Does an osteopathic treatment influence the human voice?

Comparative trial based on a technical voice measurement of vocal students

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Aer, „die Luft“, von Hendrik Goltzius (1558-1617)
Quelle: Schmitt, J., (Atemheilkunst), S.103

Im Atemholen sind zweierlei Gnaden:
Die Luft einziehn, sich ihrer entladen.
Jenes bedrängt, dieses erfrischt.
So wunderlich ist das Leben gemischt.
Du danke Gott, wenn er Dich presst,
und danke ihm, wenn er Dich wieder entlässt.

Goethe

Quelle: Schmitt J. (Atemheilkunst), s. p .

Preface

Many students of the University of Music (Department of solo singing and musical theatre) realised a significant improvement of their voices after my osteopathic treatment. This was very interesting for me as I treated many different of their specific ‘sufferings’ but did not primarily emphasize to their ‘voices’ – nevertheless their voices improved. Is this sheer coincidence?

This positive effect was reported to me many times. Dr. Lisa Malin, a trained respiratory therapist who teaches the subject respiratory and body training at the University of Music, Vienna, gave me the idea to work on this topic scientifically and thus the idea for this paper was born.

Dr. Lisa Malin has had an active part in my study by treating my comparison group. Prof. Claudia Visca, who teaches singing at the University of Music, has taken the chair. She also invested much time and work for my study by being present at all tests and by documenting on them.

A sound engineer recorded all tests which he afterwards compared by means of a complicated audio-engineering programme.

I especially want to thank these three persons.

During my time of research I looked for similar works and theses and finally found a further paper on the internet, written by two Austrian osteopaths. They submitted a thesis at the German College of Osteopathy, entitled „Osteopahtie bei PatientInnen mit funktioneller Dysphonie“ (‚Osteopathic treatment of patients suffering from functional dysphonia’)
There is, however, a fundamental difference between their study and mine.
„Osteopahtie bei PatientInnen mit funktioneller Dysphonie“ (Osteopathic treatment of patients suffering from functional dysphonia’) describes the treatment of the esophagus and its influence on the human voice. But in my study I treat those lesions of the singers that become obvious throughout therapy. So much more interesting is therefore my result.

Abstract

At the beginning of this paper the question arises if an osteopathic treatment influences the human voice. The test persons are all vocal students at the department of solo singing at the University of Music, Vienna and thus persons with a well trained vocal organ.

In the subject 'respiratory and body training' students study and experience „respiratory science". They train the development of their breathing according to the respiratory therapeutic principle in an active as well as passive way and so learn to work actively on their breathing.

In this paper the osteopathic concept will be contra posed to the respiratory therapeutic concept. Both concepts will be described with their corresponding philosophies and techniques used in this study. Furthermore all anatomic and mechanic connections relevant for the formation of sounds will be illuminated.

Practical tests will be presented by means of an explanation of the methodological design according to which they were carried out. Students undergo three different tests. An arbitrary tone will be adopted, a tone will be held as long as possible and a triad will be vocalised. The comparative values act as references for another test after the osteopathic and respiratory therapeutic treatment.

This paper shall describe variables, reliability and validity and explain the process of testing. Three different sources for documentation are available: an audio engineering programme that records all tests and graphs the results, the subjective assessment of vocal teachers and the feedback of students.

The osteopathic treatment merely adjusts to ‚osteopathic lesions' found during the examination of the students. This is how this paper differs from another paper with a comparable topic, in which, however, always the same structure is treated. (The paper mentioned is going to be quoted in this present paper.)[1]

The results of the present study show that an osteopathic treatment has a clear influence on the human voice. Graphic representations of the tests are to be found in the appendix.

[1] cf. Steiner, C./ Welz, E., (Dysphonie).

Table of contents

1. Introduction

The present treatise deals with the question if an osteopathic therapy influences the human voice. This paper is going to show that the integrated concept of osteopathy, applied to students of university of music, caused a change in their voices although the voice was not the main object of the osteopathic treatment.

During my examinations on these vocal students I was looking for osteopathic lesions which I treated. The fact that a singer's voice is their potential to turn outwards and it depends on this potential if *he or she* is well-rated or not makes it very interesting of course to observe how many structures influence the voice.

This thesis offers no 'recipe' provided which structures should be medicated to influence the human voice. 'Lesion found – lesion treated' is the motto of my therapy.

This study has been noticed with a lot of interest by the university of music as for the attendant music professor it was very interesting to observe, to which extent a singer could tap their own potential often much better after a treatment.

The aim of this treatise is to show that the quality of the voice can be influenced by an osteopathic therapy. Different tests which have been documented and compared (an audio engineering program, documentation of a music teacher and feedback by students) provide valuable results.

The condition of the voice, the breathing and the body altogether have clearly noticeable affects on the vocal achievement. The present paper is concentrating on the main points of the effect of an osteopathic concept on students. The results are compared with a peer group which has been examined and treated according to the concept of respiration therapy. I decided to use the concept of the respiratory therapy for my comparison group because the students of the university of music are taught in the subject 'breathing' by Dr. Lisa Malin according to the respiratory therapeutic concept in an active and passive way. Like osteopathy, the concept of respiratory therapy is according to philosophical foundations, so it was quite obvious to choose this peer group.

This works hypothesis is that the osteopathic treatment influences the human voice.

2. The osteopathic concept

In osteopathy you use your hands for diagnosis and therapy – these are so called sheer manual techniques – whereas humans should be perceived as individuals in their integrity. The aim of osteopathy is the rebuilding of the system of the organism – the cure of dysfunctions and the animation of self-healing forces.[2]

[2] cf. Ligner, B. / van Assche, R. (Ligner), p. 14.

An osteopath needs precise knowledge of anatomy, physiology and biomechanics to identify structural or visceral problems and changes inside the liquid or hormonal system and to affect them.[3]

2.1. History of osteopathy

Thousands of years ago manual treatments have been already carried out. This is proved by 4000 year old sculptures from Thailand that attest the use of manual techniques. Also the ancient Egyptians cured injuries and illnesses by means of their hands. Even Hippocrates utilized such techniques – for example traction and lever techniques – to cure vertebral contortion.

As time drew on manual healing techniques were incumbent on 'Badern' (quack doctors). Also the appearance of epidemics was responsible for the loss of close contact to patients.[4]

Dr. Andrew Taylor Still (1828 – 1917) revitalised this ancient knowledge and extended it into the medical sector of osteopathy.[5]

On the basis of dissection and accurate anatomical studies he detected coherence between limitations of functions and their consequences on other structures. That is how the basics of today's biomechanics accrued.[6] Dr. Still taught at the 'American School of Osteopathy' in Missouri. In addition to a 'normal' medical education a more specific way of anatomy was taught at this university – as well as diagnostics of functional disorders of joints and their adjustments. Dr. Still called those functional disorders 'osteopathic lesion'.

The osteopathic lesion is related to skeletal, articular and myofascial structures as well as the vessels, lymphatics and nerves connected to it.[7]
"Der Schwerpunkt liegt dabei auf der veränderten Funktion des muskuloskelettalen Systems und nicht auf einer Erkrankung oder einem Schmerzsyndrom. Besteht eine somatische Dysfunktion, die mit Veränderungen am Gefäßsystem, am lymphatischen System und am Nervensystem einhergeht, dann können selbstverständlich sämtliche andere Symptome vorliegen, beginnend bei unklaren Schmerzzuständen bis hin zu exakt definierten Krankheitsbildern.[8]"
[Thereby the emphasis lies on the altered function of the musculoskeletal system and not on an illness or a pain syndrome. If there is a somatic dysfunction which comes along with an alteration in the vascular system, the lymphatic system and the nervous system it is of course possible that there will be every other symptom, beginning with indefinite pain right up to accurately defined disease pattern]

[3] cf. Ligner, B. / van Assche, R. (Ligner)
[4] cf. Greenman, P. (Greenman), p. 21.
[5] cf. Ligner, B./ van Assche R. (Ligner), p. 15.
[6] cf. Ibid., p. 16.
[7] cf. Greenman, P. (Greenman), p. 29.
[8] cf. ibid., p. 29.

Philosophy of osteopathy

Still developed the five osteopathic principles.

