultural background. The results of a multivariate regression model suggested that 2.5% increase of VHI total score was related to sex, smoking habits and vocal demand. The requirements of using facemasks still prevail in some countries in Europe, at least indoors. Copying strategies to deal with vocal fatigue related to facemask use are also discussed.

MENOPAUSAL VOICE-RELATED WORK LIMITATION SCALE (MENOVL)

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Female professional voice users (FPVUs) are particularly sensitive to occupational voice disorders as compared to male professionals. On the one hand, female vocal folds are more exposed and less resistant to phonotrauma. On the other, females have greater variations in sex steroid hormonal concentrations during live span, with those occurring during menopause being of particular relevance. The significant decrease in concentrations of oestrogens, progesterone and testosterone lead to menopausal symptoms that have been reported to limit female's working ability. However, the extent to which these symptoms may affect FPVUs is still unknown. We present the development and validation of a scale that measures menopausal self-perceived voice-related limitation to work in FPVUs, henceforth the Menopausal Voice-Related Work Limitation Scale (MenoVWL). A preliminary version containing items drawn from previous literature and in-depth interviews with post-menopausal FPVUs was presented to a panel of 15 voice experts for validation. The revised version yielded 13 items that were filled in online, together with questions on current endocrinological reproductive status and related symptoms, history of amenorrhea, professional occupation, and demographic information. After applying the inclusive and exclusive criteria recommended by the Stages of Reproductive Ageing Workshop, FPVUs were allocated into pre- and post-menopausal groups (98 and 94, respectively). Their responses were used for a factorial validation approach. The subsequent exploratory and confirmatory factorial analyses rendered a 13-item one-dimension scale. Comparisons of pre- and post-menopausal scores revealed a significant higher self-perceived limitation to work in post-menopausal FPVUs. MenoVWL is a validated scale for the early detection of FPVUs who may require occupational health & safety interventions at menopause.

VOICE-TT: AN ONLINE TRAINING TOOL FOR AUDITORY-PERCEPTUAL EVALUATION OF VOICE

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Objective: International guidelines for clinical voice assessment state that auditory-perceptual evaluation of voice quality is an essential dimension of the assessment. It is a holistic, quick, cost-effective and non-invasive evaluation method. Despite the advantages of perceptual evaluation, variability within and between raters is a problem. Research has shown that training with anchor voices leads to a more accurate and consistent assessment of voice quality. The objective of this research project is to collect and select valid anchor voice samples and to compose an extended online training tool (e-learning) for auditory-perceptual voice evaluation.

Method: 158 Voice samples (normal to severely dysphonic) were collected. A highly experienced panel has rated the samples in random order for GRBAS parameters. Percentage agreement and ICC values revealed anchor voices ($\geq 90\%$ agreement) and training samples ($\geq 70\%$ agreement) for each grade and parameter of GRBAS.

The selected samples were further categorized according to difficulty and structured in a multi-level e-learning module.

Results: For each parameter/grade-combination of the GRBAS scale at least two anchor samples ($\geq 90\%$ agreement) and several training samples ($\geq 70\%$ agreement) could be included in the training tool. In comparison to grade 0, 1 and 2, grade 3 samples are underrepresented. VOICE-TT, an online Training Tool for auditory perceptual Voice evaluation, will be presented at the conference.

Conclusion: VOICE-TT is an evidence based online training tool for auditory-perceptual evaluation of voice, based on intra- and interrater agreement of experienced judges. It contributes to the quality and standardization of what is considered as the gold standard in voice assessment.

EFFECTS OF ELONGATION AND ADDUCTION ON THE VOCAL FOLD TISSUE MEASURED BY ULTRASOUND ELASTOGRAPHY

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Objective: The elasticity of the vocal folds plays an important role in the phonation process, therefore changes in these properties alter the sound production. There is no clinically available measurement technique that estimates the elastic properties without damaging the tissue. Ultrasound elastography is an examination method that meets these requirements. To demonstrate the principle, ex-vivo vocal folds were elongated and adducted to alter the elastic response of the tissue in a repeatable manner.

Methods: In this work, a specially developed ultrasound elastography algorithm is applied to image sequences of quasi-static compression of the vocal folds. The porcine vocal folds were elongated and adducted using sewn-in threads. The elongation was accomplished by a thread fixed in the thyroid cartilage which was pulled in anterior direction by defined weights. The adduction was done by two threads applying a torque on the arytenoid cartilage. The manipulations were applied in systematic order which were intermitted by reference measurements. A series of three full larynx experiments was carried out and evaluated by the elastography algorithm.

Results: The investigations showed that the changes due the elongation and adduction of the vocal folds could

be displayed using the developed elastography algorithm. The general effect of elongation and adduction is a hardening of the tissue. Whereby, the absolute change of the elastic properties, due to the manipulations, is reproducible for a single larynx. However, the relative change of specific manipulations is not the same for the identical load on different larynxes.

Conclusion: The changes due to the manipulations could be measured, showing that the elongation and adduction leads to a hardening of the tissue. To understand this effect in more detail, a larger study will be conducted.

FP60 (Th A402 12:30)

DATA MINING OPERATIC FACHS

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In this paper, we employ methodologies of modern data science in the examination of the fach system of operatic voices. The fach system is the traditional taxonomy of operatic voices and operatic roles, based on the range, weight, and color of the voice the singer possesses or the role demands.

Starting with a data set representing casting decisions by European professional opera houses during two seasons, we first perform affinity analysis, arriving to a set of association rules between roles. Each association rule can be understood as a conditional relation between two roles, stating that if a singer appeared in role A, she/he is likely also to appear in role B. Quantification for the likelihood of the relation is also given.

Next, we continue with a cluster analysis finding sets of roles such, that roles belonging to the cluster are more likely performed by a distinct group of singers, than roles not belonging to the cluster. Now, should the casting decisions of opera houses from whom we harvested our data have strictly followed a fach system – say, the one documented in Klotz's veritable Handbuch der Oper – our clustering would match perfectly that presented in the Handbook.

Moreover, our analysis provides quantification for the degree of membership of a role in a given fach, allowing us to discern between clusters (fachs) that are strictly enforced in the casting decisions from those, where a singer can more easily traverse between different role fachs. Our findings suggest there are certain differences in how the high voice types (soprano and tenor), the mid voice types (mezzo-soprano and baritone), and the low voice types (alto and bass) are used by opera companies.

We discuss the differences between our clustering and the traditional fach system, analyzing how the fach system is actually implemented by opera houses today, and discussing the implications our analysis should have on the education of operatic singers.

FP61 (Fr BB 13:00)

INVESTIGATION OF ELECTROGLOTTOGRAPHIC WAVESHAPES USING A KINEMATIC MODEL OF THE VOCAL FOLD VIBRATIONS

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Objective: Electroglottography (EGG) noninvasively quantifies the vocal fold contact area during phonation and is often used in clinical and research contexts. However, the interpretation of the EGG signal is still far from complete. A 3D kinematic model of the vocal fold vibrations was used to simulate the EGG signal, in order to compare variations in the vocal fold geometric and kinematic parameters with changes in various features of the resulting simulated EGG signal.

Methods: The kinematic model consists of a series of M5-shaped coronal vocal fold slices stacked longitudinally. Five geometric and kinematic parameters of the vocal fold vibrations were exercised independently and the resulting EGG signals were qualitatively analyzed. The five parameters were the amplitude of vibration of the lower and upper margins of the vocal folds, the convergence angle, the vertical phase difference between the lower and upper margins of the vocal folds, and the posterior half-width.

Results: The vertical phase difference and the convergence angle were found to have the largest influence on the EGG pulse shape, particularly when the posterior half-width is small and the vibration amplitudes of the lower and upper margins are large. When the vertical phase difference was non-zero, increasing the convergence angle skewed the pulse shape from the right to the left, while increasing the vertical phase difference amplified the effect of the convergence angle. In addition, it was found that a convergent glottis shape (i.e., a positive convergence angle), a high phase difference, a low posterior half-width and a high amplitude of vibration are needed for the EGG signal to exhibit a “knee” during the opening phase, which is usually seen in men’s voices.

Conclusion: Modeling of EGG waveforms revealed several relationships between vocal fold parameters and signal features, offering a more insightful interpretation of the EGG signal, for clinical and research uses.

FP62 (Fr OH 12:45)

TOWARDS LARYNGEAL PACING: DEVELOPMENT OF THE NOVEL ECE50 ENDOSCOPIC CAP FOR FUNCTIONAL ELECTRIC STIMULATION OF THE POSTERIOR CRICOARYTHENOID MUSCLE IN AN ANIMAL MODEL

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Introduction: Laryngeal pacing (LP) is a highly anticipated therapeutic option for patients suffering from bilateral vocal fold paralysis with synkinesis. Identification of candidate patients requires confirmation of a stimuable posterior cricoidarythenoid muscle (PCA) by functional electric stimulation (FES).

Goal of Study: The ECE50 silicone endoscopic cap was designed to be operated on a gastroscope tip for PCA stimulation and confirmation of a glottic opening movement in a setting comparable to a gastroscopy and without the need of general anaesthesia.

Material and Methods: A porcine animal model (n=6) was used to develop and test endoscopic cap prototypes. Three endoscopy experts evaluated and refined the ECE50 cap design and performance in regard to procedure safety, endoscope handling, accessibility of the PCA by the transoral approach and selective muscle stimulation.

Results: Vocal fold opening movements could be evoked by the examiners in 9 of 12 PCA muscles to stimulate with similar electric parameters. The endoscopic approach using the ECE50 cap proved to be atraumatic and sufficiently controlled under sedation to locate the required hotspot for FES of the PCA.

Conclusion: The functionality of the novel ECE50 endoscopic cap concept has been proven in a porcine model. It can be expected to be transferable to human application and to be of importance in identification of LP candidate patients in future.

FP63 (Fr OS 17:15)

A SURVEY STUDY ON STIGMA AGAINST VOCAL ILLNESS AMONG PROFESSIONAL SINGERS AND ACTORS

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Background: Individuals affected by a stigmatized medical condition may become reluctant of seeking medical help. Among professional singers and actors, there can be a stigma associated with vocal illnesses. No quantitative research has explored the degree and the impact of vocal stigma that may have on help-seeking behaviour in professional vocal performers.

Primary goals of this study were to 1) quantify the degree of vocal stigma among professional actors and singers, 2) quantify the association between vocal stigma and predicted help-seeking behaviour, and 3) explore personal factors that may influence vocal stigma.

Methods: An online survey questionnaire was created and deployed using LimeSurvey. The questionnaire comprised 64 items. Sections 1-3 pertained to demographics, occupation and training, and vocal health history including the VHI-10. Sections 4-6 pertained to three constructs for predicting help-seeking behaviour: Information, Motivation, and Behavioural Skills. Section 7 measured experiences of vocal stigma. Sections 4-7 were constructed in a 5-point Likert scale.

Performers were recruited via National Association of Teachers of Singing and the Alliance of Canadian Cinema, Television and Radio Artists. Gender-matched control participants with no employment experience in the arts sector were recruited via Prolific. In both groups, only Canadian participants were recruited, to control for the influence of different healthcare systems.

Results: A total of 202 professional singers and actors and 203 controls (both groups: ages 21-65; female 65%, male 32%, other 3%) participated in the survey. Overall, vocal performers reported levels of stigma that were 14.48% higher than controls ($p=0.025$).

In both groups, vocal stigma correlated negatively with Motivation (Performers: $r=-0.49$; Controls: $r=-0.59$, $p<0.001$) and Behavioural Skills (Performers: $r=-0.28$; Controls: $r=-0.46$, $p<0.001$), but not significantly associated with Information (Performers: $r=-0.09$, $p=0.205$; Controls: $r=-0.09$, $p=0.200$). The VHI-10 score was positively correlated with vocal stigma (Performers: $r=0.46$, Controls: $r=0.26$, $p<0.001$).

In both groups, stigma experiences were found to be negatively associated with age (Performers: $r=-0.27$, $p<0.001$; Controls: $r=-0.17$, $p=0.018$), recency of a vocal illness (Performers: $p=0.15$, $p=0.033$, Controls, $p=0.14$, $p=0.047$), and frequency of vocal illnesses (Performers: $p=0.46$, $p=0.005$; Controls: $p=0.26$, $p=0.031$).

Discussion and Conclusion: Results from this study confirmed the existence of vocal stigma among professional singers and actors in Canada. An individual's motivation and behavioural skills were negatively associated with vocal stigma, suggesting that performers experiencing greater stigma are less likely to seek help for a vocal illness. The negative association between age and experiences of stigma may indicate that early-career performers would be more vulnerable to this stigma, in line with existing literature. Further investigation on vocal stigma at the socioecological level such as public policy and collective agreements is warranted to provide a deeper understanding on the systematic factors associated with vocal stigma.

FP64 (Fr OS 16:30)

HOW OLDER ADULTS RELATE TO THEIR OWN VOICES: A QUALITATIVE STUDY OF SUBJECTIVE EXPERIENCES OF THE AGING VOICE

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Objective: The aim of this study was to investigate how otherwise healthy older adults with self-assessed voice problems relate to their voice and voice changes.

Method: The study used a qualitative method with an inductive approach. Focus groups were conducted at an activity center to identify how older adults reflect on their own voice and the aging voice in general. The interviews were audio recorded and transcribed. The analysis was done using thematic content analysis.

Results: The analysis resulted in three main themes: “Communicational aspects of the aging voice”, “Consequences of deteriorating vocal and communicative capacity”, and “Attitudes, strategies, and ideas”.

The participants considered voice to be an important communication tool and presented what could be interpreted as awareness regarding their voice. Voice changes were considered a natural part of aging. This attitude was also an important reason why the participants had not sought medical care for their voice problems.

The participants discussed ideas concerning extended voice use to maintain a functioning voice when aging. Simultaneously, voice changes due to aging were considered to have a negative effect on communication and social participation.

Conclusion: The voice is important for older adults, and an insufficient voice can affect communication and social participation. Information about aging voice and voice exercises, for example from speech language pathologists, could be of interest among older adults. Further studies on the voice of older adults are needed regarding how they experience their voice and the general aspects of a healthy aging voice.

FP65 (Fr OS 13:15)

EVALUATION OF VISUAL FEEDBACK IN SUBGLOTTAL PRESSURE MEASUREMENTS: A METHODOLOGICAL STUDY

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Objectives: Subglottal pressure (psub) measurements have been suggested to be included in clinical voice assessments. However, data collection procedures vary and there is a need to further develop such procedures. The aim of the present study was to evaluate different speech tasks and the use of visual feedback from real time phonetography in psub measurements.

Methods: 13 vocally healthy women, 29 to 61 years of age, participated. Intra-oral pressure was measured in three conditions: A) production of a syllable string /pae-pae/ versus a phrase, B) habitual voice level (phab) versus phonation threshold level (PTP), and C) with visual feedback of fo and SPL versus no visual feedback. The recordings were repeated after 2-4 weeks for test- retest analysis. Two persons analyzed all data. Intra- and interrater agreement were calculated in %, and reliability using intraclass correlation coefficients (ICC).

Results: The procedure generated a large amount, 96%, of valid data for phab, and less, 69%, for PTP. There were no differences between syllable string and phrase regarding valid data. The intra-rater agreement regarding valid or invalid pressure peaks were 96% and 98% for phab, and 91% and 88% for PTP. The inter-rater agreement was 95% for phab and 80% for PTP. The ICC for intra- and inter-rater reliability varied between 0.92 and 0.98. Visual feedback was helpful for the participants to match SPL in phab but not for PTP. Most participants phonated closer to the fo-target with no visual feedback. Test- retest reliability showed ICC values of 0.73 for phab and 0.55 for PTP.

Conclusions: The results showed that visual feedback using real time phonetography in phab seems useful to control for SPL, but not for fo. The procedure for collecting psub data used in this study generated valid phab data, whereas collecting valid data for PTP was more difficult. Thus, recording procedures for PTP measurements need further development.

THE EFFECTS OF SCREEN BASED COMMUNICATION ON OLDER ADULTS' SELF ASSESSMENTS OF VOICE AND EFFORT, A PILOT STUDY

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The Covid-19 pandemic has affected society in many ways. During the pandemic, we were instructed to keep our distance and interact sparingly. Especially individuals in the group "70-plus" were instructed to stay completely isolated, with reduced participation as a noticeable consequence. New ways of communicating and interacting, mostly screen-based tools, were quickly made available. Today, many people are comfortable using computers and tablets. Despite this, the pandemic situation increased the need for older adults to quickly adapt to the use of these tools to interact in work and leisure. Research about the strain that this type of communication exposes users to is now emerging. "Zoom fatigue" is a coined concept and clinical evidence shows an increase in complaints of voice fatigue and dysphonia related to online communication.

Our goal was to map the effects of screen-based communication in older adults. An online survey was designed and distributed via organizations and social media. The questionnaire included background factors and questions about familiarity with using screen-based tools and ergonomic factors such as effects on voice, posture, eyes and mental effort. Responses from 161 individuals aged 68-80 + were analyzed. The preliminary results showed that online communication was experienced as much more difficult compared to face-to-face interaction and 43.3% stated that communication via screen was more tedious than communicating face-to-face. Within the ergonomic factors, 18% reported voice fatigue, 29.2% tired eyes, 24.3% aching neck and shoulders while 19.2% experienced mental fatigue.

Screen-based communication is a good substitute for face-to-face communication even in the older population, despite the fact that it induces vocal fatigue and also increased effort and general physical strain. Therefore, advice about voice use and good ergonomics should be made easily accessible in order to prevent reduced participation in society.

DOES VOICE MATTER TO FEMALE TEACHERS DURING MENOPAUSE?

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The depletion of concentrations of sex steroid hormones during menopause have been reported to negatively impact on voice. Whereas elite professional voice users, such as singers, have access to voice education and, therefore, to coping strategies for diminishing possible impacts of menopause on voice, other professionals lack of resources. Given the over-representation of females in teaching (e.g., in Spain, 66.9% are females), it seems important to explore the meaning of menopause and its impacts on voice for these professionals. Semi-structured interviews were carried out with 20 teachers who were experimenting menopausal symptoms or have passed menopause. The aims were to explore: (i) the extent to which changes in voice quality associated with menopause could be perceived; (ii) the meaning of voice in education; and (iii) voice care and education of teachers in Spain. Only 10% of teachers related voice problems with onset of menopause. However, a higher number of interviewees (50%) reported to notice a substantial lowering of the speaking voice during a period that was coincident with menopausal transition. The meaning of voice in education unveiled self-prejudices with respect to having female voice characteristics. Participants understood their voices as being high-pitched and thus "less powerful" and "less respectable". These seemed to be responsible for mediating the mother-like relationship that female teachers perceive to have with their students. By contrast, they perceive that low-pitched male voices facilitate the role of authority that male teachers have, increasing their control over students' behaviours. To what concerns occupational health and safety, female teachers felt that they are completely

unsupported. They emphasised the absence of gender-specific health-preventive measures when it comes to menopause and its impacts on their voices and ability to work.

FP68 (Th CoH 18:30)

A NEW APPROACH TO MEASURE VOCAL TRACT RESONANCES. APPLICATION TO A MODERN-SINGING CASE STUDY

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Measuring vocal-tract acoustics is one key issue for singing voice characterization. We aim at developing a non-invasive experimental tool that would assess singer's vocal-tract acoustical behavior during singing. Grounded on previous impedance measurements, a broadband external acoustic source (chirp signal) loads vocal tract at the lips while phonating. Both chirp and voice signals are recorded by a microphone. An open-mouth condition measurement calibrated by a closed-mouth condition provides vocal-tract frequency response, from which resonance frequencies and quality factors can be estimated. A challenging aspect is to separate voice from chirp signal. We propose a new method for signal separation and test it numerically. Its applicability to real singing is then explored on vowels sung by a modern-style singer.

First step consists in estimating voice fundamental frequency on recorded voice+chirp signal. Secondly, an informed high-order chirplet analysis is performed on this signal to eliminate voice, recovering only modulated chirp. Numerical simulations, based on synthesizing vowel [a] sung at 450Hz while adding a 3dB-lower chirp, show that the method is accurate enough for resonance frequencies (resp. quality factors) not to deviate by less than 3 cents (resp. 5%).

The method is applied on recordings of a modern singer and singing teacher. The subject was asked to sing vowel [a] with different voice qualities and for several pitches (F3, G3, A3). Measurement was done during a one-second sustained phonation (voice condition) and during a following closed-glottis condition with instruction to keep vocal tract in same position (silence condition). Voice condition forces to apply voice-chirp separation method, on contrary to silence condition. Results show that the closed-glottis instruction causes additional vocal tract adjustments, even for a trained singer. The differences in resonances between registers are explored as a function of pitch and voice quality.

FP69 (Fr OS 16:45)

AN INVESTIGATION INTO THE PSYCHOLOGICAL IMPACT OF A VOCAL INJURY ON THE PROFESSIONAL VOICE USER

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Objective: The purpose of this study was to explore the psychological impact of a vocal injury on the professional voice user.

Methods: Using qualitative research, 13 semi-structured interviews were conducted consisting of 4 Speech Therapists who work with injured voice users and 9 voice users who had encountered a vocal injury. There was a series of questions devised for each group. The interviews weren't undertaken in any particular order but for ease of analysing the data, the participants were divided into their collective categories – Practitioner and Voice User. This allowed for the data source triangulation and helped determine any common themes between both sources. All interviews were analysed and any emergent themes were coded using a mixture of inductive and deductive coding.

Results: All 13 participants highlighted the psychological impact of a vocal injury, resulting in this as the overarching theme of the data. The categories within this were broken down into 4 main concerns – Psychological and Emotional, Industry Perceptions, Financial Implications and Professional Expectations and

Lasting Impact and Support. Emphasis was placed upon the lack of psychological support available at the time of injury and the detrimental effect this had on mental health and wellbeing for a significant period of time after the physical injury had healed. Furthermore, there was overwhelming comparison to the dissimilarities of how sports injury is viewed and subsequently, treated.

Conclusions: Evidence shows there is a psychological impact of a vocal injury on the professional voice user which is multi-faceted. As vocal athletes, requirement for the same comprehensive treatment as a sports athlete is paramount. Urgency for more psychological assistance at the time of injury from psychologists specialising in sports or voice will allow for better recovery, both physically and mentally. Further studies will be conducted on the psychological impact of a vocal injury on non-professional voice users.

FP70 (Th D501 18:30)

APPLICATION OF THE VPA FOR PERCEPTUAL ASSESSMENT OF VOICE QUALITY IN MEDIUM AND HIGH RANGES IN SINGING: PRELIMINARY FINDINGS

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The Vocal Profile Analysis (VPA) is a phonetically grounded instrument for the perceptual assessment of the voice quality. The theoretical model was designed for speech and encompasses perceptual assessment of the combinations of supraglottic vocal tract configurations, vocal fold adjustments and muscular tension. Different settings are described in comparison to a standard reference, the neutral setting. The model has not yet been adapted for singing. This study aims to explore the applicability of the VPA for the perceptual evaluation of singing voices, which typically present larger variations in pitch range as compared to speech. Target vowels [a], [i] and [u] were inserted in phonetically balanced words in Portuguese (stressed syllables, preceded and followed by bilabial/alveolar consonants), which were then used as lyrics for a simple melodic phrase ranging a major third. The melody was sung by five female professional singers, in three different musical keys: low, medium and high. The singers were instructed to keep the neutral setting as reference when raising pitch. Simultaneous audio signals and ultrasound images were recorded. Three judges familiar with the use of the VPA assessed the singing productions. The individual vowel ultrasound images were compared to the VPA description of the perceived voice quality, and it was observed that the higher the fundamental frequency, the more imprecise the perceptual descriptions of the vocal tract configurations underlying the voices. The judges reported difficulty in classifying articulatory behaviors when listening to the high fundamental frequency examples - this maybe led them to a tendency, in those cases, to describe voice quality more in terms of laryngeal and vocal tract tension than of specific articulatory configurations. Preliminary findings suggest that there are important challenges to overcome for the use of VPA as a tool to the perceptual assessment of the singing voice. It seems necessary to develop strategies to train judges to listen more accurately to the specific articulatory features of singing in the medium and high range. This study also highlights the importance of developing a phonetically grounded model to guide the perceptual assessment of singing voices, suitable to be used by teachers and voice therapists.

FP71 (Th D501 17:15)

SINGING AND MAKING MUSIC IN SENIOR-FOCUSED ENSEMBLES

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A new format of senior-focused music ensembles (age 60+) has found increasing acceptance in Germany in recent years. In the current study, members of various ensembles reported about their preference for different formats and their expectations from ensemble work. In cooperation with the Federal Music Association Choir & Orchestra (BMCO e.V.) in Germany, a questionnaire study was performed with 666 participants (mean age = 69.0 years, SD 8.16) from different residential locations in Germany. Most participants had experience with age-mixed ensembles (n = 527), 371 with senior-focused ensembles. Most participants had been members of a choir

(n = 426), a third of an orchestra (n = 204). The results show that most participants preferred music-making in mixed-age ensembles, even those who had already participated in senior-focused ensembles. However, with increasing participation time, preference for this format increased. Furthermore, participants preferring mixed-age ensembles expected musical progress, while those preferring senior-focused ensembles expected easier rehearsing work. Individuals with longer ensemble experience and higher musical sophistication expected progress in mixed-age work, while older individuals valued the accessibility in senior-focused ensembles. Participants expected an increased quality of life, particularly from senior-focused work. Social contact was also expected from mixed-age ensembles but was again more pronounced in senior-focused ensembles. These findings have implications for the conceptualization of senior-focused ensembles. Are these perceived as genuine alternatives to the mixed-age ensemble, or are they perhaps a form of stopgap? Advantages seem to lie in lower pressure to perform while maintaining typical functions of ensemble work, such as increased quality of life and social contact. However, the ideal-typical nature of mixed-age singing and music-making is not called into question by the new formats.

FP72 (Sa A402 14:00)

PATIENT-REPORTED VOICE IMPROVEMENT AFTER PHONOSURGERY: SWEDISH PHONOSURGERY REGISTER 2009 - 2020

Staffan Morén

Uppsala University Hospital, UPPSALA, Sweden

Objective: The aim was to study the rate of patient reported voice improvement after phonosurgery

Method: The Swedish phonosurgery register collects patient-data from 26 different hospitals. The register includes surgery for six different kinds of benign laryngeal lesions. Patient reported data was collected from 2009 until 2020. Data included VHI-10 scores before and after surgery and a rating of the voice changes.

Results: About 1500 patients had data including both preoperative and postoperative scores. A majority, 73% to 89% of the patients rated their voice to be improved after surgery depending on diagnosis.

Conclusion: Patients experienced voice improvement after phonosurgery in most, but not in all cases.

Evaluation of voice outcomes after phonosurgery is important to optimise the management of benign laryngeal lesions that cause voice disorders.

FP73 (Sa OH 15:30)

CAN ANYTHING BE DONE PEDAGOGICALLY TO ENABLE THE MATURE FEMALE SINGER TO SUSTAIN VOCAL COMPETENCY AND HEALTH?

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UCL, BVA

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This research is based on the author's doctoral study of vocal function and efficiency in the mature female singer and whether effective pedagogy can promote sustained healthy vocal production and competence. This presentation is intended to present the background of research work undertaken in this doctoral study and is intended to be a pre-cursor to the author's workshop on the same study where she hopes to present the pedagogical model for teaching the mature voice which has emerged from this study.

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—the power source for the voice—could become clogged with mucus and its function severely reduced, such that the pharynx can become sore and constricted.

This research investigated the potential benefits of pedagogical intervention on any negative features of female vocal aging in older singers.

The research questions include investigating what is a healthy voice and how does it function? Does the female voice change with age and what effect do these changes have on the components of the voice; the respiratory system, the musculoskeletal system and the larynx? Furthermore, do the changes affect the acoustics and psychoacoustics of the sound? Finally, can effective training mitigate the effect of aging and are there further benefits that the mature female singer can derive from maintaining vocal functionality?

The overarching research methodology embraced an extensive, multi-faceted literature review and an experimental study in which singers performed tasks to demonstrate the functionality of the voice. This had longitudinal and comparative elements. A questionnaire was completed by each singer and a diary that was given to each singer to note any aspect of their singing activities and vocal function.

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, and which can act as a tool to measure the impact of pedagogical intervention over time. Comparison data was drawn from a matched control group without the experience of the pedagogical intervention.

Early 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.

FP74 (Th OH 13:00)

VOCAL ANATOMY AND PHYSIOLOGY: SIMILARITIES AND DIFFERENCES BETWEEN HUMANS AND NONHUMAN PRIMATES

Takeshi Nishimura

Center for the Evolutionary Origins of Human Behavior, Kyoto University, INUYAMA, Japan

Our understanding of the evolution of human speech has been expanded by an increasing knowledge of vocal anatomy and physiology in nonhuman primates. Comparative approaches in vocal anatomy and physiology provide evidence unveiling the acoustic mechanisms for these different vocalizations. Some primates show anatomical specifications adapted for their vocalizations, e.g., a hyo-laryngeal complex in howlers for loud roaring and a vocal membrane in some primates for loud and high-pitched calls. Gibbons also experienced an anatomical specification for their melodious singing, while they adopt a voice physiology as seen in human sopranos. Nonhuman primates also produce a wider range of vocal repertoire than previously thought, reflecting their varied manipulations of the vocal apparatuses. They often descend the hyoid and larynx actively for producing calls. Such empirical studies have shown many similarities serving speech faculties, while they also provide evidence supporting the underlying differences between nonhuman primate vocalization and human speech. The vocal apparatuses act under the constraint of their anatomy, and various associations of anatomy and physiology are found in primates, including humans. Efforts to unveil these variations promise a better understanding of primate origins and of the possible evolutionary history of human speech.

FP75 (Fr OH 17:30)

SPECTRUM FEATURES THAT CONSTITUTE THE SINGERS FORMANT

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In this study, it is explored what spectral features characterize the SF and how these markings co-vary with its strength. A more unified characterization is desirable as there are different markings that all surround its spectral

appearance but there are no definite ones that allow us to prove or to disprove that we are actually dealing with the SF and a comparable mechanism.

Typically, a SF shows in the logarithmic amplitude spectrum as a parabolic bulging shape that as a whole covers a wide frequency range of around 2 kHz, generally coincided by distinct anti-resonances at the low- and high-end that emphasize the vertical contrast for the complete structure. If the raise in level around 3 kHz is the result of one formant peaking, or actually multiple formants clustering or peaking, is often not conclusively discernable from the spectrum. A first goal of this study is to present results of impedance measurements which allow an exact determination of the underlying formant locations. These support the spectral finding that sometimes extreme SF levels can be reached without any obvious clustering.

The main material this study relies on is a large database of spectral VRPs, recorded for different singer groups, all with separate recordings for laryngeal mechanism M1 (modal) and M2 (falsetto). Individual VRPs generally show that SF levels vary largely with fo and SPL. The finding that will be the main focus here, is that despite these vast SF level changes, the actual shape markers of the SF are typically consistent within a singer and remain relatively indifferent to changes in fo, SPL, spectrum slope, and in some extend to changes in laryngeal mechanism or vowel. Between singers however, the frequency location and spectral weight of the SF markings varies considerably. This complicates a unification. A second objective is to substantiate this finding by presenting the result of an analysis of the inter- and intra- singer variation for different SF markers.

FP76 (Th D501 17:00)

FUNCTIONAL ORIENTATION IN METHODOLOGY AND DIDACTICS IN VOICE PEDAGOGY AT MUSIC SCHOOLS

Elisabeth Pawelke

Leopold Mozart Centre, University of Augsburg, AUGSBURG, Germany

Background: In contemporary literature, based on today's scientific knowledge, the use of a more physiologically and function-oriented didactics and methodology instead of a pure sound orientation within voice pedagogy is required.