1. Live is movement
2. Structure rules function
3. The body works as a unit
4. Arterial rule
5. Self-healing mechanisms[9]

Details to the described principles will follow later on in the thesis at hand.[10]

In 1917 Dr. Littlejohn brought osteopathy to Europe. In the fifties the 'European School of Osteopathy' was founded in Maidstone (GB). The "Wiener Schule für Osteopathie" (Viennese School of Osteopathy) was founded in 1991 which brought the concept of Osteopathy to Austria.

2.2. Concepts of osteopathy

In osteopathy you can distinguish between different concepts. For all of those concepts direct and indirect techniques are valid. At the direct technique a bone or a tissue is straightly moved in the direction of a limited movement or a blockage to refit the natural mobility. At the indirect technique you move to the opposite direction of the natural mobility. The aim of the indirect technique is to loose spasms of the tissue holding against it.
This is also a way to relax the bands and membranes of the joint connections and as a consequence recover the physiological mobility of tissue. [11]

A description of the osteopathic concepts will follow. I have used all these concepts in my treatments except for the techniques mentioned in point 2.2.1.5. To keep the integrity of the osteopathic concept I additionally cite the technique under point 2.2.1.5. (somato-release).[12]

2.2.1. structural Osteopathy

Structural Osteopathy works on the palpation and correction of bones, muscles, sinews, ligaments and fascias.

2.2.1.1. Osteoarticular techniques

The osteoarticular techniques comprise mobilization and manipulation of off centre and blocked joints. At Thrust-techniques (manipulation technique) you can

[9] cf. Greenman, P. (Greenman), p. 17.
[10] see p. 15 ff. in the paper at hand.
[11] cf. Liem, T., Tsolodimos, C., (Osteopathie), p. 70.
[12] see p. 13 in the paper at hand.

distinguish between the ‘cervical wheel’ in the cervical spin, the ‘dog’- and ‘lift’-techniques in the thoracic vertebral column, the ‘lumbar roll’ for the lumbar spine and different manipulations on the sacrum. You can also manipulate every other joint of the body. A manipulation is a high speed technique at which as few strength has to be used because of an advantageous appointed angle.

Mobilization works with less speed, however it concerns nearly every structure of the body. Apart from joints this is also musculature, sinews, ligaments, nerves, vessels, fascias and scars.

According to Greenman you should be treated through manual therapy techniques if a somatic dysfunction is diagnosed. [13]

2.2.1.2. Soft tissue techniques

At these techniques you influence on one hand the tension of different body tissues, on the other hand it is about loosing ‘clotted’ structures. The point is ‘to bring movement into tissue’ and with this enhance nutrient and oxygen supply. Moreover those techniques can animate the decomposition of waste products of the metabolism, fortify the immune system and cause a beneficial relaxation.

An example of ‘soft tissue techniques’ is ‘inhibition’.
At ‘inhibition’ a muscle is expanded into the lateral direction and held like this until it has changed its tension.[14]

2.2.1.3. Neuromuscular reprogrammation techniques according to Dr. L. H. Jones

At these techniques you bring the affected joint into a position which is as free from pain as possible. Mostly this position is situated in direction of the lesion. If you leave it in this position for a longer time (up to 90 seconds) the tension of the joint can be improved. In most cases also a ‘trigger point’ is held, which can be, according to Janet Travell, associated with every lesion.[15]

2.2.1.4. Muscle energy technique according to Dr. F. L. Mitchell

These techniques work through active muscle contraction of the patient. The therapist brings the joint close to its motorial barrier. The patient performs an isometric contraction into the opposite direction. This is the direction of the lesion. The therapist offers resistance. After a relaxation the joint is being brought again to the new motorial barrier.[16]

[13] cf. Liem, T., Tsolodimos, C. (Osteopathie), p. 29
[14] cf. ibid., p. 87.
[15] cf. Ligner, B. / van Assche, R., (Ligner), p. 21.
[16] cf. ibid., p. 20, f.

2.2.1.5. Somato-Emotional-Release according to Dr. J. E. Upledger

Upledger describes a working model which uses the image of so called ‘energy cysts’ in consequence of traumas. Vector-like force on different tissues caused by psychic traumas produce an energy congestion. During the therapy the patient often adopts positions which he or she knows from the trauma.[17]

2.2.1.6. Myofascial techniques

Base of this techniques is the so called ‘fascial distortion model’ that has been developed by Typaldos.[18] It is an anatomic model whereby lesions of the supporting apparatus and musculoskeletal system are regarded as a change of one or more fascial distortion types.

The fascial distortion model distinguishes between six main types:

The trigger band describes a twisted fascial ligament.

The trigger point hernia describes an abnormal protrusion of tissue through the fascial level.

The continuum distortion describes a change of the transition zone between ligament, tendon and the like and bone.

The fold distortion means a three-dimensional change of the fascial level.

At a cylinder distortion you talk about an overlap of the cylindrical coil convolution of the surficial fascias.

At a tectonic anchorage you talk about a change of the ability to slide of the fascial surface.[19]

Trigger bands are treated with the Trigger band technique.[20]

The trigger point hernias are treated by exertion of pressure.[21]

The continuum technique comprises of the hard and uninterrupted pressure on a continuum distortion that moves a described transition zone.[22]

At the fold distortions you distinguish between unfold distortions and fold in distortions. Those distortions are treated by means of fold techniques.[23]

[17] cf. Ligner, B. / van Assche, R., (Ligner), p.22.
[18] cf. Typaldos, S., (Typlados), p. 15.
[19] cf. ibid., p. 23.
[20] cf. ibid., p. 29.
[21] cf. ibid., p. 37.
[22] cf. ibid., p. 42.
[23] cf. ibid., p. 47.

The cylinder distortions are treated by means of cylinder techniques. Here you distinguish between nettle techniques, double thumb techniques and abstracting techniques.[24]

Tectonic anchorages are treated by means of tectonic techniques. Here you distinguish for example between 'frog leg technique' and 'inverse frog leg technique', whip technique, suck technique, cupping technique, Kirksville crunch for the thoracic spine, lumbar roll for the lumbar spine and the neutral thrust for the cervical spine.[25]

2.2.2. Craniosacral osteopathy

Based on Dr. Still craniosacral osteopathy has been evolved by Dr. William Garner Sutherland (a student of Dr. Still).

One of the essential works of literature for osteopathy called 'The Cranial Bowl' was published by Sutherland in 1939. Dr. H. I. Magoun caused the breakthrough of those theories with his piece of literature called 'Osteopathy in the Cranial Field'.[26]

The craniosacral osteopathy is based on the concept of the craniosacral rhythm, a rhythm of the body which influences the metabolism of the organism and every body cell. The craniosacral rhythm moves the cranial bones and every other bone smoothly in a frequency from six to fourteen in flexion and extension respectively in lateral and internal rotation. Very early, namely during the embryonal development, this rhythm sets in and you can even palpate it after death.[27]

In craniosacral osteopathy you search for the "fulcum" (a centre of movement, a point of rest) or the "inner eye of a hurricane". An example for a fulcum is the "Sinus Rectus" (Sutherland Fulcum).[28] To keep the balance of the movement of the membrane and the tensions in every direction, the membranes themselves operate from a fulcum. This fulcum has to move automatically. An osteopathic access to craniosacral therapy is to search this fulcum, focus on it and therewith help the membran to change it. Shortly before the tension changes a so called "Still-Point" arises. This "Still Point" is a snap-shot after which the tissue can realign itself.

In craniosacral osteopathy you work a lot on the skull – a profound knowledge of the sutures of the skull (which are the cranial sutures, the connections between the cranial bones) and their Pivot points (those are the changes in alignment) is a precondition. At this work on the skull the cranial sutures are examined and blockages at these sutures are abolished trough direct and indirect techniques.

Although you work a lot at the skull you can influence other structures of the body, starting from the skull. So you also work a lot with humours, vessels, the nervous system and the immune system.

[24] cf. Typaldos, S., (Typlados), p. 60.
[25] cf. ibid., p. 63 ff.
[26] cf. Ligner, B. / van Assche, R., (Ligner), p. 21.
[27] cf. Liem, T., (Liem), p. 4.
[28] cf. Ibid., p. 277.