Objectives: The aim of the study is to investigate to what extent functional orientation (FO) is currently used within the teaching of singing with adolescents and adults in individual voice lessons at Bavarian music schools. Due to the abundance of methods, it is another objective to find out if the vocal pedagogues at these schools teach according to any functional method and which textbooks and learning methods are mainly used by them.

Methods: For the present study, 146 singing teachers from 182 of the 198 Bavarian music schools who are members of the largest association of German music schools (VdM) and offer singing lessons were surveyed in 2021. The inclusion criterion for the sample selection was the vocal pedagogical activity with adolescents and adults in individual lessons at a VdM music school in Bavaria. A digital questionnaire was developed and sent to the music schools after a pretest with 10 other music schools was conducted.

Results: The results show that the level of FO in subjects is in a middle range of the generated scores. A little over half of the subjects (53%) also stated that they did not teach according to any functional method, 27.5% according to no textbook. The highest level of agreement concerning the use of a textbook was only 15 %. There is also a highly significant medium-sized relationship between FO and the particular functional method chosen for teaching.

Conclusion: The results indicate that a methodical and didactic functional orientation is statistically highly significant in relation to the choice of the preferred singing method. In addition, it can be concluded that the degree of FO and sound orientation in singing lessons at Bavarian music schools is currently about the same, with a slight predominance of vocal pedagogues who do not teach according to a functional method. The selection of textbooks is also very heterogeneous within subjects.

THE INFLUENCE OF SPEAKERS' SPEECH QUALITY ON LISTENERS' PURCHASE INTENTION

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Purpose: This study aimed to investigate the individual and combined effects of the speakers' overall voice quality and speech rate on the listeners' perception of the speakers' personality and how that would affect the listeners' purchase intention.

Method: Three stimulus sets were synthesized based on the just noticeable difference in speech rate perception and the best representative samples of three different levels of overall voice quality. The three stimulus sets were differed in overall voice quality only, in speech rate only or in both factors. Forty participants were invited to rate their perception of the speakers' personality and their own purchase intention after listening to the stimuli by using a five-point Likert scales on each of the four variables: perceived attractiveness, perceived competence willingness to listen further and willingness to make a purchase. The individual and combined effects of overall voice quality and speech rate on the four variables were computed by the Quade's rank analysis of covariance. The ordinal logistic regression models were used to analyse the strengths of the effects.

Results: The findings showed that a deterioration on the speakers' overall voice quality significantly lowered the listeners' ratings on all four variables, and the speakers with non-manipulated speech rate were rated significantly higher on all four variables by the participants. Overall voice quality showed significantly greater effects than speech rate on all four variables. Last, perceived personality correlated highly and positively with purchase intention.

Conclusions: The results revealed the importance of the speakers' overall voice quality over speech rate in influencing the listeners' purchase intention. Employers from the personal selling industry should pay extra attention to occupational voice safety and health of the salesforce in order to achieve the best sales performance.

SONGBIRDS MUST SING: HOW ARTISTIC VOICE USERS PERCEIVE THEIR VOICE IN TIMES OF COVID-19

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Objective: The COVID-19 pandemic has led to a critical disruption in the music and performing arts industry, and affected singers and other artists. This study was designed to examine the effect of this unique time on artistic voice users, the way they perceive their voice, and their voice-related behaviors.

Methods: A total of 110 participants volunteered for the study: 57 professional artistic voice users (34 singers and 19 actors) and a control group of 53 nonprofessional voice users. All participants completed three questionnaires related to their self-assessment of their voice, their voice difficulties, vocal training, and current stress in the time of the COVID-19 pandemic.

Results: Compared to the controls, artistic voice users were more concerned about their voice ($P < 0.001$), practiced their voice more often ($P < 0.001$), and experience more anxiety and stress ($P < 0.05$). In addition, within the professional group, singers reported practicing their voice in the time of the COVID-19 significantly more than actors ($P < 0.01$).

Conclusions: Professional artistic voice users experience the COVID-19 pandemic as a stressful time, with negative effects on their well-being and specifically on their voice. This should be considered in the treatment and maintenance of their voice and professional career at current and future stressful times.

FP79 (Fr OS 17:30)

SELF-REPORTED VOICE PROBLEMS IN CLASSICAL SINGERS: A SYSTEMATIC REVIEW OF VOCAL SYMPTOMS, ASSESSMENT METHODS AND ASSOCIATED FACTORS

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Objectives: The objective of this study was to identify and analyse research evidence pertaining to self-reported voice problems in classical singers. A systematic review was carried out addressing the following in classical singers: 1) How are self-reported voice problems assessed? 2) What is the nature and severity of their self-reported voice problems? 3) What are the factors associated with self-reported voice problems?

Methods: A systematic literature search of ten electronic databases using both EBSCOhost and OVID online platforms was conducted following the Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines. Only peer-reviewed articles which assessed self-reported voice problems in classical singers were included. Methodological quality was assessed using Johanna-Briggs Institute Critical Appraisal checklists. Data analysis was conducted using narrative synthesis.

Results: Following deduplication, abstract and full text screening, 27 articles were included in the review. The studies involved classical singers belonging to various sub genres such as Carnatic, Western Classical, Opera and Classical choir. Both validated and non-validated tools were used to assess voice problems. The most used validated tools were related to vocal handicap. The symptoms reported most frequently by classical singers were vocal fatigue followed by difficulty reaching higher pitches and changes in voice quality. Factors such as stress, voice use, singing experience and use of contraceptives were found to influence vocal health.

Conclusion: Classical singers are a distinct group of singers due to their singing mechanics and training regimes. The generated symptom profiles and identified factors likely to impact the classical voice can aid in the development of appropriate preventive programmes. Implications also extend to adapting assessment and voice management for this group. Current limitations and future directions for research are also outlined.

FP80 (Fr OS 17:45)

HOW DO SINGERS COPE WITH VOICE PROBLEMS? A QUALITATIVE EXPLORATION OF THE PERCEPTIONS OF WESTERN CLASSICAL AND CARNATIC SINGERS, SINGING TEACHERS AND SPEECH AND LANGUAGE THERAPISTS (SLT)

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Objectives: Singers are 'elite vocal performers' whose livelihood depends on optimal functioning of their voices. Since singers frequently encounter voice problems, it becomes essential to explore how they manage, or cope, with these voice problems, as these can have an impact on their vocation, well-being and quality of life. This study aimed to explore beliefs and perceptions of singers, singing teachers and Speech and Language Therapists (SLT) specialised in voice disorders regarding voice related coping in two groups of classical singers-Carnatic (South Indian classical) and Western Classical.

Methods: A qualitative analytic methodology was adopted, and semi-structured interviews were used to gather rich and descriptive data. Nineteen purposively selected participants were interviewed across 3 groups: singers

(n=6), singing teachers (n=7) and SLTs (n=6) who were associated with either the Western Classical or Carnatic genre. Framework analysis was adopted to analyse data using NVivo software.

Results: Nineteen participants were recruited in the study. Four overarching themes were identified-1) Coping strategies employed by singers, 2) Beliefs and perceptions of SLTs surrounding assessment of coping, 3) Factors affecting coping and 4) Impact of coping on singers. Comparison between two singing groups revealed differences in perceptions implying the role of culture and genre in coping (e.g. reliance on religion by Carnatic singers to cope with a voice problem). Similarly, comparisons between groups (singers, singing teachers and SLTs) highlighted similarities and differences in how coping is viewed by these groups (e.g.: what is considered adaptive/maladaptive).

Conclusion: This study explored perceptions and beliefs surrounding voice related coping which is beneficial in understanding its role in the onset, development and maintenance of voice problems, and can inform voice assessment and management.

FP81 (Fr A402 11:15)

ACOUSTIC THEMES OF RANGE AND ORNAMENTATION IN CARNATIC REPERTOIRE

Samyukta Ranganathan, Kate Cubley

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Indian Classical Music (ICM) is an oral tradition taught through a guru-shishya (teacher-student) lineage. While there have been recent efforts to understand the vocal mechanics, specifically range and agility of ICM (Venkataraman, 2020; Arunachalam, 2014; Radhakrishnan, 2011), there appears to be a lack of an overarching, science-based, vocal pedagogy. Consequently, this research project intended to bridge this gap by utilising concepts from vocal acoustics while contributing original knowledge to the field.

This study investigates ICM singers' acoustic profiles as they traverse their range with particular focus on ornamentations and agility gestures typical of ICM. Hyperfunction, strain and range reduction seem to be common complaints for ICM singers (Arunachalam, 2014; Venkataraman, 2020). Consequently, the study considers that understanding the vocal acoustics of this genre of music may reveal reasons why, whilst simultaneously uncovering practical teaching strategies that promote efficiency of phonation.

This pilot study spectrographically analysed six professional-level Carnatic singers through a case-study approach guided by questionnaire data where singers indicated areas of strain and ease. The study revealed that high range strategies are not often consistently employed, highlighting a need for training.

Cleanly executed ornamentations and perceived ease in the high range were accompanied by higher harmonic presence above 1.5 kHz and a lower second harmonic presence, perhaps due to strategies such as twang and pharyngeal voice (Bozeman, 2013; Buescher & Sims, 2011). It was found that overly pressed phonation may interfere with the production of clean and efficient vocal ornamentations, pointing to a possible negative impact of hyperfunction on singing agility. This study highlights a need for incorporating consistent science-based vocal pedagogy in ICM, particularly to alleviate common complaints of strain and high range difficulty in ICM singers.

FP82 (Th OH 13:15)

THE EVOLUTION OF RHYTHM: A COMPARATIVE APPROACH

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Who's got rhythm? While some species are particularly rhythmic, it is unclear why this happened in evolution. Many hypotheses try to explain the origins of acoustic rhythm capacities, but few are empirically tested and

compared. In this talk, I will discuss the major hypotheses for the evolution of vocal rhythmicity in humans and other animals, which link acoustic rhythms to gait, breathing, chorusing or vocal learning. I will suggest how integrating approaches from ethology, psychology, neuroscience, modeling, and physiology is needed to obtain a full picture. I will then zoom in on some crucial species which are key to test alternative hypotheses on rhythm origins. Pinnipeds are particularly promising species to find rhythmic capacities, because of their developed vocal learning and breathing control. I will present data from harbour seal pups in four different setups: recordings of semi-natural vocal interactions in individual and group settings, playback experiments to elicit vocal responses and perceptual listening experiments to measure behavioral responses. Our data suggest that seal pups have developed capacities to produce and perceive rhythmic patterns. Seals' vocal exchanges show rhythmic interactivity and antisynchronous coordination. Other mammals, such as singing primates, are also promising animals to display rhythm because of their gait patterns and engagement in choruses. I will present data from lemurs *Indi indri* and other singing primates showing, for the first time in mammals, that their vocalizations are organized according to rhythmic categories; i.e., the rhythmic units of songs are quantized. I will also present rhythmic data on chimpanzees, discussing the potential meaning of a discontinuity between singing primates and apes. Finally, I will show how this empirical data can be complemented and enhanced by mathematical and agent-based computational modeling. I will conclude by highlighting which species have rhythm, and hypothesizing why humans evolved to be such chatty, rhythmic creatures.

FP83 (Fr CoH 10:00)

THE “VLS PARAMETERS FORM” FOR THE COLLECTION OF VIDEOLARYNGOSTROSCOPY (VLS) BASIC FINDINGS

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Objective: Videolaryngostroboscopy (VLS) is a basic investigation for the assessment of dysphonia, allowing to study the vibration of the vocal folds. It is recommended by the ELS guidelines. In 2002 the Italian Society of Phoniatics and Logopedics (SIFEL) proposed a protocol that follows the ELS guidelines, containing a form for the collection of the basic findings of videolaryngostroboscopy. It considered several parameters, as those codified by Hirano and Bless (as the “Mucosal Wave” and the “Glottic Closure”) and other parameters proposed by Bergamini and Ricci-Maccarini, as the “Vocal Fold Motility” and the “Seat of Voice Source”, providing a comprehensive evaluation tool for the videolaryngostroboscopic examination. In 2018 this form was published with drawings that help voice clinicians in the evaluation of videolaryngostroboscopic findings. This form, called “VLS Parameters Form” includes the evaluation of 12 parameters. In 2016 Poburka, Patel and Bless published a form for the collection of basic findings of the videolaryngostroboscopy and a form for the High-Speed Videoendoscopy. The first one, called “VALI (voice vibratory assessment with laryngeal imaging) Form for Stroboscopy”, provides for the evaluation of 11 parameters, similar to the ones contained in the VLS Parameters Form, but with an evaluation in percent and without the parameters “Vocal Fold Motility” and the “Seat of Voice Source”. The evaluation in percent of the parameters of the VALI Form gave us the suggestion to improve the rating of four parameters of the VLS Parameters Form.

Methods: In order to investigate the inter-and intra-rater reliability and reproducibility of the evaluation of the 12 parameters contained in the VLS Parameters Form, we have performed a study on 150 forms for the laryngostroboscopic examination, which were filled by 5 experienced voice clinicians, who evaluated, in blind way (only knowing gender and age of the patients) 20 video files mp4 with audio, containing laryngostroboscopy samples, including the sound of patient's voice during the examination and the indication of the pitch of the vowel produced by the subject during the laryngostroboscopic examination.

The samples were the pre and post-phonosurgery examinations of 5 selected patients (4 females and 1 male age 29-60 y.o.) and 5 normal subjects (4 females and 1 male age 30-60 y.o.) as control group. The diagnosis and the phonosurgery performed in the 5 patients were blinded to the raters. The assessment of the laryngostroboscopic examination with the VLS Parameters Form was compared with the assessment of the same 10 samples of

pathologic voices using the VALI Form for Stroboscopy. The parameters of the VALI form are scored in percent of deviation from normal, while the in VLS Parameters Form they have not a percent scoring, so we approximated the two rating methods in order to compare the data and to allow a statistical analysis of the results. Each parameter of the VLS Form and of the VALI Form was evaluated by the raters who scored the parameter as indicated in the form and annotated the “Difficulty” in the evaluation of the parameter (0 Not Difficult, 1 Slightly Difficult, 2 Very Difficult) and the Importance of the parameter for the Diagnosis (0 Not Important, 1 Slightly Important, 2 Very Important).

Then the 5 pre-operative video samples were presented to the 5 raters in a different order (always random as in the previous evaluation) to test the reproducibility of the evaluation of the 12 laryngostroboscopic parameters contained in the VLS Parameters Form.

Results: The statistical analysis of the results of this study showed a good inter-and intra-rater reliability and reproducibility of the evaluation of the 12 parameters contained in the VLS Parameters Form.

Conclusions: The VLS Parameters Form provides a comprehensive evaluation of the laryngostroboscopic basic findings. This form and the VALI form allow to assess the changing of laryngostroboscopy parameters after phonosurgery. In the VLS Parameters Form, the parameter “Vocal Fold Motility”, which is not contained in the VALI form, allows for the evaluation of the position of the immobile vocal fold and the comparison with the examination performed before and after medialization laryngoplasty with injection laryngoplasty or with laryngoplasty through external approach. Furthermore the parameter “Seat of voice source” is contained only in the VLS Parameters Form: it allows for the evaluation of the laryngeal sphincter (and not only the glottis) during phonation, as in supraglottic voice produced by the ventricular bands.

The parameter “Vocal Fold Morphology” of the VLS Parameter Form is more complete of the relative parameter of the VALI Form “Non Vibratory Observations”, because it allows for the detection of the augmentation of the vocal fold e.g. after injection laryngoplasty and the presence of laryngeal lesions. On the other hands, the VALI Form for Stroboscopy allows for the evaluation in percent, which is more detailed, but more difficult.

FP84 (Sa A402 14:15)

MANAGEMENT OF SPASMODIC DYSPHONIA IN THE COVID ERA

Emma Richards, Nur Wahidah Wahid, Ameera Abdelrahim, Giulia Campbell, Anita Sonsale
Queen Elizabeth Hospital Birmingham, BIRMINGHAM, United Kingdom

Objectives: The COVID-19 Pandemic has had a major impact on the delivery of ENT services and the wellbeing of the population. Both of these affect those with spasmodic dysphonia (SD) who rely on repeat botox injections in specialised multidisciplinary clinics for symptom control. Limitations on hospital foot-fall have necessitated new means to combat delays. In our department this involved distribution of advice sheets and the establishment of virtual clinics run by our ENT Surgeon and Speech and Language Team (SALT) to triage patients. Although face-to-face appointments have been re-established they are still subject to restrictions and ongoing home support is required. We sought to assess the impact of the pandemic on this group.

Methods: On resumption of services, patients attending our tertiary voice clinic for injections were invited to complete a simple, validated 14-item questionnaire. Questions included time intervals, symptoms and the impact of missed injections on function and wellbeing. We have continued the service using a oneway path for patients, with limitations on people accompanying patients to facilitate social distancing.

Results: We had 59 patients at the start of COVID-19 who completed the questionnaire. Over 75% reported a delay in injection (4-28 weeks). Most felt they needed an injection before it was offered, however many were happy to wait due to the risk of COVID-19. Virtual interim voice clinics and advice sheets were positively received. The main impacts of missed injections were difficulty communicating and loss of confidence. Most reported emotional distress and a sense of isolation. A total of 104 patients are now on our dataset coming for regular injection.

Conclusion: Our work shows the challenges experienced by those with SD during the Pandemic. Our approach

helps screen patients to prioritise those struggling the most. With COVID-19 persisting, this successful model is useful in providing continued care for SD patients.

FP85 (Sa OH 12:30)

HISTORICAL SOUND RECORDINGS FROM BERLIN: THEIR SCOPE AND POSSIBLE DIACHRONIC LANGUAGE CHANGES

Jaan Ross

Estonian Academy of Music and Theatre, TALLINN, Estonia

Between 1916 and 1918, extensive sound recordings of Estonian informants were carried out in five German prisoner-of-war camps. Before 1918, Estonia was part of the Russian empire, and during World War I ethnic Estonian conscripts fought in the Russian army alongside with representatives of other national minorities. The duration of available audio material is about one hour. It is preserved in two archives: wax rolls at the Ethnologisches Museum in Berlin-Dahlem (Phonogramm-Archiv) and shellac discs at the Humboldt-Universität zu Berlin (Lautarchiv). The recorded material includes readings of excerpts of narrative text or word lists, as well as songs, recitals, and number-counting. The Berlin recordings may be the earliest audio document to highlight differences between Estonian dialects by reference to a standard source text. Likewise, the material seems to represent the first recordings of the phonological effects of palatalization and quantity in Estonian. From the point of view of music studies, the Berlin recordings contain several instances of popular songs and patriotic songs, including the anthem of the Republic of Estonia. Estonian is one of the few languages that exhibit a three-level quantity opposition. Rather than an opposition of vowel length only, Estonian quantity is a complex prosodic phenomenon manifested in the domain of disyllabic feet. Historical recordings give us a unique opportunity to see whether there have been developments in Estonian word prosody during the past century. The segmental duration of disyllabic words from the Berlin recordings is analyzed, and compared with data from present-day speakers. It is surprising to see the similarity in the syllable ratios derived from the Berlin data at the beginning of the 20th century and in contemporary data. At the same time, the reading style has changed: in the contemporary data, the speech rate is considerably faster and the pitch is lower than in the Berlin data.

FP86 (Fr OS 13:00)

DIFFERENT SINGING STYLES AND 3D MRI DATA ANALYSIS: VOCAL TRACT CONFIGURATIONS AND ACOUSTIC PROPERTIES DERIVED FROM ESTILL VOICE TRAINING® QUALITIES

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Estill Voice Training® defines 7 different Voice Qualities (Speech, Falsetto, Sob, Nasal Twang, Oral Twang, Opera, Belting) which are used in contemporary commercial music as well as in classically western style of singing. To understand more in detail how these are defined by different vocal tract configurations, advances in Magnetic Resonance Imaging of the vocal tract during singing is used in 2 professional trained singers with a high grade qualification level in Estill Voice Training®. They performed sustained phonation in 7 Qualities at different fundamental frequencies.

3D vocal tract models were segmented after the implantation of teeth models. The models were evaluated in their overall length, volume as well as their volume of different sections and the area function were derived. From the segmented vocal tract surfaces, finite element models for acoustic simulations were created.

Both subjects showed similarities in their vocal tract modifications for the 7 Qualities. The vocal tract

configuration for Twang/Belting, Sob/Opera and Falsetto/Speech and their acoustic evaluation were more alike. The vocal tract length was much shorter in Belting and Twang compared to Opera/Sob while the length for Falsetto/ Speech were in the middle. Acoustic enhancement was lowest for Falsetto/Speech phonation while all resonance frequencies (f_{Rn}), were slightly higher for speech compared to falsetto. Opera and Sob are characterized by the lowest values in $f_{R1\&2}$. We find a high boost in harmonic energy for Opera, but less for Sob. Twang and Belting both are associated with the highest $f_{R1\&2}$ and a very high harmonic energy. Results underline that 7 Estill Voice Qualities can be differentiated via their acoustic approach which is controlled via specific vocal tract configurations.

FP87 (Th D501 12:15)

A VOICE ERGONOMIC TOOL - AMPLIFICATION – A SOLUTION TO DECREASE VOICE LOADING

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Amplifiers are sometimes recommended to occupational voice users, especially to those with a voice disorder. It is not always recognized what the purpose of the amplifier is, how we expect the amplifier to work to relieve the voice disorder. We may expect amplifier to change the voice production technique towards more physiologic or the device amplifies the sound so that there is no need the speaker to rise the voice, or we may really expect the amplifier to amplify the speech to be better audible.

Teachers' speech level, fundamental frequency of the voice and activity noise levels in classrooms were measured without and with an amplifier. Teachers and students were also asked for their opinions on the use of amplifiers.

Teachers' vocal symptoms increased when they did not use the amplifier, whereas no change was found when using the amplifier. The results showed also that speech levels and fundamental frequencies were lower when using the amplifier. Teachers found speaking with an amplifier more comfortable, and also students were more satisfied when speaking with an amplifier. According to this study, the use of a sound amplifier can be recommended to decrease the loading of voice.

FP88 (Fr A402 10:15)

CONTRIBUTION OF TWANG ON VOCAL ECONOMY IN CONTEMPORARY COMMERCIAL MUSIC SINGERS

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Objective: Singing voice requires specific voice training approaches to reduce vocal fatigue to allow singers to meet their vocal and artistic demands. Vocal economy has been proposed as a relevant goal of singing voice training. Studies based on computational models have shown that a megaphone-like shape of the vocal tract, (as when using a twang quality), increased the acoustic inertance of the vocal tract and, therefore, vocal economy. To the best of our knowledge, there are no studies of vocal economy performed in real singers during twang phonation. The present study aimed to determine the degree of vocal economy produced by twang quality in CCM singers.

Methods: Fifteen volunteer CCM singers were asked to sing the [a:] vowel in two different pitches (at the lower 25% of their pitch range and at the 50% of their pitch range). Each singer used both a neutral voice quality (open vocal tract) and twang (megaphone-like shape of the vocal tract) for each pitch. Both voice qualities were asked to be performed as loudly and comfortable as possible. Vocal tract configurations were controlled previously by laryngoscopy. Vocal economy was obtained by the Quasi Output-Cost Ratio (QOCR).

Results and Conclusions: Preliminary results show a tendency of a greater degree of vocal economy during a neutral voice quality (open vocal tract) compared to twang quality (megaphone-like shape of the vocal tract). Results obtained in real singers do not agree with previous studies based on computational models. The anatomic and acoustic features of twang might help singers to increase loudness at a lower expense to the vocal fold tissues and with a reduced body effort. However, other variables should be taken into account in order to perform twang economically, as in the case of the excess of subglottic pressure. Future studies should consider inverse filter and aerodynamic analysis as complementary measures of vocal economy in real singers.

FP89 (Fr A402 10:00)

THE UPPER VOCAL TRACT CONTRIBUTION ON THE AUDITORY PERCEPTION OF TWANG

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Objective: The auditory perception of twang has been related to lower vocal tract adjustments. Although some authors have proposed that the upper vocal tract (UVT) might also contribute to the twang voice quality, to the best of our knowledge, there are no auditory perceptual studies based on natural voice stimuli that have assessed the contribution of the UVT to the perception of twang. Through auditory-perceptual tests, the present study attempted to answer whether the spectral features related to the UVT adjustments contribute to the perception of twang and the magnitude of this contribution compared to the spectral characteristics related to the lower vocal tract (LVT).

Method: Ten blinded judges rated the amount of twang perceived on seventy-six stimuli. Stimuli consisted of twenty voices recorded from eight CCM singers who sustained the vowel [a:] in different pitches, with and without twang quality. Also, forty spectrum-manipulated samples and sixteen synthesized stimuli were included. The spectral manipulation and synthesis were performed based on the acoustic data obtained from the original samples (fundamental frequencies and formant frequencies).

Results and Conclusions: Preliminary results show that the auditory perception of twang increased for stimuli that contained acoustic changes below 2 kHz compared to stimuli that contained acoustic changes over 2 kHz. Also, similar results were found when comparing artificial stimuli that resembled twang based on the lower formants and those based on the higher formants. Both the LVT and UVT may contribute to the perception of twang. However, based on preliminary data, twang quality seems to rely more on the UVT changes.

FP90 (Th A402 12:15)

LISTENING TO OTHER'S EMOTIONS: A FMRI CASE-STUDY ON EMPATHY ARISING FROM EMOTIONAL VOICES

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The capacity to share others' emotions and empathize is crucial to social relationships. Studies on empathy in relation to pain, emotional situations and emotional faces have referred to the assumption that we understand actions and share sensations and emotions of others by (at least partially) activating neural representations of those same actions, sensations and emotions in our own brains.

The purpose of this pilot functional-Magnetic-Resonance-Imaging (fMRI) case-study is to investigate whether areas of the brain referred in relevant literature as being associated with laryngeal and articulatory motor-planning and control, are also activated when a participant listens to another person's emotions expressed

vocally.

Method: Classical univariate analysis was used in order to identify the areas of the brain that were activated when a participant listened to brief “neutral”, nonverbal vocalizations and when the same participant listened to brief, nonverbal vocalizations conveying different emotions while trying to empathize with them. The participant was subsequently asked questions relating to the own emotional involvement when listening to the different voices.

Results: In a comparison with listening to neutral voices, the fMRI images revealed that listening to and emphasizing with emotional voices involved significantly stronger activations in areas of the brain associated with: the motor control of voluntary movements, including laryngeal and articulatory movements; the “temporal voice areas” of human auditory cortex; and areas of the limbic system.

Conclusion: This case study suggests that listening to and emphasizing with emotional voices also activates areas of the brain associated with voice production. Further analyses involving more fMRI data on both perception and production of emotional voices are required in order to confirm these preliminary results.

FP91 (Fr BB 12:30)

EFFECT OF VF MANIPULATIONS ON THE ELASTICITY OF ITS TISSUE INVESTIGATED WITH THE PIPETTE ASPIRATION TECHNIQUE

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Investigation's objective: Phonation is a complex process where the material properties of the vocal folds (VFs) play a major role. In voice and speech production the frequency of the primary signal varies a lot, done by manipulating the VFs. In vivid state, muscles acting on the arytenoid and the cricoid cartilage can change the pressure between both VFs and the tension in each VF. Still little is known about the effect of those manipulations. To gain more information, ex-vivo experiments with porcine larynges are performed. The properties of the VF tissue are measured with a dynamic pipette aspiration technique, which provides near surface data of the static and dynamic elasticity.

Method: The dynamic pipette aspiration setup uses a Laser-Doppler-Vibrometer to measure tissue movement and allows to calculate the dynamic elasticity for excitation frequencies between 200 – 1000 Hz, using the well-known Aoki formula. The static elasticity of the tissue is identified out of the indentation of the pipette head and the acting contact forces.

Surgical sutures have been sewn on the arytenoid and the cricoid cartilage to manipulate the VFs. The position and direction in which the forces act imitate the physiological movements of the larynx. The forces on these strings have been changed in eight combinations to simulate adduction and elongation.

Results: The experiments show the setup's ability to measure changes in elasticity due to the applied manipulations.

As a result of the manipulations, a stiffening of the tissues can be seen. Reference measurements after the manipulation series show that they are in the elastic range.

Conclusion: The effect of VF manipulations was investigated successfully. In general can be said that it leads to higher elasticity values. To understand this effect in more detail, a measurement series with a higher sample number is desirable.

ELECTROSTIMULATION OF INTERNAL BRANCH OF SUPRALARYNGEAL NERVE (iSLN) OR THYROARYTENOID/LATERAL CRICOARYTENOID MUSCLES (TA/LCA) FOR THE TREATMENT OF SPASMODIC DYSPHONIA AND VOICE TREMOR

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Introduction: Spasmodic dysphonia (SD) and voice tremor (VT) are rare forms of neurolaryngeal disorders, generally of idiopathic etiology, caused by dysfunctions of the brain regions involved in muscle control and/or of the relevant neurotransmission paths. So far, neither diagnosis nor treatment have been standardized, with the most common and effective therapy being the off-label bilateral administration of botulinum toxin in the thyroarytenoid-lateral cricoarytenoid (TA-LCA) complex. Our study assesses the effects of selective unilateral electrostimulation of the internal branch of the superior laryngeal nerve (iSLN) vs. bilateral electrostimulation of the TA-LCA complex.

Materials and Methods: In a multicenter study, we stimulated the iSLN in 13 and the TA-LCA complex in 7 patients using hooked-wire electrodes connected to an external stimulator. The effects of stimulation, which was performed for 30 min on 5 consecutive days, were assessed by comparing strain and tremor score, spasm count, voice parameters and quality of life prior to, and daily during and after stimulation and 1 week after the last stimulation session.

Results: All 20/20 patients completed the study. Strain and tremor score, spasm count, maximum phonation time improved over treatment. The stimulation effects lasted for about 1 week after the last session and disappeared thereafter. The stimulation frequency used for VT was generally higher than that for SD patients, though always in the range between 40–100 Hz with a mean pulse width of 0.2 ms and an average amplitude < 5 mA.

Conclusions: The exploratory results support the idea that electrostimulation of the laryngeal region may be considered for the development of new therapeutic solutions for both SD and VT.

GLOTTIS-ANALYSIS-TOOLS: AUTOMATED HIGH-SPEED VIDEOENDOSCOPY ANALYSIS OF VOCAL FOLD VIBRATIONS

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Objective: High-speed-videoendoscopy (HSV) is becoming more and more popular in our field. The analysis of HSV data has shifted from subjective evaluation towards objective and quantitative analysis of the vocal fold vibrations. To ensure user friendly and quantitative HSV image processing and subsequent analysis we have been developing a software called Glottis-Analysis-Tools (GAT) being also distributed by us for free [1].

Method: The GAT tool is implemented in C# containing a user-friendly graphical user interface (GUI). The glottis segmentation can be performed semi-automatic [2] or fully automated [3] by three different deep neural networks. Parameters are computed for the glottal area waveform (GAW), vocal fold trajectories and the Phonovibrogram (PVG). Also, parameters for a synchronously recorded acoustic signal are computed. A „result collector“ merges parameters from different recordings in one Excel table allowing for the subsequent import to SPSS and further analysis.

Results: GAT enables easy and comfortable processing of HSV data. Hence, many HSV data sets can be processed in a reasonable amount of time allowing to analyze and perform extensive studies as will be shown.

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FP94 (Sa OS 14:00)

LARYNGOPHARYNGEAL REFLUX AS A CAUSE OF BENIGN LESIONS OF THE VOCAL FOLDS

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Objectives: The etiology of benign vocal fold lesions (vocal nodules, vocal fold polyps, oedema and papillomas) is known (voice abuse, inappropriate phonation technique, smoking, allergies, viral infection). The role of laryngopharyngeal reflux (LPR) in the development of these vocal fold changes is not entirely clear.