2.2.3. Visceral osteopathy

The visceral osteopathy was developed by Thure Brand in 1890 and has been established amongst others through the works of Jean-Pierre Barral.[29] In the visceral osteopathy you also talk about osteopathic lesions. This can affect the mobility and motility of an organ. Mobility is the flexibility of an organ concerning its ambience. Physiological this movement happens because of the pressure of the diaphragmatic motion.[30] Motility is the proper motion of an organ. For every organ there is a typical motility.[31]

Every organ has got an inner strength to maintain against gravity. Organs and viscera carry themselves and so they do not need to be stabilized from outside. If an organ looses this ability it will need exterior forces.[32] Changes that result from this development can be treated with visceral-osteopathic techniques.

2.3. Principles of osteopathy

Literally translated osteopathy means “morbid change of the bone” (“osteon” – bone; “patos” – condition). This can lead to misunderstanding. Still choose this name because he started his research of the bone. Since he began to normalise the osseous skeleton.[33]

Osteopathy is philosophy, science and art, all in one. The philosophy deals with the concept of unity of structure and function of the organism in a well-being as well as in an ill status. From a scientific point of view it is biology, chemistry and physics in service of health as well as prevention, healing and abatement from illnesses. The use of this philosophy and science in practice is the art of osteopathic medicine.[34]

2.3.1. “Life is movement”

Precondition for an osteopathic treatment is cognition of a limitation of movement – mobility and motility.
The limitation of mobility in tissues leads to the fact that not only the supply of oxygen and nutrimental substances is not assured – also the evacuation is reduced. Still also reconstructed the relation of the limitation of functions and their influence on other structures by dissecting corpses.[35]

For the expression of motility see point 2.2.3. visceral osteopathy.[36]

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[29] cf. Ligner, B. / van Assche, R., (Ligner), p. 21.
[30] cf. Barral, J., (Barral-1), p. 8.
[31] cf. ibid., p. 9.
[32] cf. Helsmoortel J.; (Helsmoortel), p. 1.
[33] cf. Liem, T., (Liem), p. 4.
[34] cf. Liem, T., Tsolodimos, C., (Osteopathie), p. 21 refer to H. NM. Wright, Perspectives in Osteopathic Medicine, Kirksville College of Osteopathic Medicine, Kirksville 1976.
[35] cf. Ligner, B. / van Assche, R., (Ligner), p. 16.
[36] see p. 15 of the paper at hand.

2.3.2. “Structure rules function”

Still used this principle in the sense of absorption of the whole body.[37]
Structure and function are connected in a close interrelation and influence each other.

For example a proximal phalangeal joint is a hinge joint (structure). Such a joint has to accomplish movements for bending and stretching (function). Because of a long-lasting wilful or arbitrary over- or underload of a part of the body, which means a change of its original function, the structure can be mutated.[38]

Another point in this coherence is that this interplay exists not only locally but can impinge globally on the body. For examples changes and false positions of a joint cause problems in other parts of the body. A distortion of the ankle joint for instance can lead to an exertion in the stabilising ligaments and thus to a reflectory contraction of the “musculus biceps femoris”. The consequence is a dysfunction in foot and knee.[39]

2.3.3. “The body works as a unit”

The human being is a unit of body, soul and spirit. Whether a person feels healthy, ill, happy or sad and also if he or she is healthy for a long period of time is dictated by a huge number of physical and psychological processes. They are intrinsically tied to each other and so you have to see it as a unit. That is the reason why osteopaths think and cure holistically.[40]

“Life proves its perfection by its work”[41]

2.3.4. “The arterial law”

A well-functioning circulation of fluids is considered as the highest value in the human organism and so it is the most important factor in osteopathy because life has to be nourished. This term is not only confined to the arterial and venous system but comprises also liquor, lymph, synovial fluid, gas exchange and unhindered transmission of nerve impulses. Tissues with insufficient supply rather tend to pathologies.[42]

2.3.5. “ Self-healing mechanism”

Health is the result of a string of self-regulating processes of the immune system, the endocrine system, the autonomous nervous system and other regulation systems.

[37] cf. Greenman, P. (Greenman), p. 22.
[38] cf. Liem, T., Tsolodimos, C., (Osteopathie), p. 25.
[39] cf. Ligner, B. / van Assche, R., (Ligner), p. 23
[40] cf. Liem, T., Tsolodimos, C., (Osteopathie), p. 22
[41] cf. Still, A., (Still), p. 379
[42] cf. Ligner, B. / van Assche, R. (Ligner), p. 23

Starting to work on this and to bring it to an optimal dimension of power without overtaxing the body is the aim of the osteopath.[43]

3. The human voice

A description of the human voice – its structure, its scope and how it is influenced – now follows.

The human voice is an organ of communication which produces a tone on phonation respiration, additive synthesis and sound shaping (as different sub- processes). Similar to the structure of a wind instrument, the air streams from a "wind space" (trachea, bronchi, etc.) through the gap of the vibratory vocal cords (vocal ligaments) into the "air space" which consists of pharynx, mouth and nasal cavity.[44]

Speech and voice develop during the phase of expiration, which means during that time when the diaphragm swings back to its initial situation. The power, that is necessary for exhalation, has to be measured out to enable a tone keeping its tension. An inspiratory countertension has to be produced.[45]
As you can vary the strength of the air space (the volume of the sound results from that) as well as the tension of the vocal cords and the width and shape of the fissure of glottis (the general sound colour of the voice results from that) and also the air space in size and form (the timbre results from that), therefore you need a lot of muscles. Vocal ligaments and the vocal cord and their adjustment are regulated by the joints and mussels of the larynx. The signals which influence the vagus nerve stem from the motosensoric cortex. The vagus nerve provides the larynx motorically as well as sensitively, which is important for phonation and in the same enables an adverse-effects reflex for coughing.[46]

Sensitive fibres of mucous membrane of the larynx and sensoric fibres of muscle spindle send impulses to the centre to report about the position and tension of the vocal ligaments. There are close connections to the auditory pathway with the bulbar and cortical centres of the motor functions of speech. The conditions are necessary for fine tuning of the voice. When the air flow causes the vocal cords to vibrate, they do not simply open and close, but swing into the direction which is preset by the air flow in a kind of rolling motion. At rather deep notes the glottis is closed for a longer time than opened (ratio 5:1 at 100 Hz), at higher notes (400 Hz) the ratio sinks to 1.4:1. If you sing with head voice or whisper the glottis is not closed at all.[46]

The frequency range of the human voice varies from about 40 Hz up to 2000 Hz and more. While speaking the vocal range contains approximately one octave, singers use up to three octaves.[46]

[43] cf. Ligner, B. / van Assche, R. (Ligner), p. 24.
[44] cf. Kittel, G., (Phonaitrie), p. 17.
[45] cf. Richter, H., (Atemwelten), p. 99.
[46] cf. Steiner, C. / Welz, E., (Dysphonie), p. 39 ff.

A description of the anatomy, the functional anatomy and the physiology for producing a tone follows.

3.1. The vocal organ from an anatomic and from a functional point of view

The main sectors of the vocal organ are the larynx, the muscular network in which the larynx is hung in (connecting mechanism) and the respiratory system.

The skeleton of the larynx (larynx) consists of two arytenoid cartilages, a thyroid cartilage and a cricoid cartilage. The thyroid cartilage is linked to the cricoid cartilage by two joints. Because of this connection you can do a tipping movement with both cartilages. Also the arytenoid cartilages are linked to the cricoid cartilage and by this connection of joints it is flexible and turnable in a triple manner.