Methods: study compared a group of LPR patients (N= 36) (esophagogastroscope with biopsy of esophageal mucosa, 24-hour pH measurement with impedance and esophageal manometry), and the group of patients operated for benign vocal fold lesions BVFL (N=38), and a group of healthy participants (N=42) based on Reflux symptom index (RSI), Reflux finding score (RFS) and saliva analyses (pH, pepsin concentration, bile acid concentration, and pepsin enzymatic activity)

Results: The BVFL group compared to the LPR group showed statistically significant difference only in RSI and RFS scores, while BVFL compared to healthy controls showed significantly higher values in almost all tested parameters (RSI score, RFS score, saliva pepsin concentration, bile acids concentration, pepsin enzymatic activity).

Conclusions: LPR is common in patients with benign vocal fold lesions and significantly more prevalent compared to healthy controls.

Key words: benign vocal fold lesions, laryngopharyngeal reflux, saliva, pepsin

FP95 (Sa A402 12:00)

DIY IN LARYNGOLOGY – LOW-COST STROBOSCOPY

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Background: Stroboscopic imaging of the larynx has been the staple of the vocal folds' examination, allowing for the assessment of the vocal folds' function as well as its appearance. Newer modalities arose over time but have yet to overtake Laryngostroboscopy as a routine examination. Do-it-yourself culture rose in the past decade and allowed for accessibility to many technologies previously unavailable. We set to try and construct an ultra-low-cost stroboscope.

Methods: The strobe was built using an Arduino nano clone microcontroller, N-type MOSFET, and 18w 6500 °K LED as a light source for the hardware. The code uses fast Fourier transformation to assess the voice frequency and strobe the light accordingly.

Results: Several participants' vocal folds were imaged using the constructed device, reaching results similar to a commercial product with some limitations. The constructed device price was less than 15.5\$, weighing 58g and sized about 8 by 3 by 4 cm, while the commercial device costs close to 14,000 euro, weighs 5kg, and is sized 29 by 32 by 12 cm.

Conclusions: Fusing DIY culture with the medical field could yield a novel approach for more affordable and versatile tools.

FP96 (Sa OS 14:30)

QUALITATIVE CHARACTERISTICS OF THE VOICE STATE IN PATIENTS WITH FUNCTIONAL DYSPHONIA ACCORDING VIDEOLARINGOSTROBOSKOPY

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Functional hypotonus dysphonia (FD) is the most common functional disorder of the vocal apparatus, but diagnosis of this condition is a challenge for physicians otolaryngologists, since in this case we have motility disorders of the larynx without visible organic changes.

Purpose: assessment of the functional activity of the vocal folds according videolaringostroboskopy with functional dysphonia.

Materials and Methods: 40 patients FD and 15 healthy people. Videolaringostroboskopy conducted on equipment «Storz» (Germany). To estimate takes the following parameters: synchronous oscillations of the vocal folds in frequency and amplitude, the presence or absence of stroboscopic comfort, the presence or absence of symptoms "mucosal wave", state of glottis gap in the phase of "closing."

Results: All patients in the control group vibratory oscillation of the vocal folds were synchronized in frequency and amplitude, all achieved stroboscopic comfort, symptom "mucosal wave" was present at all, when the phase of "closing" was a complete closure of the vocal folds in all 15 persons. In patients with FD all 40 people observed asynchron dipole oscillations, both in frequency and amplitude. When assessing glottis gap phase "closing" recorded absence in all 40 patients. Achieving stroboscopic comfort was found in 37 cases, the symptom of "mucosal wave" was present in 100% of cases, that is, in all 40 patients.

Conclusion: In functional hypotonus dysphonia the main videolaringostroboskopy manifestations are asynchronous of fonator dipole oscillation frequency and amplitude, as well as lack of complete closure of the vocal folds in the phase of "closing". The study not only allows you to visualize and document the state of the vocal apparatus in FD, and highlight the main criteria videolaringostroboskopy changes in functional hypotonus dysphonia. The obtained results are useful for a professional selection and conduct of professional expertise the people of voice professions.

FP97 (Sa OS 15: 15:15)

RETROGRADE CRICOPHARYNGEAL DYSFUNCTION, MY FIRST 100 PATIENTS

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This fairly new diagnosis will be of interest for all voice professionals who deal with dysphagia as well. The complaint of the inability to belch is only recently recognized as part a clinical entity by Robert Bastian. He coined this syndrome Retrograde Cricopharyngeal Dysfunction (R-CPD). There is a typical set of symptoms which suffices to make the diagnosis. The diagnosis can be confirmed by continuously measuring intra-esophageal pressure and impedance while provoking the problem with carbonated drinks. Treatment with botulinum toxin is simple and has a high succes rate, as will be shown.

Jurjaan Snelleman is a Dutch ENT specialist at the Voice Clinic at Meander Medisch Centrum in Amersfoort, which is acknowledged as a top clinical expertise center. He is co-founder of the Ruysdael Voice Clinic in Amsterdam, where he practices as well.

FP98 (Th A402 15:30)

VOICE AND SWALLOWING DISORDERS AFTER THYROID SURGERY

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Objective: The aim of the study was to evaluate voice and swallowing function following thyroid surgery, to identify dynamic changes during the follow-up period of 12-18 month and to find possible indicative signs of permanent or temporary vocal fold palsy.

Methods: All participants (N=110) were prospectively enrolled from the preoperative thyroid surgery patients between September 2013 and December 2016. All subjects underwent preoperatively, 1st week and 12-18 month postoperatively videolaryngostroboscopy, filled in subjective evaluation of voice (Voice Handicap Index, VHI) and swallowing (Swallowing Impairment Score, SIS) complaints. Acoustic voice analysis (AVA), maximum phonation time (MPT) measurement and perceptual voice evaluation were conducted. In the presence of laryngeal damage, additional 1st and 6th month follow-up visits were planned. Patients, whom we suspected laryngeal nerve damage, underwent laryngeal electromyography 4 weeks after the operation.

Results: On first postoperative week evaluation, no objective voice changes within patients with postoperatively intact laryngeal nerves were found. Subjective evaluations showed decline in VHI physical domain and increased strain in postoperative voice. Patients with postoperative nerve damage had a drastic decline in subjective voice quality (VHI all subscales and total score), AVA parameter jitter, MPT and perceptual voice quality. Subjective evaluation of swallowing revealed disturbances in all patients regardless of the nerve damage.

We noticed remarkable differences in 1st week and 1st month visits between patients with permanent and temporary palsy in VHI total score and physical domain, MPT and perceptual breathiness and asthenia in voice. Regardless of the nerve injury, by the end of the follow-up period all changes had become statistically insignificant with the exception of perceptual evaluation of voice quality.

Conclusions: Patients with postoperative laryngeal nerve damage experience substantial deterioration of both subjective and objective voice quality with more extensive impairment in patients with permanent paralysis. Thyroid surgery causes subjective swallowing changes irrespective of laryngeal nerve damage. In patients without laryngeal nerve damage, swallowing function improves following thyroidectomy. Possible indicators for permanent paralysis are delayed recovery in the values of MPT and jitter and persistent perceptual breathiness and asthenia.

FP99 (Sa OS 14:45)

ANALYZING THE ETIOPATHOGENETIC MARKERS OF CHRONIC HYPERPLASTIC LARYNGITIS WITH FORMATION OF VOCAL NODULES

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Chronic hyperplastic laryngitis with formation of vocal nodules is the most common disease of professional speakers and singers based on vocal abuse. Precise etiopathogenesis of vocal nodules is unknown. We

researched vocal nodules from 10 professional speakers compared to 7 vocal cord tissue fragments of control group of cadavers. The immunohistochemical markers were analyzed: Ki-67 (proliferation), EGFR (growth), TUNEL (apoptosis), IL-1 α , IL-10 (inflammation), VEGF (proliferation), PGP 9.5 (immunoreactive innervation). The results showed a likely ($p < 0,05$) increase in markers of proliferation, apoptosis, growth and inflammation IL-1 α compared to vocal cord tissue fragments of control group. There was not much of a difference between IL-10 (inflammation) and PGP 9.5 (immunoreactive innervation). The results could help in treatment of chronic hyperplastic laryngitis in the future.

FP100 (Fr OH 16:00)

SUBGLOTTAL PRESSURE AND GLOTTAL RESISTANCE IN TWO OPERA SINGERS' EXPRESSION OF EMOTION. A STUDY OF VOICE SOURCE AND LONG-TERM AVERAGE SPECTRUM

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Emotional expressivity is an important aspect of a sung performance. Yet, little research has devoted to the underlying voice production mechanisms. In this study, two highly experienced professional male opera singers sang on the syllable /pae/ scales while portraying 10 emotional colors. The audio signal was analyzed in terms of long-term-average spectra (LTAS) and also inverse filtered, so as to allow analysis of the voice source. Subglottal pressure was captured as the oral pressure during the /p/- occlusion. In a previous study an expert panel had classified the recorded material in a forced-choice listening test according to these ten emotions. An analysis of the resulting confusion matrix yielded four significantly different homogeneous emotion families, (1) Anger, Contempt, (2) Joy, Love, Pride, (3) Calm, Tender, Neutral, and (4) Sad, Fear. Here we analyze to what extent the physiological voice control parameters subglottal pressure and glottal resistance, i.e. the pressure/airflow ratio controlled mainly by glottal adduction, vary systematically between emotions.

The results show the importance of combining LTAS and voice source data with subglottic pressure measurement in going beyond sheer loudness distinction between emotions. Further they corroborate theoretical predictions proposed by Scherer (1986) that affective processes differentially affect voice production. Also, they suggest how information about these processes can be estimated from parameters related to the voice source and LTAS properties.

FP101 (Th A103 12:15)

FEMINIZATION LARYNGOPLASTY WITH THYROHYOID ELEVATION

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Voicedoctor Private Practice

Feminization laryngoplasty with thyrohyoid elevation is a surgical approach to altering the male larynx to a more female dimension and female position in the neck, resulting in a voice change from a masculine quality toward a feminine quality. A smaller larynx and pharynx should accomplish this by raising both the comfortable speaking fundamental frequency of the voice and the resonant frequencies of the vocal tract. Additionally, it should truncate the lower vocal range.

It is an effective approach to reattachment and tensioning of loosened or detached vocal cords occurring after an aggressive Tracheal shave procedure.

Voice results are durable beyond 10 years.

Laser tuning and debulking procedures may further augment voice quality and remedy some post-operative complications.

FP102 (Th CoH 17:00)

THE NEXT GENERATION OF MODELS FOR VOICE SIMULATION

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Recent computer simulation efforts have gone in the direction of increasing the complexity in vocal fold tissue morphology, three-dimensional airway structures, and variations across gender, age, disorders, and multiple species. With this increased complexity comes an ever greater need to find shortcuts in computation, especially with regard to fluid-flow in a glottis with irregular time-varying contact. We are generating a large database of pressure-flow patterns with physical measurement and high-fidelity computation for glottal shapes with variable contact patterns. From this inventory of pressure-flow relations, we expect to shorten computation time with pre-calculations (deep learning). When contemplating and justifying these shortcuts, the difference between a model and a complete computational prototype of the physical system needs to be understood. Much thought is required to tailor a model to the question of interest. For some questions, a low-dimensional model with few degrees of freedom and few parameters is preferable to a high-dimensional model with uncertainty in the parameter set.

FP103 (Th D501 12:00)

THE INVESTIGATION OF VOICE ERGONOMICS FACTORS IN CHOIR CONDUCTORS

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For choir conductors, voice is the primary working tool. They are the one who demonstrates the model of correct voice production and attitude to voice health to singers. Therefore, issues related to voice ergonomics are relevant to choir conductors.

Method: The online questionnaire survey was carried out on 155 choir conductors. The modified voice ergonomics risk factors questionnaire was supplemented by the Vocal Symptom Scale, VHI-10, and SVHI-10.

Results: Indoor noise in rehearsal rooms was identified by 52% of conductors, outdoor noise by 62.6%. Air quality in rehearsal rooms was characterised by dry air (63.9%), the presence of objects gathering dust (36.8%), and inappropriate room temperature (25.2%). Respondents (81.3%) evaluated their body posture during the rehearsal as comfortable. A loud voice in rehearsals was used by 66% of respondents. Significant correlation between the voice loudness and vocal effort ($r = 0.376$, $P < 0.001$), the activity noise during rehearsals and conductors' voice loudness ($r = 0.269$, $P = 0.001$), the activity noise and vocal effort ($r = 0.339$, $P < 0.001$) was found. Excessive and continuous voice use during the day was mentioned by 58.7% of conductors. The average duration of rehearsals was 133 minutes (SD = 32.4). The knowledge about voice ergonomics was rated as good by 62% of conductors, 45.2% used this knowledge in daily practice. Self-assessed voice disorders were observed in 46.1% of females and 27.5% of males. Conductors' self-reported voice disorders were related to medical factors, body and head posture during rehearsals, prolonged and excessive voice use, dust in rehearsal rooms, stress, vocal effort and activity noise. Voice disorders were rarer among the conductors who used knowledge of voice ergonomics in daily practice and rested their voices during breaks.

Conclusions. The knowledge about voice ergonomics needs improving among conductors. Teaching voice ergonomics should be brought into choir conductors' educational programs, the standard of professions and post-diploma education.

The complete research is published in Trinite et al. (2021). The investigation of voice ergonomics factors in the profession of a conductor. *Problems in Music Pedagogy*, 20(2), 71-85. <http://pmp.du.lv/index.php/16-2/>

The Latvian Council of Science funds the research, the project "An investigation of vocal load in choral conductors in the context of voice ergonomics", project No. lzp-2020/2-0250.

FP104 (Fr BB 13:30)

EFFECTS OF VARIOUS RESPIRATORY ACTIVITIES ON HUMAN AEROSOL EMISSIONS - EXPERIMENTAL DESIGN AND PRELIMINARY RESULTS

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The increased respiratory particle generation during speaking, singing and coughing has turned out to be a key factor for the airborne transmission of the SARS-CoV-2 and other respiratory viruses. Understanding mechanisms of human aerosol generation and the effects of individual anatomy and physiology is extremely important when assessing how the airborne transmission of pathogens happens. In previous studies, it has been suggested that singing can produce more particles than speaking or even coughing. Previous research has also indicated that individual variation in aerosol generation generally is high. However, the open question is, what is the role of individual differences compared to the differences caused by various respiratory activities.

This study combines particle measurements and acoustic measurements to study aerosols generated in breathing, speaking, singing and coughing. Particle measurements are carried out at clean air laboratory of VTT Technical Research Centre of Finland using a portable measurement chamber designed specially for the study. Acoustic and electroglottography measurements will both help to standardize the measurements and bring new insight of the possible individual differences in the aerosol rates.

Understanding mechanisms of human aerosol generation is important in trying to understand how the airborne transmission of pathogens takes place and furthermore in assessing how to minimize the risk of transmission. The results can be used in the context of all airborne disease.

We will present our methodology with the portable measurement chamber and preliminary results.

FP105 (Sa A402 12:15)

VOICE PATHOLOGY ASSESSMENT THROUGH THE SMARTPHONE IN CLINICAL SETTING

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Objective: To develop the application suitable for mobile communication devices for estimation of Acoustic Voice Quality Index (AVQI) and evaluate its applicability in the clinical setting.

Method: The elaborated mobile VoiceScreen application is running an iOS operating system and allows voice recording, automatically extracting acoustic voice features, and displaying the AVQI. The app was tested on a study group consisting of 30 adult individuals with normal voices and 73 patients with pathological voices. The study participants were asked to read aloud a standard text and sustain the vowel /a/. Voice recordings were performed in the clinical setting with VoiceScreen app using smartphone microphones. The receiver-operating characteristic statistics i.e. area under the curve (AUC), sensitivity and specificity, and correct classification rate (CCR) were used for evaluation of the diagnostic accuracy differentiating normal and pathological voice.

Results: A high level of precision of AVQI in discriminating between normal and dysphonic voices was achieved with the corresponding AUC = 0.937. The AVQI cut-off score of 3.4 demonstrated a sensitivity of

86.3% and specificity of 95.6% with a CCR of 89.2%.

Conclusion: The VoiceScreen app represented an accurate and robust tool for dysphonia severity detection and can be used in clinical settings as a sensitive measure for voice pathology assessment. Due to the portability, user-friendliness, and applicability the VoiceScreen app may be preferred by patients and clinicians for voice assessment and data collection in both home and clinical settings.

FP106 (Sa A402 14:30)

VOICE HANDICAP INDEX-10: VALIDATION OF THE EUROPEAN PORTUGUESE VERSION

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Objective: the aim of this study was to validate the Voice Handicap Index 10 to European Portuguese.

Method: the study has 45 subjects with and 45 without vocal complaints, followed on the outpatient Otorhinolaryngology Clinic at Centro Hospitalar Universitário of Oporto. The Voice Handicap Index 30 (VHI-30) and The Voice Handicap Index 10 (VHI-10) questionnaires were applied by phone call. Afterwards, VHI-10 was re-applied in the next two to seven days after the first call. These procedures allowed the validation of VHI-10 according to its reproducibility, internal consistency and correlation between the two questionnaires.

Results: in the group with vocal complaints we verified a significant statistical correlation and a strong linear correlation between VHI-30 and VHI-10 ($r = 0.915$; $P < 0.001$). The group without vocal complaints showed a significant statistical correlation and a moderate linear correlation between VHI-30 and VHI-10 ($r = 0.647$; $P < 0.001$). VHI-10 detected a significant statistical difference between patients with and without vocal complaints. VHI-10 was reliable and reproducible.

Conclusion: VHI-10 is a valid and easy to collect instrument that assesses the auto-perception of the impact of a voice disorder in quality of life. It showed to be a valid representation of the VHI-30, with proven psychometric properties, that can be implemented on the Portuguese population.

FP107 (Th A402 16:15)

VOICE THERAPY ONSET AND IT'S LONG TERM IMPACT IN QUALITY OF LIFE – RESULTS OF A COHORT OF UNILATERAL VOCAL FOLD PARALYSIS PATIENTS

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Objective: to assess the impact of an early onset of a voice therapy program, in a group of unilateral vocal fold paralysis (UVFP) patients, using results and longitudinal analysis of the voice handicap index 30 (VHI-30).

Method: case-series study, prospective, observational and cross-sectional that was carried out on consecutive patients diagnosed with UVFP in the outpatient Otorhinolaryngology Clinic, in a tertiary center, between 2013 and 2019. Each subject underwent fiberoptic videolaryngoscopy with stroboscopy and completed the VHI-30. Its scores were reviewed in three temporal frames: before voice therapy, at the discharge of voice therapy and in the present ENT follow-up. Data regarding demographic and clinical information was also collected.

Results: 59 patients (46 females and 13 males) with a mean age of 60,97 years were included. The mean time of follow-up after voice therapy was 3,942 years (range 6 months – 7 years) and 78% of the patients had iatrogenic

UVFP. In the iatrogenic UVFP population, patients who had started voice therapy earlier (<50 days from symptoms onset) showed better outcomes regarding long-term VHI-30 ($p=0,001$). There was a significant improvement in vocal quality expressed by a decrease in VHI-30 through time in the general linear model ($p<0,001$). The early voice therapy subgroup showed improved outcomes across time ($p=0,017$).

Conclusion: an early onset of voice therapy (<50 days since the first symptoms) reflects on higher quality of life results and better long-term vocal prognosis, in iatrogenic UVFP patients. One can expect an improvement in vocal function long after the discharge of therapy, irrespective of etiology.

FP108 (Sa A402 14:45)

PRESBYLARYNX: USING CUT-OFF VALUES IN AUTO-ASSESSMENT QUESTIONNAIRES TO PREDICT GLOTTAL GAP PATTERNS

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Objective: determine cut-off points in auto-assessment questionnaires to predict the presence and extent of glottal gap associated to presbylarynx.

Method: case control, prospective, observational, and cross-sectional study that was carried out on consecutive subjects of the outpatient Otorhinolaryngology Clinic, in a tertiary center, in 2020. Each subject underwent fiberoptic videolaryngoscopy with stroboscopy. Presbylarynx was considered when two or more of the following endoscopic findings were identified: vocal fold bowing, prominence of vocal processes in abduction, and a spindle-shaped glottal gap. Each subject completed three questionnaires: the Voice Handicap Index (VHI), with 30 and 10 questions, and the “Screening for voice disorders in older adults questionnaire” (RAVI).

Results: the studied population included 174 Caucasian subjects (60 males; 114 females), with a mean age of 73.99 years ($SD= 6.37$; range 65–95 years). Presbylarynx was identified in 71 patients (41%). Among patients with presbylarynx, a glottal gap was identified in 22 patients (31%). The mean score of VHI-30 between “no presbylarynx” and “presbylarynx” groups was statistically different ($p< 0.001$), with a higher score for subjects with signs of presbylarynx. The presence of glottal gap was associated to a higher mean score of VHI-30 (41.64 ± 11.87) ($p< 0.001$). The mean score of VHI-10 between “no presbylarynx” and “presbylarynx” groups was statistically different ($p< 0.001$), with a higher score for subjects with signs of presbylarynx. Among patients with presbylarynx, the presence of glottal gap was associated to higher mean score of VHI-10 (14.04 ± 3.91) ($p< 0.001$). There was a strong positive correlation between VHI-30 and VHI-10 ($r_s = 0.969$; $p< 0.001$). The mean score of RAVI between “no presbylarynx” and “presbylarynx” groups was statistically different ($p< 0.001$), with a higher score for subjects with signs of presbylarynx. Among patients with presbylarynx, the presence of glottal gap was associated to a higher mean score of RAVI (11.68 ± 1.61) ($p< 0.001$). There was a strong positive correlation not only between RAVI and VHI-30 ($r_s = 0.922$; $p< 0.001$), but also between RAVI and VHI-10 ($r_s = 0.906$; $p< 0.001$). The optimal cut-off points to discriminate “no presbylarynx” from “presbylarynx”, obtained by the Youden’ index, were 3.5 for RAVI, 4.5 for VHI-30 and 1.5 for VHI-10. RAVI had the highest sensitivity and specificity. The optimal cut-off points to predict glottal gap, obtained by the Youden’ index, were 9.5 for RAVI, 21 for VHI-30 and 7.5 for VHI-10.

Conclusion: the optimal cut-off points do discriminate “no presbylarynx” from “presbylarynx” were 3.5 for RAVI, 4.5 for VHI-30 and 1.5 for VHI-10. RAVI had the highest sensitivity and specificity, probably because it was designed specifically for vocal complaints of the elderly. Among patients with presbylarynx, cut-off points of 9.5 for RAVI, 21 for VHI-30 and 7.5 for VHI-10 were determined to predict patients with and without glottal gap. It was found a strong positive correlation between RAVI, VHI-30 and VHI-10. Thus, VHI-10 can be preferred to VHI-30 to assess voice impairment in clinical practice, because for elderly patients it is easier to answer. However, to predict endoscopic signs of presbylarynx, RAVI should be selected.

FP109 (Fr OS 12:45)

THE INTERACTION BETWEEN VOICE DISORDERS AND STRESS FOR WORK ABILITY OF TEACHER

Hanna Vertanen-Greis

Less attention has been paid to the interaction between voice disorders and stress for work ability in teachers. Therefore, the aim was to study whether lower work ability associated more strongly when the variables of voice disorders and stress at work were combined as opposed to evaluating these two factors separately.

A questionnaire study was conducted including validated self-assessment of work ability utilizing a sample of 1 198 of Finnish teachers.

When combined, voice disorders and stress at work had a stronger association to decreased work ability than when they were evaluated separately. The occurrence of stress was more prevalent in poor and moderate work ability than the occurrence of voice disorders. Nine out of ten of the teachers who had neither voice disorders nor stress reported good work ability, while four out of ten of the teachers who suffered from both voice disorders and stress had poor work ability.

It is recommended to offering support for reducing stress at work to improve teachers' work performance. Follow-up studies are needed to investigate the possible effects of voice disorders and the associated variables on work ability.

FP110 (Fr CoH 10:15)

PITCH INDUCED PASSIVE VOICE "COVERING" OF THE SINGING VOICE

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Background: According to the aesthetics of classical singing style, vocalists should modify ("cover") the vowels at pitches of the so-called passaggio region to avoid disagreeable timbre (Appleman 1986). Different opinions exist as to how the voice should be "covered".

Recently, Miller (2008) and Bozeman (2017) have claimed that "covering" is primarily an acoustic illusion when the vocalist tries to avoid the habitual and instinctive way of articulation (opening the mouth wider and raising the larynx) as the pitch ascends to the passaggio. The first formant of the vowel (F1) tunes to the second harmonic of the voice spectrum (H2) thus making the voice louder. The timbre of the voice changes with pitch even if the singer keeps the formant frequencies invariant: it seems "open" if at least two harmonics locate lower than the F1, and "covered" if this concerns only the fundamental.

Aim: The purpose of this study was to check these assumptions by the use of perception tests.

Method. Forty-four vocalists and voice teachers from six countries participated as experts. The experiment consisted of nine subtests where synthesized sung-vowel-like sounds at different chromatic scale pitches were played in random order to the experts. We used the 2 voice category (male, female) × 5 vowel paradigm and pitch ranges that included the pitches at which the shift from the "open" to "covered" timbre was expected. The formant frequencies of the vowels were kept invariant at all pitches. Experts were asked to rate each sound's timbre on a 5-point scale from "open" to "covered".

Results: In the case of all vowels, except /i/ and female /u/, there was a statistically significant tendency to rate the timbre of sounds as more "covered" when the pitch was higher, and more "open", when the pitch was lower, without the expected abrupt changes at those pitches where the H2 passed the F1. About 13% of the experts actually used the terms "open" and "covered" in the opposite manner to the majority, while 45% of the responses did not show any systematic dependence on pitch.

Conclusions: The concept of passive "covering" of the voice (which takes place with changes in pitch but without articulatory intervention) is relevant for some vocalists, as pitch can indeed influence the perceived timbre. However, such impact is often idiosyncratic.

MUSICAL INTERESTS SUPPORT EMOTION IDENTIFICATION OF CHILDREN WITH MIGRANT BACKGROUND

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In this study we investigated the perception of vocal emotions by children with a migrant background (CMBs; n=24) and their native Finnish-speaking peers (n=13). The children participated in a listening test where they evaluated nonsense sentences and prolonged vowels whether the emotion expressed was excitement, fear, anger, or contentment. The emotions were embedded in nonsense sentences and prolonged vowels /a:/, /i:/ and /u:/ by professional actors. No actual language was used since the focus was on the nonverbal emotional variation of the voice, i.e. voice quality variation. Before the listening test, the children completed a questionnaire on their musical interests. The answers were statistically analyzed.

The results showed that the CMBs recognized the emotions with 62% accuracy, and their native peers with 81% accuracy. Speakers of a second language seem to have a limited ability to catch the same amount of emotional variations in voice quality compared to native speakers. Self-reported good mood, being interested in singing and dancing, playing a musical instrument, dancing in a correct rhythm and to easily learn a new melody had a positive effect on emotion recognition in the CMBs ($p < 0.05$), whereas in the native peers, none of the musical interests or mood affected correct recognition. In order to support the social and emotional lives of CMBs, it may be worth to develop practice methods using music, and different melody contours and variations of rhythms in order to develop communication of different emotional contents in speech.

FP112 (Sa OH 12:00)

NEWS ANCHORS' FUNDAMENTAL FREQUENCY FROM THE 1990'S TO 2020'S IN FINLAND. A PILOT STUDY

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Speaking pitch may reflect socio-cultural changes. Various studies have reported pitch lowering in females during the last century. However, recent studies in Finland have shown an opposite tendency. Female university students of 2010's had significantly higher F0 compared to students in the 1990's. The present study focuses on pitch in media speech. We investigated news anchors whose position is influential when representing an institution, such as a national broadcasting company. Also, news anchors' speech may reflect changes in the gender presentation in the society. Thus, our subjects were both females and males.

Speech samples from forty-six news anchors (24 males, 22 females) were studied from ordinary, neutral news casts in the 1990's and 2020-2022. The samples were collected from the Internet. The average duration of the samples was 70.4 seconds (sd 17.8).

In the 1990's, the mean F0 in females was 178.9 Hz (sd 16.4) and in the 2020's it was 180.6 Hz (sd 11.3). In males, the values were 112.9 Hz (sd 6.1) and 112 Hz (sd 9.2), respectively. The differences were not significant. However, the standard deviation of F0 per sample, which may roughly reflect intonation width, decreased in males from 3.7 semitones (sd 0.6) to 3.2 semitones (sd 0.4). The change was significant ($p 0.012$). In females, the change was from 3.5 semitones (sd 0.3) to 3.3 (0.6) which it was not significant.

The results suggest that pitch in newscasting speech on Finnish national broadcasting channels has remained relatively unchanged, only males' intonation width has decreased somewhat during the last 30 years.

FP113 (Th D501 12:30)

EVOLUTION OF THE VLT WITH SPECIFIC CONTROLLED VOCAL DEMANDS TO QUANTIFY VOCAL EFFORT AND VOCAL DEMAND RESPONSE

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Objectives: To illustrate the feasibility and reliability of a semi-automated vocal loading task which includes specified vocal demands while collecting vocal effort and vocal demand response (voice production). The long-term objective is to quantify the relationship more reliably between vocal fatigue, vocal effort, vocal demand and vocal demand response.

Introduction: To increase the reliability and comparability of vocal loading studies, this paper proposes the use of a standardized approach with experiments that are (1) grounded on consistent definitions of terms related to vocal fatigue (vocal effort, vocal demand, and vocal demand response), and (2) designed to reduce uncertainty and increase repeatability.

Methods: A semi-automated vocal loading task was implemented to quantify the extent to which vocal effort and vocal demand response are sensitive to changes in vocal demands (i.e., noise only, noise plus duration). Participants described a series of maps for 30 minutes in a background noise. Vocal effort was elicited every 5 minutes.

Results: Results indicate that the proposed protocol design consistently induced change in both vocal effort and vocal demand response, indicating vocal fatigue. The innovative semi-automatic research protocol reduces inherent variability commonly seen in vocal loading tasks while increasing efficiencies in collecting and preparing vocal samples for analysis.

Conclusions: This protocol illustrates how future vocal loading studies could be improved by adopting a more efficient and consistent methodology for quantifying vocal fatigue, thus increasing interstudy comparability of results and conclusions.

FP114 (Fr OS 12:30)

CLASSIFICATION OF PHONATION TYPES BASED ON MICROPHONE, THROAT ACCELEROMETER AND VOICE SOURCE ANALYSIS

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Objectives: The aim of the present study is to evaluate the usefulness of features extracted from flow glottogram, a microphone, and a miniature accelerometer attached to speaker's tracheal wall below the glottis for classification of phonation type, and to analyse the correlation between these three types of signals.

Methods: Five trained singers (two females and three males) were recorded producing the syllable /pæ:/ with decreasing vocal loudness in three voice qualities (breathy, neutral and pressed) and at three pitch levels. Features extracted from the three signals were used for classification of phonation type, using a random forest classifier. In addition, the accelerometer and microphone features that were most strongly correlated with the voice source features were identified.

Results: The three signals showed comparable classification error rates, with considerable differences across speakers, both with respect to the overall performance and the importance of individual features. At the same time, variation of phonation type had consistent effects on voice source, accelerometer and microphone signals. With regard to the voice source, AQ, NAQ, L1L2 and CQ all showed a monotonic variation along the Breathy –

Neutral – Pressed continuum. Several features were also found to vary systematically in the accelerometer and microphone signals: HRF, L1L2 and CPPS (both the accelerometer and the microphone), as well as intensity level and the Alpha ratio (for the microphone). The random forest analysis revealed that these parameters were also among the most important for the classification of voice quality.

Conclusions: All three signals were found to carry information useful for discrimination between phonation types. Surprisingly, the accelerometer signal, being largely uncontaminated by vocal tract resonances, offered no advantage over the microphone signal.