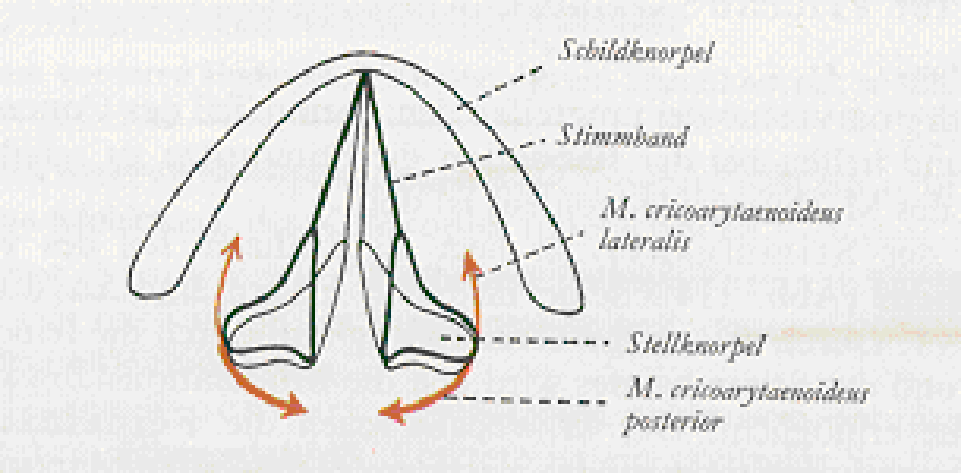

Figure 1- function of the arytenoid cartilage[47]

During the deglutition the epiglottis (Cartilago epiglottica – a leaf shaped, elastic cartilage) closes the entrance of the throat. The epiglottis can lift and lower itself and is affixed with a ligament at the rear side of the thyroid cartilage. The larynx is hanged at the hyoid bone. The muscles that start at the larynx are important for phonation.

The two vocal folds are laid in the framework of cartilages that has been described above. Because of their vibrancy they make the exhaled air swinging – let the voice arouse. During that you can distinguish between the vocal cords (the inner body of the muscle of the vocal folds) and the vocal ligaments (the upper longitudinal strain of the tissue in which the vocal cords are embedded).[48]

[47] cf. l. Waldeyer, A. / Mayet, A.., (Anatomie 2), p. 143.
[48] cf. Husler, F. / Rodd-Marling, Y. (Singen), p. 32 ff. and Waldeyer, A./ Mayet, A., (Anatomie 2), p.138 ff.

The vocal ligaments (ligamentum vocale) are the upper border that is spread out between the proc. Vocalis, the arytenoid cartilage and the rear side of the voice cartilage. The vocal ligaments consist of undulated, colagene and elastic fibres. The conus elasticus is a tapered funnel beginning at the cricoid cartilage and ending in the vocal ligaments.[49]

The vocal cords are able to tense and to relax separately so they can change the shape of the vocal cord and the fissure of glottis (gap between the vocal folds). The vocal cord is a tension mechanism which braces the vocal folds up and down as well as forward, backward and outward. The fissure of glottis is opened during breathing (respiratory position) but while phonation it is rather closed (phonation position).

Figure 2- Vocal ligaments in respiration position[50]

Figure 3- Vocal ligaments in phonation position[51]

The vocal ligaments are not able to move autonomously in contrast to the muscular vocal cords. Primarily they are expanded and consequently extended and thinned by cricoid – thyroid cartilage muscle. The tone pitch depends on thickness and tension of the vocal ligaments. The more elongation and tension, the higher the tone.

A singers voice material emerges only until the vocal cord and the vocal ligaments (extensor and expander) activate themselves out of one impulse and at the same time while producing the voice.[52]

[49] cf. Waldeyer, A. / Mayet, A., (Anatomie 2), p. 142 ff.
[50] cf. Pschyrembel, (Pschyrembel), Figure 279.
[51] cf. ibid., Figure 279.

3.1.1. Anatomic description of the muscles of larynx

A detailed numeration of the muscles of the larynx, that influence the larynx but also the vocal ligaments as well as the voice, follows. I did not emphasize especially on those in my treatment but it is necessary to describe them to gain an insight into the formation of a tone.

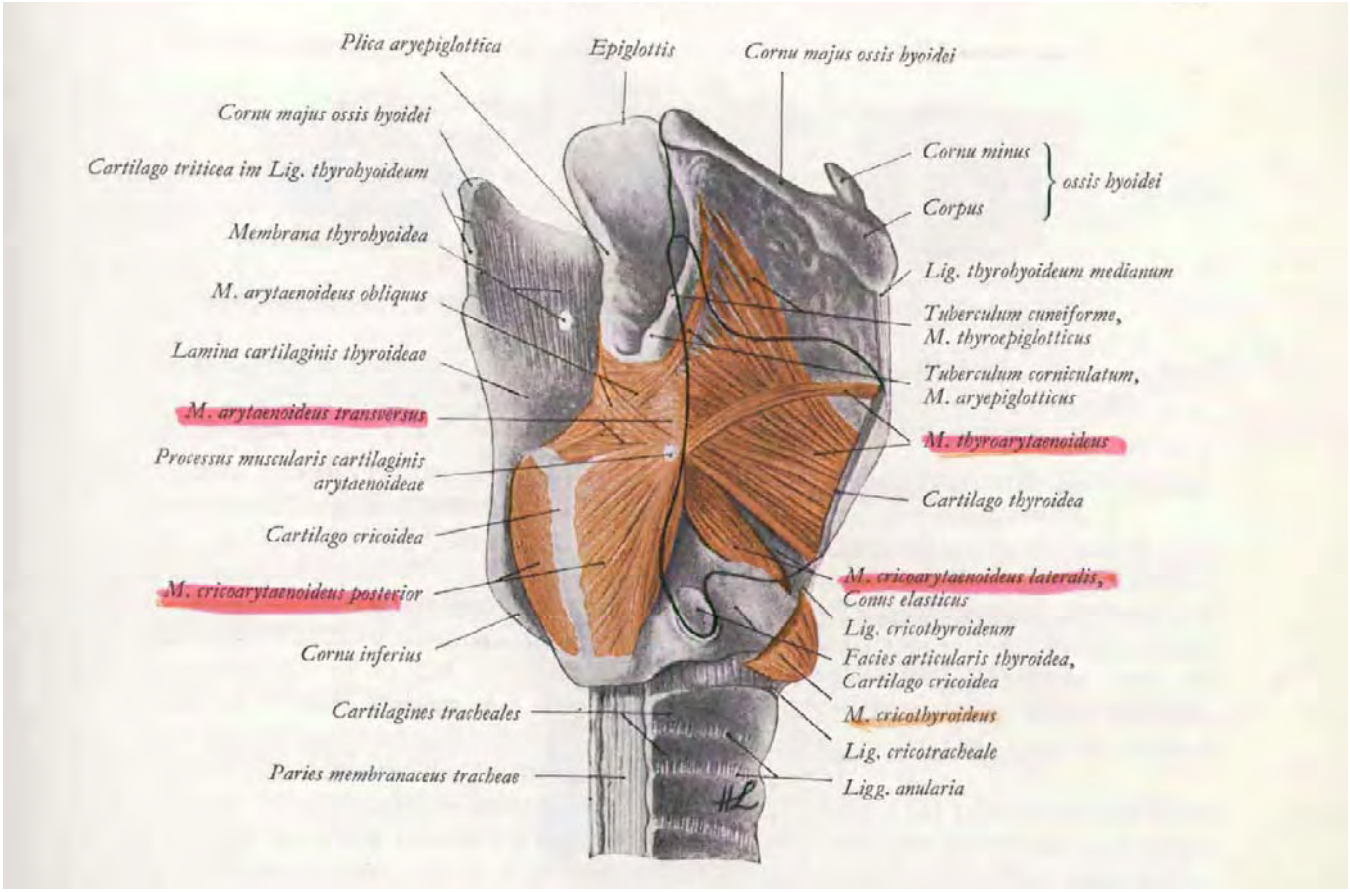

Figure 4- muscles of larynx – shown from the right hand side[53]

The muscles of the larynx are divided into the sphincter internus muscle and the sphincter externus muscle.
The sphincter externus muscle (cricothyroideus muscle = “anticus”) emanates of the cricoid cartilage and passes over into inferior horn of the thyroid cartilage. Its effect is to nourish the cricoid and thyroid cartilage and to bring the vocal ligament into a “approximate tension”.[54]

[52] cf. Waldeyer, A. / Mayet, A., (Anatomie 2), p. 138 ff.
[53] cf. ibid., p. 143.
[54] cf. ibid., p. 144.

The sphincter internus muscle consists of the following muscles:

- Cricoarytenoideus posterior muscle ("musculus posticus" the clinican). This is the only one which opens the fissure of glottis.
- Cricoarytenoideus lateralis muscle – this one closes the intermembranous part of the fissure of glottis while the intercartilaginous part stays open. So it is responsible for whisper.
- Arytenoideus transversus muscle and arytenoideus obliquus muscle connect the arytenoid cartilages and thus help closing the intercartilaginous part.
- Thyroarytenoideus muscle – its inner fibre content passes into the vocalis muscle (= vocal muscle).
- Vocalis muscle – according to Waldeyer this one is responsible for fine adjustment and fine tension of the vocal ligament.[55]

As there have been singers treated in this study and as the production of a sung tone is a very complex process, the functional interaction of all factors responsible for vocalisation and their coherence is described afterwards.

According to Husler/ Rodd-Marling the vocal ligaments need further muscles as takers and antagonists to hold out against the tension of the inner vocal fold muscles while vocalisation. The muscle 'musculus posticus' – cricoarytenoideus posterior muscle ('opener') is located on the rear side of the larynx arranged in couples and opens the throat to clear space for drawing breath.[56]

The 'closers' (cricoarytenoideus posterior muscle, interarytenoideus muscle) decrease the gap between the vocal folds defining the shape of the fissure of glottis. The more the vocal folds converge the more 'concentrated' the tone sounds. Through narrowing the fissure of glottis the 'throatiness' of the voice is abolished.[57]

The human voice gets the precision and the individual expression out of the 'fine tuning' of a complex muscular system which lays in the vocal fold. This muscular system discharges into the very margin of the vocal ligaments ('margin muscles'). The vocal folds can be modified by these muscles in many different ways and so a unlimited possibility of distinction of the mass of sound is allowed. This is necessary for producing vocal values. Those muscles (lateralis muscle and transversus muscle) are the bridge between the 'thoracic- and head-falsetto-register' – and build a unity between both of those main registers.[58]

3.1.2. The anatomic surrounding of larynx

For successful physiological singing the "elastic" framework of the larynx is essential – those net of pairs of muscles, in which the larynx is actively chucked in. Among those lie the "levators" which pull the larynx up: the thyroid cartilage muscle and the hyoid bone muscle (thyreohyoideus muscle), palate larynx muscle (palatolaryngeus muscle) and the stylopharyngeus muscle (lifts and expands the pharyngeal space).

[55] cf. Waldeyer, A./ Mayet, A.., (Anatomie 2), p. 144.
[56] cf. Husler, F. / Rodd-Marling, Y., (Singen), p. 40 f and Waldeyer, A. / Mayet, A., (Anatomie 2), p. 142
[57] cf. Husler, F. / Rodd-Marling, Y., (Singen), p. 41.
[58] cf. ibid., p. 43.

Furthermore the “countersinks” that pull the larynx down: the pair of sternum thyroid cartilage muscle (sternothyreohyoideus muscle), the cricopharyngeus muscle (anchors the cricoid cartilage so that the thyroid cartilage can move freely on the cricoid cartilage); the trachea (pulls the larynx down) and the gullet (pulls backwards and down).
The elastic framework of the larynx is one of the most important organic connections between the head voice and the chest voice. Vocal gifted singers are to be characterised by “columnar throats” that comply to a distinctive “hook in musculature” (elastic framework).[59]
The spaces above the vocal folds (gullet, mouth room) are indicated as “connecting tube”. Thereby the formation of this room is not as important for the quality of the voice as the perimeter of the hook in mechanism. Therefore the main focus is on the conversion of the vocal organ.[60]

3.1.3. Fascial structure of the neck

The connective tissue of the throat builds firm membranes that serve as guiding tubes for muscles or as cover for organs and so it permits the ability to slide for the ample moves of the bowels (swallowing, talking, choking, etc.)

You distinguish between three cervical fascias:

Superficial lamina of cervical fascia: (fascia colli superficialis): lies beneath the skin and the platysma and enwraps the whole throat as coherent bandage, caudal it begins at the lower jaw. It envelopes the two sternocleidomastoideus muscles and the two trapezius muscles.

Pretracheal lamina of cervical fascia: (fascia colli media): goes from the hyoid bone to the inner surface of the collarbones and to the sternum.

Prevertebral lamina of cervical fascia: (fascia colli profunda): continues prior to the spine and the prevertebral muscles, covers the scalenus muscles and the levator muscle and passes dorsal into the superficial fascias.[61]

I am aware of the fact that the throat, the respiratory organ and the vocal organ are influenced a lot by the muscles of the thorax, the back, the throat and the head. But describing this here would extravagate this thesis.

3.2. The respiratory organ from an anatomic and a functional point of view

Of course respiratory muscles and auxiliary respiratory muscles are counted among the physiological necessities for phonation. An illustration of the respiratory organ

[59] cf. Husler, F. / Rodd-Marling, Y., (Singen), p. 46 ff.
[60] cf. ibid., p. 50 f.
[61] cf. Waldeyer, A. / Mayet, A., (Anatomie 2), p.163.

follows in this paper just insofar as it is relevant for the description of the techniques used at this study.

3.2.1. The lungs

The lung is a paired organ and it is shaped like a cone that rests upon the diaphragm. The apex of lung rises through the upper thorax aperture into the region of the throat.[62]

The lungs (pulmones) lie in the chest cavity and are connected with each other by means of the lung shaft. The lung consists of several lobes of lung. Those lobes of lung add up to an anatomic and physiologic unity. The main bronchus passes into two lobar bronchi for the left lung and three lobar bronchi for the right one. Segment bronchi emanate from the lobar bronchi, which again split up into terminal bronchioles.[63]

The basis of the lung rests on the diaphragm with its diaphragmatic fascia. The apex of lung goes ventral from two to three centimetres above the clavicle dorsal to the upper frame of the first rib. The inferior part of lung reaches the upper renal pole while inhaling. The costodiaphragmatic recess reaches until behind the upper third of the kidney.[64]

The left lung consists of two lobes of lung whereby the dividing line between the two lobes is called oblique fissure of left lung. It goes from the fourth costovertebral joint to the sixth condrosternal joint. The right lung consists of three lobes whereby these lobes are divided by two fissures: the oblique fissure of right lung which goes from the third costovertebral joint posterior forward to the sixth rib, and the horizontal fissure of right lung that goes from the fourth rib backwards to the third condrosternal joint.[65]

Every lung lies in a pleural cavity. This pleural cavity is coated with parietal pleura. The lung is put into pleura sack. The Space between those two pleura sacks is called mediastinum.[66] There are important connections reaching from the cupula of pleura to the spine and its joints.

In this context it is important to mention three ligaments as they have been influenced during my osteopathic treatment:

- Ligamentum transverso-pleurale: this goes from the transverse process from C7 to the lateral part of the suprapleural membrane.
- Ligamentum costo-pleurale: this goes from the throat of the first rib to the upper part of the suprapleural membrane.
- Ligamentum vertebro-pleurale: this goes from the prevertebral aponeurosis from C6, C7 and Th1 to the inner part of the suprapleural membrane.[67]

[62] cf. Waldeyer, A. / Mayet, A., (Anatomie 2), p. 561.
[63] cf. Ligner, B., (Thorax/Lunge), p. 21.
[64] cf. Waldeyer, A. / Mayet, A., (Anatomie 2), p.562 ff.
[65] cf. Ligner, B., (Thorax/Lunge), p. 21.
[66] cf. Waldeyer, A. / Mayet, A., (Anatomie 2), p. 555 ff.
[67] cf. Ligner, B., (Throax/Lunge), p. 5.