Keywords: phonation type, voice source, accelerometer, classification

FP115 (Th A103 11:45)

TENSIONING GLOTTOPLASTY; A NOVEL TECHNIQUE FOR VOICE FEMINIZATION

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Voice being an integral part of one's image, it's essential that men and women from all walks of life feel confident in their voice. There are a number of procedures available to elevate the pitch of voice and in each technique the objective is to achieve a higher vocal tone, that is, to pass from a voice perceived as stereotypically masculine to a voice perceived as stereotypically feminine. These surgeries are primarily designed for male-to-female transgender patients or for genetic males with vocal pitch and vocal resonance that are often too low to be perceived as a female. Tensioning Glottoplasty is a new technique in voice feminization. It is an outpatient operating room procedure in where the anterior 1/3 front part of the vocal cords are sutured together in order to shorten the length of the vocal cords. Also with binding the sutures outside of the thyroid cartilage, vocal fold tension is increased. This effectively shortens the vibratory length of the vocal cords and makes them more tense, hence elevates the comfortable speaking pitch. A voice rest period is mandatory postoperatively.

FP116 (Th A103 13:00)

A COMPREHENSIVE COMMUNICATION PROGRAM FOR MALE-TO-FEMALE TRANSGENDER INDIVIDUALS

Gamze Yesilli Puzella,

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Male-to-female (MtF) transgender people are occasionally included in the referral of a speech-language pathologist's voice practice. As a therapy approach, even though it might seem like raising the pitch of the voice to the range of a woman's voice would work, the fact is that in those situations, the voice sometimes sounds very male. Increasing the fundamental frequency seems to be relatively simple. However, because the size of the vocal tract is maintained, MtF transgender people can sometimes not erase the masculine quality of their voice. So, for the biological male who wants to develop a feminine speaking style, pitch, and other communication behaviors should be the focus of therapy. A comprehensive communication program, including speech, language, and non-verbal behavior, could be advised as an approach to therapy. These communication activities include language and lexicon, breathiness, facial expression, gesture intonation, pitch flexibility, rate, volume, loudness, and vowel lengthening. These actions appear to be the most distinguishable between the genders. The counseling approach should also address how clients' words and gestures influence their overall gender presentation in conversation, work, and leisure. Changing one's behavior is not a simple process for a transgender individual in transition, who may typically experience severe psychological and social issues. However, good outcomes can be achieved with careful selection and habituation of a target pitch, the practice of a comprehensive communication program, and monitoring tactile and non-linguistic behaviors in continuous speech.

EFFECT OF LARYNGEAL AND EPILARYNGEAL ADJUSTMENTS ON ORAL VIBRATORY SENSATION AT DIFFERENT SEMI-OCCLUDED VOCAL TRACT CONFIGURATIONS

Zhaoyan Zhang

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Voice therapy approaches, such as resonant voice therapy or semi-occluded vocal tract exercises, often emphasize vibratory sensations in the front part of the vocal tract during phonation. It remains unclear what laryngeal and vocal tract adjustments are elicited in patients by this emphasis on oral vibratory sensations and how these adjustments improve voice production. This study aims to identify laryngeal and vocal tract adjustments that maximize oral vibratory sensations during phonation and thus are likely to be elicited by an emphasis on vibratory sensations at different semi-occluded vocal tract conditions. Using a three-dimensional phonation model, voice simulations were performed with parametric variations in configurations in the larynx, epilarynx, and vocal tract semi-occlusion. Vibratory sensation was quantified by the oral sound pressure level (SPL) behind the lips. The results showed that maximum oral SPL is reached at intermediate vocal fold adduction conditions. Epilaryngeal tube narrowing further increases the oral SPL in an open vocal tract, but this effect is much reduced and even reversed in a semi-occluded vocal tract, due to a reduced sensitivity of the first formant to epilaryngeal manipulation in a constricted vocal tract. These findings suggest that emphasis on oral vibratory sensations generally elicits a laryngeal configuration that is neither too tight nor too open, which has been shown to improve vocal efficiency and reduce vocal fold contact pressure. In a semi-occluded vocal tract, this emphasis may also reduce the degree of epilaryngeal narrowing, as often observed in recent imaging studies.

POSTER PRESENTATIONS

PP01

COVID-19 INFECTION AND ITS INFLUENCE ON VOICE QUALITY AND ARTICULATION PROBLEMS IN PATIENTS.

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In last two years the whole world was dealing with COVID-19 pandemia. COVID-19 is the disease caused by SARS-CoV-2, the coronavirus that emerged in December 2019. The course of the disease can vary from mild, nonspecific symptoms to life-threatening conditions.

Most common COVID-19 symptoms include:

- Cough
- Fever or chills
- Rhinitis
- Shortness of breath or difficulty breathing
- Muscle or body aches
- Sore throat
- Loss of taste or smell
- Diarrhea
- Headache
- New fatigue
- Nausea or vomiting

Symptomatology depends on the type of virus (alfa, omicron etc.) and the underlying symptoms change with the duration of the pandemic. The virus is transmitted both directly from person to person by droplets (during coughing, sneezing) and indirectly through contact with the mucus left on surfaces and objects. One of the more common symptoms of COVID-19 may be voice disorders. The mechanism of their formation can be varied: from weakness and fatigue of the voice associated with prolonged cough or direct virus exposure to the laryngeal mucosa, through paresis of the vocal fold resulting from damage to the laryngeal nerves, to paresis of the vocal muscles resulting from prolonged intubation. Some studies shows the occurrence of dysphonia and phonesthesia in COVID-19 patients correlated with vocal fold congestion.

In order to investigate the COVID-19 influence on the larynx, voice quality and articulation the analysis of literature published was performed. In addition, own experiences were presented based on the structured medical history of patients of the Otolaryngology Department (with Laryngology and Phoniatic Outpatients Clinics) of the University Clinical Center Medical University of Gdańsk. Additionally, the methods and results of long-term phoniatic and logopaedics rehabilitations in these patients are discussed.

PP02

EMOTIONS AND EXPRESSIVITY: VOICE AND TIMING MEASUREMENTS IN SINGING.

Tiago Cruz, Mauricio Loureiro

UFMG (Federal University of Minas Gerais), Brazil

Understanding that the opera singer is also an actor who interprets the text of the aria or recitative, each lyric in these pieces contains messages that arouse some kind of emotion. The singer, in addition to singing the musical notes, interprets the text in order to convey the emotion contained in the lyrics. This interpretation is conveyed to the listener mainly through the singing voice. A singer communicates with the listener by way of his interpretive intentions, and sometimes, those with the best vocal technique are not Always the most expressive. Emotions influence the singer's expressivity, which often changes his emotional state within the context of the same opera or even within the same aria. Such changes have an impact on the voice, changing aspects such as

vocal fold vibration mode, resonance, timbre, in addition to vocal emission characteristics that modify musical parameters related to expressiveness. Thus, this study aims to analyze how the emission of the singing voice while the singer is expressing various emotions (fear, anger, joy, and sadness) impacts vocal and expressive parameters. A musical excerpt was composed based on the romantic opera period and neutral lyrics written so that the singers can, through the same song, portray different emotions, without being indirectly influenced by an aria melody and lyrics whose emotional intention is already known. During the musical performance, the singers were recorded and the audio analyzed. Some inverse filtering measurements were made. Pitch, loudness and vibrato rate and extent was measured to compare with a neutral performance and see how they deviate from it. Measurements of the inter-beat interval (IBI) allowed us to see how singers deal with timing in different emotional emissions.

PP03

SINGING IMPAIRMENT MEASUREMENTS FOR PROFESSIONAL LIFE EVALUATION (SIMPLE)

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Singers of different musical styles may have different vocal issues or problems, with a greater or lesser impact on their careers. Many start singing when they are young, sometimes without guidance or voice lessons, and then go on to study voice at educational institutions, seeking a degree that includes voice study. Other than regular juries, when the singers are heard and assessed by faculty, college-age music programs rarely have a periodic vocal assessment and monitoring program for singing students. Self-assessment questionnaires, such as the Voice Handicap Index (VHI) and others developed from it, such as the Singing Voice Handicap Index (SVHI), Classical Singing Voice Handicap Index (CSVHI) and the Modern Singing Handicap Index (MSVHI), may be used to assess the impact of a technical deficiency on the singer's quality of life. Thus, the main objective of this study is to do an initial screening of singers from the Setnor School of Music and the School of Drama from Syracuse University. This initial assessment is part of an ongoing project and aims to monitor the technical vocal evolution of singing students, from the first to the last year of the course. The questionnaire was adapted from Classical Singing Voice Handicap Index (CSVHI). The questions have been changed to a Native American language in order to be easier to understand, and to be simpler for both freshman singing students and senior students. Singing Impairment Measurements for Professional Life Evaluation (SIMPLE) was the name chosen to this questionnaire. For this study, singers answered this self-assessment questionnaire along with other voice quality questions to track their vocal health. Descriptive and inferential statistics was used to analyze inter-subject data and compare groups divided per years of study.

PP04

HUMAN BEATBOXING: LINKING ARTICULATION, AERODYNAMICS AND ACOUSTICS OF PHONATION TYPES

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Human Beatboxing (HBB) is a musical technique produced with vocal tract movements. Beatboxing literature focuses on supralaryngeal gestures for drum imitations. We chose to focus on laryngeal phonation type of electronic sound imitations.

Laryngoscopic, aerodynamic and acoustic recordings of 4 voice effects produced by 4 different subjects were acquired: the "Chest Bass" (egressive aryepiglottic voice), the "Inward Bass" (ingressive aryepiglottic trilling with open glottis), the "Throat Bass" (egressive ventricular voice) and a "saturated voice" (egressive breathy falsetto voice). A sample of modal voice was measured and serves as a reference. We measured F0, F1 to F5 and we extracted spectrums to evaluate whether the first harmonic and acoustic resonances were correctly tracked. Following Kreiman et al. (2014), we measured the spectral source characteristics (i.e. Spectral Tilt and Harmonic-to-Noise Ratio) by means of inverse filtering.

F0 and Formants extraction was successful. F0 values are unusual for all sounds: the chest bass (41-46Hz), the inward bass (57-79Hz) the throat bass (87-91Hz) and the saturated voice (535Hz). Oral airflow for the modal voice, the chest and throat bass is around 0.2 dm³/s whereas it is 2 dm³/s for the saturated voice and -1.6 dm³/s for the inward bass. Differences of F0 are due to different laryngeal settings.

Spectral Tilts and HNR (Fig. 3 & 4) shows modal voice has the highest values for H1-H2, the throat bass and the chest bass values are lower. The lower the value, the greater the glottal constriction. Surprisingly, the inward bass spectral tilts is similar to modal voice when we expect it to be higher because of the open glottis. The model (ibid) is not suited for falsetto productions. Concerning HNR, modal voice has a high value, the throat and chest bass a moderate values and the inward bass and saturated voice have the lowest value.

Phonation types in HBB are complex and highly unusual. H1-H2 is able to distinguish modal voicing from ventricular or aryepiglottic phonation but fails to distinguish inward aryepiglottic phonation and do not apply to falsetto register. HNR distinguishes well between regular (high HNR), irregular (moderate HNR) and noisy (low HNR) phonation types. Human Beatboxing results to be challenging for phonetic models and theories.

PP05

KAZAKH TRADITIONAL SINGING: ACOUSTIC ASPECTS – BEGINNING OF THE INVESTIGATION

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Background: Kazakh phoniatric not only did not conduct a comparative study of vocal traditions of the regions of Kazakhstan, but no one has not addressed specifically, in terms of modern scientific knowledge of traditional music, we identified above the problem of rhythmic organization, intonation structure, harmony and compositional structure.

Our examination of a small group of traditional performers, consisting of representatives of different regional singing cultures, revealed that the timbre, as well as that of classical performers, gives only an individual coloring.

Musical tones, are complex tones consisting of many oscillations of different frequency and strength.

Results: The Kazakh musical culture

“an-kuy-jyr” (song, instrumental and epic traditions) reflected two different linguistic musical systems in two styles - Western and Eastern Kazakhstan.

We can say that many of the techniques of this skill (huge breathing, sound filing, plasticity of phrasing, and so on) create the distinctive features of Kazakh folk singing.

In all above-mentioned traditional genres of the East Turkic peoples, including throat singing, the main constructive feature of the texture is a two-voice vertical scale, in which the overtone melody is superimposed on the basic sound of the bourdon (basic tone), which is the foundation and source of the instrumental melody. Traditional performers are characterized by the manner of singing with an emphasis on the pronunciation of the "E" sound.

And also the melodiousness of the singing can be due to the presence of 9 vowel letters in the alphabet.

The formation of the voice of traditional singers differs from the classical singers - in the opera performance the voice is based more on the breath, and is trained academically, so that the voice is covered or rounded.

A traditional performance uses the technique of an open sound.

Conclusion: During the acoustic study of the voice of traditional performers, we determined that with a relatively small voice range, the sound is formed by oscillatory movements and is accentuated by the balance of the volume - such a manner is dictated by the need to perform with your own accompaniment by a musical instrument - usually a dombra.

We point out the factors of their dissimilarity, lying on the surface.

This is the starting point for the deeper study of two traditions.

WHAT IS GLOTTAL WHISTLE - AN EXTREME END OF THE WHISTLE REGISTER OR A DISTINCT VOCAL REGISTER?

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The subjective of this research is to investigate the underlying production mechanisms of extremely high pitched voices, in particular the so-called Glottal Whistles (GW, cf. Edgerton 2013). There are various studies and assumptions about the human whistle register. This whistle or flageolet register (M3, Roubeau et al. 2008), is described as having a separate tuning mechanical principle, in which the vocal folds no longer close and only a small part of them vibrates (Martienssen-Lohmann 1963; Miller/Schutte 1993). With regard to extremely high voice pitches, other authors use the term split- or chink tones (Schütz 1953; Klingholz 1986; Berry et al. 1996; Habermann 1986). Phenomenons of nonlinear dynamics, as found in studies of neonatal cries, “extreme voices”, voice disorders, and mammalian vocalization demonstrate that relatively small changes in phonatory settings can produce subharmonics, biphonation, frequency jumps, and deterministic chaos (Herzel/Reuter 1997). The vocal tract also has an effect on registers by means of a change in source-filter interaction (Miller/Schutte 1993). From this context, we turn to the GW, which differs from the whistle register in its auditory impression, in its pitch range, and presumably also in its vocal production mechanism. In contrast to the whistle register the average pitch of the GW goes beyond that. It is reported by Edgerton (2013) to be between 1 and 3kHz and often occurring as a biphonation. In this study we present data using a high-speed camera with a transnasal endoscope to visually assess closure of the vocal folds although the pharyngeal cavities tend to be narrowed. Electroglottography (EGG) is used to detect oscillation of the vocal folds. Acoustic analysis of overtone structure and transitional phases of the whistle register to the GW will in addition allow to describe the time course of changes in the production mechanism.

EMOTION EXPRESSION IN THE SINGING VOICE

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This study examines emotional expression in singing and its teachability using a novel parameter modulation technique. The work is an experimental comparative study using listener evaluations, acoustic analyses, and statistical deduction to assess the emotional expressiveness of the singing voice from short vocal samples and sung phrases. The investigation consists of three sub-studies, the first of which explores the auditory recognition of emotion from samples sung with Classical and non-Classical singing techniques at three different pitches. The second study compares the qualitative features of emotional expression in Classical and non-Classical singing techniques by means of acoustic analysis. The third sub-study focuses on teaching the parameter modulation technique to acting students. It compares the clarity of emotional expression between the instructional and control groups before and after the training intervention. The measures of emotional expression clarity in this study are considered to be the auditory recognition of emotional expression and the qualitative variation of the voice between different emotional expressions.

In the study, we used a seven-week training program focusing on parameter modulation technique that taught the use of different sound qualities to a group of acting students. The test group increased the use of different sound qualities as a means of emotional expression after training. This result was confirmed by acoustic analyses and by the improved recognition of emotions in the listening tests. After training, the test group appeared to use F1, SPL, HNR, and alpha ratio for emotional expression more systematically.