Zangenfeind distinguishes between external and internal respiration. The external respiration includes the gas exchange that takes place inside the lungs where oxygen rich air is absorbed. Here the oxygen is emitted to the blood by air vesicles. Carbon dioxide, which is released by the blood, effuses while exhaling. At the internal respiration the blood carries the oxygen to cells, that need it for their metabolism, and receives the waste product carbon dioxide from the tissues. The respiratory movement expands the lung tissue and lets it sink down. For this three-dimensional expansion the respiratory muscles and the auxiliary respiratory muscles are necessary. The main respiratory muscle is the diaphragm.[68]

3.2.2. The pericardium

The heart sac (pericardium) is a fibrous sack nerved by the big vessels of the heart. The pericardium is anchored by means of firm ligaments at the diaphragm, at the anterior and posterior thoracic wall and at the region of the throat. As those fixations are ligaments they can be treated and influenced osteopathically (and to some extent I have treated them in regard of this study.)[69]

Those ligaments are:

- Ligamentum phrenico-pericardiaca: is linked to the tendinous centre
- Ligamentum sterno-pericardiaca: the sternopericardiac ligament superior goes from the manubrium of sternum to the anterior superior side of the pericardium, the sternopericardiac ligament inferior: goes from the top of the xiphoid process to the anterior inferior side of the pericardium.
- Ligamentum vertebro-pericardiaca: goes from vertebral bodies from C7, Th1, Th2 and Th3 to the left side of the pericardium
- Ligamentum cervico-pericardiaca: is a prolongation of the visceral fascia of the throat
- Ligamentum viscero-pericardiaca: connects the pericardium with the esophagus, the bifurcation of trachea and the pulmonary veins [70]

[68] cf. Höller-Zangenfeind, M., (Stimme), p. 30.
[69] cf. Ligner, B., (Thorax/Lunge), p. 25.
[70] cf. ibid., p. 25.

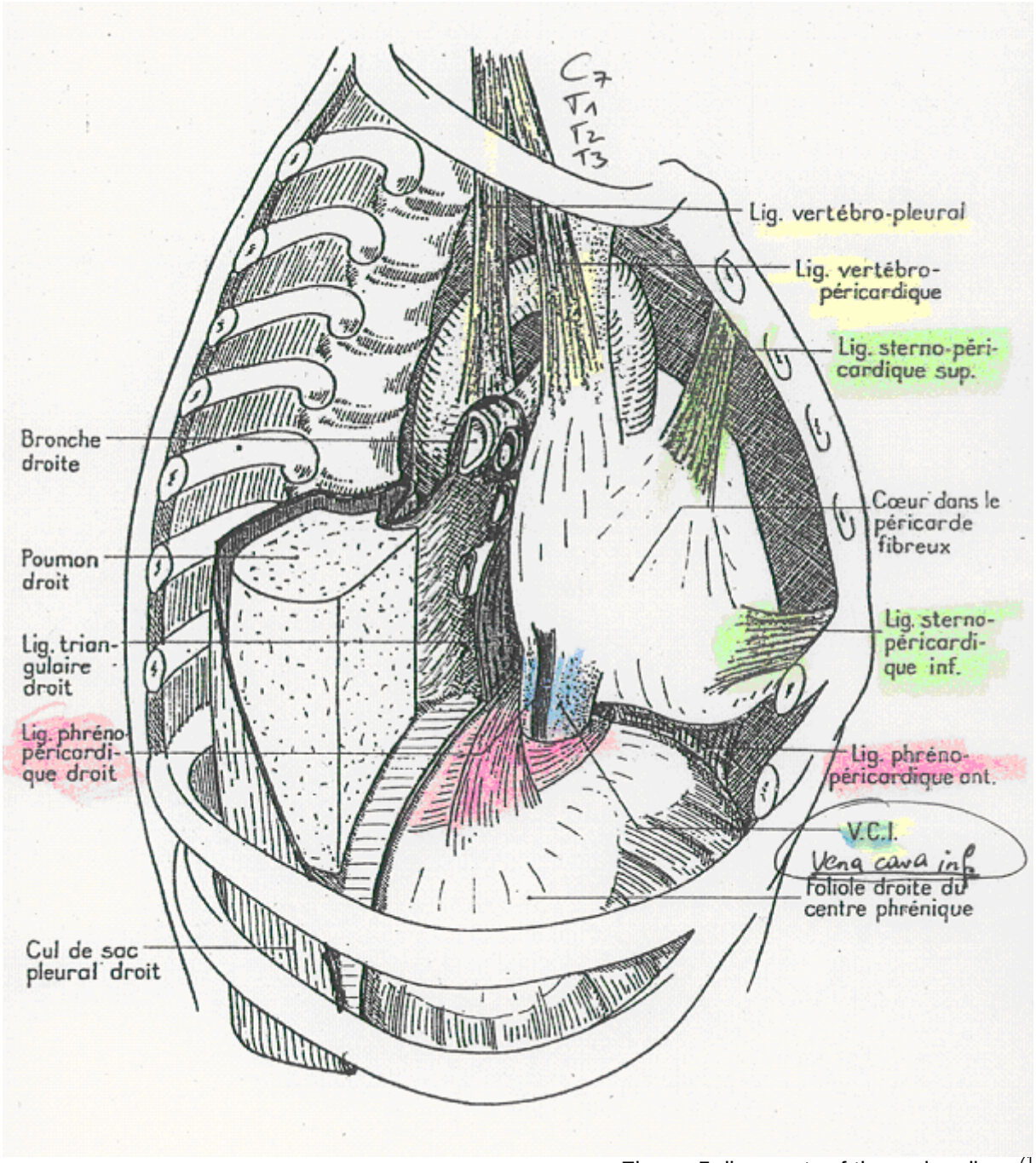

Figure 5- ligaments of the pericardium [71]

[71] cf. Ligner, B., (Thorax/ Lunge), s.p.

3.2.3. The diaphragm

The midriff (diaphragm) is the main respiratory muscle.[72] It performs about 20.000 moves a day and in doing so incorporates lung and ventral organs every time.[73]

During inspiration (inhalation) a flattening of the vault of diaphragm takes place, however the tedinous centre stays in place. When inspiration is more forceful the peripheral muscular parts of the midriff lift from the lateral chest wall by means of contraction. Thus the costodiaphragmatic recess dilates and the lung moves into it. Moreover the tedinous centre moves a little bit downwards. Consequently out of its move the diaphragm changes the volume of the chest and of the abdominal cavity. The midriff is a muscular dome-shaped partition wall and emanates from the lower chest aperture at the lumbar spine, from the ribs and the sternum. According to these parts you distinguish between a lumbar part, a costal part and a sternal part.[74]

Worth mentioning are the apertures in the diaphragm for the aorta (aortic hiatus), an aperture for the vena cava and an aperture for the gullet (esophageal hiatus). Through the aperture last mentioned is not only passing the gullet but also the anterior and posterior vagal trunk (they contain fibres of the left and right vagus nerve).[75]

The midriff is associated with lots of structures of the musculoskeletal system. It has got connections to the lumbar spine, the six lower ribs, the xiphoid process of the sternum and because of myofascial connections to the lower extremities, the psoas muscle and the quadratus lumborum muscle.[76]

3.2.4. The auxiliary respiratory muscles

The function of the auxiliary respiratory muscle during still inhalation is still contended but they do in fact act while laboured inspiration.[77] As a sung tone accomplishes only under laboured inspiration, the auxiliary respiratory muscles are described in the following text.

This includes the sternocleidomastoideus muscle (the “head turner”). At one-sided action of this muscle the face is turned to the opposite side and the chin is lifted. At mutual actionthe occiput is drawn to caudal and the chin is lifted. But if head and throat are fixed it supports the inhalation by lifting the chest in collaboration with the rest of the throat and neck muscles.[78]

In the same way the saclenus group is counted among the auxiliary respiratory muscles. Here you distinguish between the scalenus anterior, medius and posterior muscle. (It is also important to mention the rear and the front scalenus gap which lie between the muscles, as in the rear scalenus gap the subclavian artery and the

[72] cf. Waldeyer, A. / Mayet, A., (Anatomie 1), p. 198.
[73] cf. Barall, (Barall-1), p. 3.
[74] cf. Waldeyer, A. / Mayet, A., (Anatomie 1), p. 198.
[75] cf. ibid., p. 201.
[76] cf. Greenman, p. 27.
[77] cf. Waldeyer, A. / Mayet, A., (Anatomie 2), p. 82.
[78] cf. ibid., p. 77.

brachial plexus cross and in the front one the sublavian vein crosses). The effect of the scalenus group is very multifunctional. They lift the ribs but they also can bend the cervical spine if the ribs are fixed. When the cervical spine is fixed and there is strained inspiration they work as auxiliary respiratory muscles.[79]

Also mentionable are the intercostal muscles that belong to the muscles of the chest. They also act like respiratory muscles whereby the external intercostal muscles and the intercartilaginei muscles lift the ribs and so extend the chest – consequently they are inspirators. (The internal intercostal muscles and the transversus thoracis muscle lower the ribs and consequently they are exspirators.)[80]

3.3. Respiration from an anatomic and a functional point of view

"Überall auf dem ganzen Erdball umgibt uns Luft. Vom Anfang bis zum Ende unseres Lebens, vom ersten bis zum letzten Tage nehmen wir Luft ein. Ohne dieselbe können wir nicht leben. Speise und Trank nehmen wir nur einige Male täglich zu uns, aber Luft atmen wir ungefähr 15-20 Mal in der Minute, also etwa 1.200 Mal in einer Stunde."[81]
["Everywhere, on the whole world there is air. From the beginning until the end of our life, from the first to the last day we breath. Without the same we could not life. Food and drink we ingest only a few times a day but we breath about 15-20 times in and out in one minute, that means 1.200 times a day."]

Respiration is the only function of the metabolism that works permanently autonomously, but can also be controlled deliberately. From this it follows that we can use our respiration actively to support our health. Respiration is also a mirror for our soul because it shows our base emotions.[82]

The inhalation (inspiration) is an active process which is induced by the diaphragm and the external intercostal muscles. The midriff lowers its cupolas – thereby the intrathoracic volume enlarges. Furthermore an enhancement of the chest accrues because of the uplift of the sternum and the costal arches and the erecting of the thoracic spine. As there is negative pressure in the pleural cavity the lungs follow the moves of the thorax. From this a lung volume enlargement results that leads to a negative pressure in the lung so that air streams in.

At increased inspiration the auxiliary respiratory muscles come into effect. The infrahyoid muscles and the sternocleidomastoideus muscle lift the chest provided that the head and cervical spine are fixed by means of extensors.

The shoulder girdle is lifted by the rhomboideus muscle, levator scapulae and the trapezius muscle and so relieves the thorax of his exspiratorical burden. The extensors of the thoracic spine support inspiration because the uplift of the ribs is connected to the strechting.[83]

[79] cf. Waldeyer, A. / Mayet, A., (Anatomie 2), p. 81 ff.
[80] cf. ibid., p. 545 ff.
[81] cf. Platen, M., (Platen), p. 68
[82] cf. Ehrmann, W., (Atemtherapie), p. 11
[83] cf. Waldeyer, A. / Mayet, A., (Anatomie 2), p. 551

The event of expiration accrues because of the elastic reset forces of the ribs, the lung and the mediastinum. This process is passive.

Requirement for an efficient respiration is an elastic thorax with a surrounding tissue free of tension.[84]

3.4. The Tone

A tone begins in the larynx because of the fast swinging of the vocal cords. This swinging are lead by the expiration air and the muscle tone. Those vibrations are forwarded by bones – the surrounding body space resonates. When the body space resonates, triggered by fine vibrations, you talk about a resonating cavity – so the tone develops into a sound.[85]

The own voice is mainly transported by means of bones, that is why you hear yourself mainly from within. Foreign voices are brought to our eardrum trough the air by sound waves.[86] Resonating cavities that are set in swinging during phonation are internal body spaces. Respiration movement and resonance vibration can be located in the same body region.[87]

Not trained healthy voices show a vocal range of about two octaves. Trained singers reach three to four and a half octaves.[88]

High tones

For high tones the freedom of the head sound is determining and therewith the passage from the throat to the back of the head since it is the largest bulge of a bone in the head and enables a sonority. The rear pharynx space and the oral cavity take part in the production of warm tones. They influence singing and speaking voice.

The head can be divided in a middle level – this consists of the upper jaw, the upper alignment, the zygomatic bones, the temples and the hard palate. This middle level is associated with a bright, broad, light and open sound quality. An “inner smile” would help to make this middle level sound because this widens the cavity of the head. If that happens the lower jaw can participate less, stay loose, so that a fingerbreadth distance occurs between the upper and lower alignment at the vowels “e” and “i”.

Furthermore there is the nasal sound space which consists of the nasal bone and the frontal bone. The soft palate is lifted at the same time. This sound is mainly used in spiritual music and in French language. If all facial bones sound you call it “mask”. It has a dazzling effect and is carried outwards far.

You have reached your highest tone when the skullcap, the frontal bone, the hard palpate and the whole upper head space is brought into resonance vibration. When

[84] cf. Osteopathie bei PatientInnen mit funktioneller Dysphonie, p. 37
[85] cf. Höller-Zangenfeind, M., (Stimme), p. 74
[86] cf. ibid., p. 75
[87] cf. ibid., p. 77
[88] cf. Kittel, G., (Phoniatrie), p. 21 f.

the skullcap swings the acoustic noise spreads over the ceiling, the dome and the windows.[89]

Deep tones

The shoulder girdle, the costal arches, the spine and the pelvic bone – the big bones of the body – create space for deep tones and audible physicalness. These bones form the big visceral cavity. The front is apperceived more than the side walls or the back side so the bones at the back are rarely used for sound. Therefore it is useful to train loosening exercises for the back and the flanks as preparation for a deep sound space. When the trunk sounds this leads to an acoustical rather horizontal dispersion. The sound waves are lead by the air and can touch a dialog partner. This might be the secret of an appealing voice.[90]

Breaking tones

It often happens to untrained singers that there is a break when they change from chest resonance to head resonance. You hear a shifting in the gorge. In singing those breaks are called “register breaks”.[91]
A voice register is a row of sequent tones that are built after a similar physiological principal. The chest (plain-) register develops because of the swinging of the vocal cords in their full width with vibration perceptions in the chest area. In the head register with the perceived vibrations in the head area (head voice) the vocal cords just swing in the area near the verge – that is why it is often called “verge register”.

It is not sure whether a middle register (transition register) is existing or not.[92] It is also called mixed register (mixed voice). This register contains the speaking voice in which sounds of the head resonance and the chest resonance are mixed up. Anatomical this is the region from the upper chest up to the nasal cavity. When you sing in middle voice the whole breadth of the vocal is cords is utilised.[93]

The middle voice of women amounts 196-262 Hz, the middle voice of men amounts 98-131 Hz. Literature quotes extreme values in the singing voice going from 43 up to 3200 Hz.[94]

The volume of the voice is dictated by the subglottic pressure. While normally speaking there is a volume of about 70-80 db. Recorded peak values lies 110-120 db. A dynamic latitude of about 27 db is the normal range for a qualified adult voice.[95]

The maximum phonation time of the tone is determined by the vital capacity, the phonation volume and the average flow velocity and the phonatoric efficiency factor. On average the length of the tone held amounts to 22.5 sec with women and 30.3 sec with men. Singers achieve a considerably higher value. [96]

[89] cf. Kittel, G., (Phonaitrie), p. 87 ff.
[90] cf. Höller-Zangenfeind, M., (Stimme), p. 88f.
[91] cf. ibid., p. 90
[92] cf. Kittel, G., (Phonaitrie), p. 22
[93] cf. Höller-Zangenfeind, M., (Stimme), p. 90
[94] cf. Kittel, G., (Phonaitrie), p. 21
[95] cf. ibid., p. 22
[96] cf. Kittel, G., (Phonaitrie), p. 21.

3.5. Influence on the human voice

A major factor for the influence on the human voice is respiration. You can train breathing actively and improve it. As the osteopathic concept is compared partly to the respiratory therapeutic concept in this thesis it is worth mentioning that respiratory therapy, which consists of an active and a passive part, can advance the ability to breath "well". Further information concerning this under point 4 – respiratory therapeutic concept.[97]

There are many different opinions about the "right breathing" – for example abdominal breathing is good – high breath is bad and to breath slowly is better than to breath fast, you also should breath in deeply and breath out forcefully and so on. But it would be best to forget all those advices. What we know today about the event of breathing is that it is individual for every person and that it is influenced a lot by every feeling.
It starts with the fact that the respiration changes if you perform a task and that it varies if this task bores or fulfils. Therefore you cannot decide whether the happening is "right" or "wrong" or sort it in "drawers".[98]

As it are the affects (emotions like laughter, sob, yawn and so an) which are "conveyed" by the diaphragm to the vocalisation organ, singer stimulate their vocalisation organ with artificially created affects (which do not exactly align with what should be displayed).[99]

"Die Leistung für einen langen Ausatem – sei es für einen Ton oder für eine Melodie, muss mit der Skelettmuskulatur bewältigt werden. Die Muskeln gehorchen dem Willen. Sie nehmen seinen Befehl, mehr zu leisten oder loszulassen entgegen und setzten ihn um. Diese Leistung wirkt indirekt auf einen langen Ton und direkt auf einen beschleunigten Einatemreflex".[100]

["The attainment for long exhalation – be it for a tone or a melody, has to be coped by the skeletal muscles. Muscles obey the will. They receive its orders to accomplish more or to release and they implement it. This attainment affects a long tone indirectly and the accelerated inhalation reflex directly."]