The study showed that the sound pressure level and the way energy is distributed in the sound spectrum were the two most typical indicators of the emotional characteristics of sound. The study finds that training in different sound qualities can help with the expression of emotions in the singing voice.

THE AVQI REFERENCE VALUES IN VOCALLY HEALTHY FINNISH SPEAKING SUBJECTS

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Objective: This study presents reference values for the six sub-parameters of Acoustic Voice Quality Index in vocally healthy Finnish speaking subjects.

Methods: Participants in the present study were 100 volunteers (female n=50, male n=50, mean age 38 years, range 19-84 years). The participants' voices were healthy according to the participants' self-evaluations and perceptual evaluations made by three voice experts. The voice samples were recorded with an AKG C544L head-mounted condenser microphone (4 cm from the lip corner) and digitized at 44100 samples per second and with 16 bits amplitude quantization using the Focusrite iTrack Solo soundcard. The participants read aloud a standard text and sustained the vowel [a:] at a comfortable pitch and loudness level. The Voice Quality Index (AVQI) and the sub-parameters of it (CPPs, HNR, Shim%, ShdB, Slope and Tilt), taken from both 31 syllables of text reading and 3 sec sustained vowel together, were calculated. The analyses were executed with the program Praat and AVQI03.01 script. Further, the mean F0 and the calibrated SPL were calculated. Statistical analyses were carried out using SPSS statistics software.

Results: The mean AVQI score was 0.72 (SD 0.9) and the AVQI-parameters' mean values were as follows: CPPs for males 15.4 (SD 1.6) and for females 14.6 (SD 1.5), HNR 20.55 (SD 1.9), Shim% for male 4.6 (SD 1.1) and for female 3.8 (SD 0.9), ShdB for male 0.47 dB (SD 0.72) and for female 0.41 dB (SD 0.06), Slope -22.78 dB (SD 3.37 dB), and Tilt -12.42 dB (SD 0.78 dB). The mean F0 and SPL in the samples were for the females 185 Hz (SD 20 Hz) and 71 dB (SD 4.5 dB) and for the males 107 Hz (SD 14 Hz) and 77 dB (SD 5.5 dB).

Conclusion: The results show that Finnish reference values in AVQI differ somewhat from AVQI values collected e.g. in Belgium (Batthyany et al. 2019) or the USA (Pierce et al. 2021). Further analysis is needed for assessing normative values for different age groups of Finnish speakers.

VOCAL FATIGUE INDEX IN FINNISH SPEAKING POPULATION

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The present study investigates the reliability and validity of the Finnish translation of the Vocal Fatigue Index (VFI) questionnaire in Finnish speaking subjects.

The VFI questionnaire was translated from English to Finnish according to the WHO (2014) recommendation for the translation for clinical research tools. The Ethics Committee of Tampere University Hospital provided approval for the present study (R19069).

Hundred voice patients (females n=75, males n=25, mean age 53 years, range 21-82 years) from a voice clinic and 34 vocally healthy controls (females n=24, males n=10, mean age 48 years, range 20-84 years) volunteered to participate in the study. Diagnoses for the voice patients were vocal fold paresis (n=38), spasmodic dysphonia (n=38) and functional dysphonia (n=24). Vocally healthy controls had in Voice Handicap Index total score less than 30.

Participants filled in VFI questionnaire first when they were asked to participate in the research and second time after two to eight weeks. Simultaneously with the questionnaires, the participants also gave three voice samples: reading aloud a standard text, speaking spontaneously for one minute, and sustaining [a:] three times in habitual speaking pitch and loudness. Recordings were made in a quiet surgery or office with an AKG C544L head-mounted condenser microphone (4 cm from the lip corner) and digitized at 44100 samples per second and with

16 bits amplitude quantization using the Focusrite iTrack Solo soundcard.

Recruiting of the participants is still going on during the spring 2022. The voice samples will be analyzed with Praat software and AVQ103.01 script. Results of the first and second filling of VFI questionnaire will be compared as well as the VFI and the acoustic results will be compared between healthy and dysphonic voice users. Statistical analyses will be carried out using SPSS statistics software. Results and conclusions of this study will be presented in a poster in Pevoc14.

PP10

PHYSICAL THERAPY APPROACHES TO PREVENT AND CURE SINGERS DYSPHONIAS

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The aim of this thesis is to provide a literature overview about singers' voice disorders and physical therapy approaches to prevent and cure dysphonias. The subject is important because a significant proportion - according to the research 21-84% - of people who take up singing suffer from voice disorders. The search was carried out using the following keywords: voice, singing, disorder, dysphonia, physical, therapy, posture, breathing, respiratory, circumlaryngeal, manual, therapy. The latest literature resources spanning back five years were used wherever possible. Since there are not many, older resources were also used. The main methods that physical therapists can use on a singer with voice disorders are posture training, respiratory muscle training, Pilates training, massage of the neck and shoulder area, and circumlaryngeal manual therapy. Many resources have noted the benefits of these methods and encourage using them in multidisciplinary treatment of voice disorders. We have to acknowledge that this subject has not been studied well enough, therefore, this thesis is heavily based on research that has been carried out not specifically on singers but on people with voice disorders in general. Number of people that have participated in research is quite small and the control group was not used when carrying out the study. Perhaps there are only a few studies concerning the vocal health of singers because they notice small changes in their vocal apparatus as normal phenomena. This makes it difficult to diagnose and determine treatment. In order to prevent vocal disorders, optimal techniques and constant vocal training are a must. Few studies have found that Pilates and posture training have shown positive effects on the quality of voice. It is important to note that students who were learning singing were most likely to continue with their regular singing lessons during the period of the research. Therefore, the results can be affected by many features. In further studies on the topic, the control group among a bigger number of the people examined could be involved. Physiotherapy approaches can be applied in the cure of voice disorders.

PP11

WHAT THE FACIAL RESONANCE VIBRATIONS TELL US? A SINGLE-CASE STUDY OF POTENTIAL VOCAL ECONOMY MARKERS

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Facial vibrations are traditionally aimed at in voice pedagogy as they are intuitively related to well-projecting and easy phonation, so-called 'resonant voice'. This study investigates voice production in normal speaking voice without and with sensation of facial vibrations. It is hypothesized that voice production with sensation of facial vibrations shows intensified facial vibrations and is related to more economic voice production.

One female voice trainer uttered the syllables [pa:], [pi:] and [pu:] in ordinary voice, without sensation of facial vibrations, and in 'resonant voice' with facial vibrations, felt particularly on the nose bridge. Acoustic and electroglottographic (EGG) signals were registered, oral pressure (Poral) was measured, and piezoelectric accelerometer signals were captured on the nose cartilage and on the cricoid cartilage. Poral during [p] was used to estimate subglottic pressure (Psub). As potential estimates of vocal economy the following were measured: (1) transglottic pressure (Ptrans) (= Psub-Poral), (2) Quasi-Output-Cost-Ratio (QOCR) [(SPL/CQ)*(T/T0)], where T is period length and T0 is reference value 0,005 s, (3) contact quotient (CQ), and (4) 'energy conversion ratio' (SPL from the accelerometer on the nose bridge - SPL from the accelerometer on the larynx).

Additionally, the first formant (F1) and its relation to F0 were studied.

In ‘resonant voice’, Psub, Ptrans and CQ were lower, and QOCR higher. For [a] and [i], F1 was lower and F1-F0 difference (in Hz and in dB) smaller. In contrast to the subject’s sensations, the measured vibrations of the nose were smaller and those from the larynx larger in resonant voice.

The results suggest that sensations of the facial vibrations are not necessarily in a direct relation to measurements of vibrations although the sensations may be used as guides to resonant voice production. Further study should compare different placements of the accelerometers on the face.

PP12

AERODYNAMIC AND ELECTROGLOTTOGRAPHIC MEASUREMENTS OF VOCAL MODES DETERMINED BY AMOUNT OF METAL AND DEGREE OF PHONATORY DENSITY FROM COMPLETE VOCAL TECHNIQUE: A PRELIMINARY DOUBLE-CASE STUDY

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Recent research document vocal fold vibratory patterns and laryngeal configurations of four CVT vocal modes and related perceptual parameters of ‘metal’ and ‘density’ using laryngostroboscopic imaging (McGlashan et al., 2016; Aaen et al., 2017, 2018, 2019, 2021), MRI (Leppävuori et al., 2020), and CT and inverse filtering (Saldias et al., 2020). Reduced perceptual ‘density’ has been associated with elongated vocal folds caused by a forward thyroid tilt, independent of fundamental frequency, while ‘metal’ has been associated with increased laryngeal narrowing, increased vocal fold contact quotient (CQ), and high SPL. Aerodynamics in these sounds have not been studied.

This study investigates subglottal pressure (Psub), transglottal airflow, SPL, and contact quotient (CQ) for different degrees of ‘metal’ and ‘density’ across four CVT modes.

Two non-classical singers (F age 44, M age 31), trained in CVT were recorded while performing p+vowel syllables at three pitches (B3, E4, B4 for female; C3, F3, C4 for male) across all four modes. A Flowmask captured airflow, Psub was estimated by oral pressure during p, with simultaneous audio and EGG capturing.

Non-metallic phonation was related to an increase in transglottal airflow and decrease in Psub with lower CQ and SPL compared to metallic modes. Reduced density conditions exhibited lower values in Psub, SPL, CQ and transglottal airflow with the exceptions of the male sample showing increased transglottal airflow in higher pitch, and the female sample showing no trend in CQ change on lower pitch. For both genders, higher pitch was related to an increase in Psub, SPL, and CQ with varying transglottal airflow. Higher glottal resistance was observed for the female participant.

Singers can control ‘metal’ and ‘density’ parameters in phonation. Both parameters are reflected in changes in Psub, SPL, CQ and transglottal airflow. Individual and/or gender related differences and correlations with pitch should be further investigated.

PP13

VOICE AND EXPRESSIVENESS: SINGING WITH DIFFERENT EMOTIONS

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Understanding that the opera singer is also an actor who interprets the text of the aria or recitative, each lyric in these pieces contains messages that arouse some kind of emotion. The singer, in addition to singing the musical

notes, interprets the text in order to convey the emotion contained in the lyrics. This interpretation is conveyed to the listener mainly through the singing voice.

A singer communicates with the listener by way of his interpretive intentions, and sometimes, those with the best vocal technique are not Always the most expressive. Emotions influence the singer's expressivity, which often changes his emotional state within the context of the same opera or even within the same aria. Such changes have an impact on the voice, changing aspects such as vocal fold vibration mode, resonance, timbre, in addition to vocal emission characteristics that modify musical parameters related to expressiveness. Thus, this study aims to analyze how the emission of the singing voice while the singer is expressing various emotions (fear, anger, joy, and sadness) impacts vocal and expressive parameters.

A musical excerpt was composed based on the romantic opera period and neutral lyrics written so that the singers can, through the same song, portray different emotions, without being indirectly influenced by an aria melody and lyrics whose emotional intention is already known. During the musical performance, the singers was recorded and the audio and EGG data analyzed. Some inverse filtering measurements will be made, and correlated with the EGG data. Pitch, loudness and vibrato rate and extent will be measured to compare with a neutral performance and see how they deviate from it. Measurements of the inter-beat interval (IBI) will allow us to see how singers deal with timing in different emotional emissions.

PP14

COMPARISON OF THYROPLASTY AND LARYNGEAL REINNERVATION FOR SURGICAL TREATMENT OF VOICE DISORDERS DUE TO UNILATERAL VOCAL FOLD PARALYSIS

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Objective: Overview of treatment modalities for unilateral vocal fold paralysis (UVFP). The application of a new parameter set-up including the vocal extend measure for comparison of thyroplasty Typ I with arytenoid adduction and non-selective laryngeal reinnervation.

Method: Three cases of non-selective reinnervation and corresponding matched cases of thyroplasty with arytenoid adduction regarding age, sex, and follow up intervals are presented.

Results: The data document efficacy of both treatment options and show the potential of various voice measures including the vocal extend measure.

Conclusion: Both treatment options for UVFP resulted in improved vocal functional conditions. So far, no satisfying data regarding the long-term stability of therapeutic outcomes for UVFP exists.

PP15

THE FACTORS AFFECTING LONGEVITY OF VOICE PROSTHESIS

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Objective:

The study was aimed to perform analysis of the impact of different variables on the longevity of third-generation Voice Prosthesis (VP) in patients after total laryngectomy.

Patients and Methods:

Data about a continuous series of 328 third-generation VP, which were implanted between 2016 and 2020 in Department Otorhinolaryngology of Lithuanian University of Health Sciences (Kaunas Clinic) was obtained for this retrospective cohort study. Data about the VP users' age, sex, place of residence, laryngeal tumor stage, neck irradiation, VP size, and the use of Heat and Moisture Exchanger (HME) were analyzed as possible

contributing factors. The effect of these variables on VP longevity was determined.

Results:

The median lifetime of VPs in patients 65 years old and above was 182 days (95% CI 168-196), versus 146 days (95% CI 130-162) ($P = 0.033$) in patients younger than 65. Neck irradiation was associated with a longer VP median lifetime of 161 days (95% CI 142-180) compared to 126 days (95% CI 100-152) with no prior neck irradiation ($P = 0.046$). HME usage was associated with significantly increased longevity of VPs: 182 days (95% CI 156-208) with HME and 149 days (95% CI 132-166) without HME usage ($P = 0.039$).

Conclusion : The results of the present study suggest that older age, neck irradiation, and routine use of use of HME are associated with increased VP longevity.

PP16

A CLINICAL PERSPECTIVE INTO TRANSWOMEN'S SPEECH THERAPY IN A FINNISH CONTEXT: REFERRAL PRACTISES, ASSESMENT AND THERAPY GOALS

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The aim of this study was to find out what the current practices of transwomen's speech therapy referrals, assessment, and the typical goals of intervention are in Finland. Transwoman (male-to-female, Mtf) is a person, whose sex has been classified as a male during birth but whose gender identity represents female. The Finnish legislation defines public healthcare to be responsible for the transition process towards one's gender identity. The role of speech therapy is to help transwomen in finding a communication style which aligns with their gender identity.

By using a half-structured interview, data was collected from eight speech and language therapists (SLTs), who currently work or have previously been working with transwomen at the phoniatrics units of five Finnish university hospitals. According to the main findings 1) assessment and intervention are intertwined with each other, and 2) the features of a feminine voice comprise the most common theme both in assessment and intervention. Defining the goals for the intervention needs to be realistic in respect of client's wishes and they are not supposed to compromise vocal hygiene. Some differences were found to exist between the university hospitals in general practices which, however, had no effect on the assessment or intervention (such as the waiting time for the first SLT's appointment).

This topic is yet scarcely studied, and more information is still needed for securing nationwide equal access to speech therapy services for transwomen.

PP17

PROSOVR: DEVELOPING A PROTOTYPE FOR A VIRTUAL REALITY-BASED PROSODY ASSESSMENT

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Introduction: Prosody assessment in voice and speech-language disorders is complex and difficult to isolate among other relevant features. As in many tools in neurosciences, prosody assessment protocols usually collect speech samples using standard but artificial tasks that may compromise ecologic validity. Therefore, new ways of assessing prosody, using technologies as virtual reality (VR), may benefit prosody assessment. They potentially recreate more realistic environments and may induce more natural speech production in standard protocols.

Objective: Develop a prototype of ProsoVR, a VR-based prosody assessment tool.

Method: Following design thinking method, an approach to develop new solutions to identified problems, the research team explored and proposed a VR technology solution to collect reliable speech samples regarding emotional prosody assessment in European Portuguese language. After brainstorming sessions, a draft version of ProsoVR was developed. A five experts' panel, including SLT and specialists in different prosody-related fields, analyzed and provided feedback about the content and structure of the tool.

Results: A semi-immersive 360° video VR experience script was developed including four trigger-environments, conceived to induce neutral, joy, sadness, and anger emotions. Repeated key-sentences were included in each environment.

Conclusion: A final version of the ProsoVR script was achieved and is ready to be tested using perceptual and acoustic prosody assessment, prior to its final production.



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