Working on the respiration – independent from the concrete form affects on:

- the body, in the sense of an ideal muscle tonus, an improved propulsion, an ideal posture

- the soul as the patient learns do distinguish between external and own powers, to improve his/her ability to form relationships by admission, adapting

[97] cf. p. 31 of this paper
[98] cf. Höller-Zangenfeind, M., (Stimme), p. 29 and Middendorf, I., (Atemtherapie), p. 2
[99] cf. Husler, F. / Rodd-Marling, Y., (Singen), p. 55.
[100] cf. ibid., p. 43.

and resisting (even if the result is that the wish arises to be just someone different)

- the sound: improvement in sound concerning the length of the tone, the strength of the tone, optimisation of the inhaling reflex, support for high tones, the breathing and a freer interpretation.[101]

This thesis proves that an osteopathic treatment has an influence on the human voice – consequently also on respiration. All structures that are responsible for a well-functioning respiration and a good voice, are the anatomic structures cited under point 3.1. [102]

4. Influence of the respiratory therapeutic concept on the human voice

„Sind wir ein Spiel von jedem Druck der Luft?“[103]

Goethe

Already in the womb the respiratory technique is developed systematically. Concerning the outer form of the breast these developing processes take place during the second foetal month.

As breath accompanies all people throughout their whole life, is it then not important to optimise it? Respiratory therapy is one way of making us aware of our breath.[104]

Speaking in an uneconomic way often causes vegetative dysfunctions. Deficiency in concentration, nerviness, lassitude and sometimes even dysfunctions of the circulatory regulations may be the consequences.[105] Speaking in an economic way, however, is characterised by a vocal efficiency without a waste of power, as well as by an optimum supply and usage of breath, which shows how much working on one’s breath influences the human voice. [106]

4.1. Definition of the respiratory therapeutic concept according to Middendorf

As the respiratory therapeutic concept is a very extensive one it goes far beyond influencing biological breath or improving people’s voices. It is a holistic concept that is based on the theory of Ilse Middendorf concerning an experiencable breath and the work with the consciously admitted breath. This theory describes a so called somatic therapy – method where physical and mental well-being is raised by means of practising simple motion sequences as well as by means of a conscious percipience of the respiratory movements. It is not predominantly a matter of

[101] cf. Höller-Zangenfeind, M., (Stimme), p. 72.
[102] cf. p. 19 of this paper.
[103] cf. Schmitt, J., (Atemheilkunst), Einführung.
[104] cf. ibid., p.11.
[105] cf. Coblenzer, H./ Muhar, F., (Atem und Stimme), p. 20.
[106] cf. ibid., p.11.

improving physiological breathing, although this is often achieved by such a treatment- it is more a matter of apperceiving one's unconscious respiration and thus permit it.
Nevertheless the knowledge of the physiologic-anatomic background of respiration is a necessary prerequisite for every respiratory therapist.[107]
Aim of the respiratory therapy is a 'eutonic state', which is characterised by the following features: a good muscle tone, an optimum joint flexibility, the permeability of the body for the respiratory movements, a well-balanced mental alertness.[108]

4.2. The mode of action of the respiratory therapeutic concept

The respiratory therapist attends to and supports the patient – a permanent exchange between patient and therapist happens. It is very important not to convey an 'ideal of breathing to the patient but that the therapy is borne by what the patient 'reveals'.[109]

The respiratory therapy is based on the following basic principles:

- Only the patient is able to judge how harmonious a certain movement feels for him at that moment- ergo there are no 'right' or 'wrong' movements.
- The patient builds up an inner attentiveness, by which even minimal physical, emotional and mental processes are noticed.
- It is aimed at eutonic movements- movements which are performed in adequate myotonus.
- A fundamental feeling of being stabilized, held and borne is conveyed.
- Respiration is not manipulated or forced. The respiratory movement happens, is being admitted and apperceived.[110]

For achieving the objectives of a consciously admitted respiration according to Middendorf [111] the following techniques are used:

4.2.1. Stretching and pressure

By stretching specific groups of muscles or whole body regions during the inhalation and exhalation phase breath is being animated and deepened.
On working with pressure points the correlation of pressure points and respiratory movements is being used in certain body spaces in order to influence respiration.[112]

[107] cf. Fischer, K., Kemann- Huber E., (bewusster Atem), p. 9 f.
[108] cf. ibid., p.12.
[109] cf. ibid., p.19.
[110] cf. Fischer, K., Kemann- Huber E., (bewusster Atem), p. 57 ff.
[111] on the operating principles based on Middendorf cf. Fischer, K., Kemann- Huber E., (bewusster Atem), p. 105 ff.
[112] cf. Fischer, K., Kemann- Huber E., (bewusster Atem), p.105 ff.

4.2.2. Motion sequences applied

By means of consciously, i.e. deliberately applied motion sequences breath is being animated and made obvious and consequently the individual respiratory rhythm can be experienced. A distinction is made between smooth motion sequences where the movement rhythm is being dictated by work and where breath keeps its own rhythm and smooth motion sequences where the rhythm of the outer movements is dictated by the respiratory rhythm. Stretching motion sequences serve the spatial sensation and the formation of respiratory scopes, and rhythmic motion sequences help to make somebody aware of their exhalation movement and to strengthen it.[113]

4.2.3. Movement from respiration

Form, quality, mode and intensity of the movement arises from breath whereby the consciously admitted respiratory movement activates the inner movement.[114]

4.2.4. Work on breath related tension phenomena

Work on breath related tension phenomena is about experiencing inhalation- as well as exhalation – tension. It is based on an interaction of contraction and expansion, of directedness and softness as a bodily equivalence of mental energies.[115]

4.2.5. Vowel space work and work on consonants

The work on vowels builds respiratory space in a specific way. Each vowel corresponds to a certain respiratory space with its own characteristic experiential and sensational qualities. With the help of consonants it is possible to release the diaphragm and work on the inner mobility. Consonants have the character of strokes, centerings, impulsions, conjunctions and loosenings in the entirety of the body walls. By means of both works the impulsive quality of breath as well as the compression and centering is being experienced.[116]

4.2.6. Work on vocal expression

The physical preconditions for the development of the creative potential of the voice are being laid. Vowel space work and consonant work are being extended by a work on breath, tone, tone tension and resonance. Hereby sensations, feelings and thoughts are expressed just as possibilities and potentials available. [117]

[113] cf. Fischer, K., Kemann- Huber E., (bewusster Atem), p. 114 ff.
[114] cf ibid., p. 122 ff.
[115] cf. Fischer, K., Kemann- Huber E., (bewusster Atem), p. 130.
[116] cf. ibid., p. 136 ff.
[117] cf. ibid., p. 140 ff.

4.2.7. Tinting from breath

By tinting the patient produces whatever breath releases at that moment.[118]

4.3. Respiratory massage according to Schmitt

Schmitt[119] distinguishes between the following techniques of the respiratory art of healing:

4.3.1. Passive treatment: Respiratory massage

During back treatment the movability of the complete thoracic vertebral column is tested and the intermediate vertebra as well as the vertebral joints are being loosed by means of flexible pressure from the bottom up.

Schmitt describes the existence of muscular indurations, muscle hardenings and myogelotic changes of the musculature. He states that myogelosis and their earlier stages can be localised in a regular way at the insertion area of muscles.[120] These myogelotic changes are released by different massage techniques. There is also an influence on the different reflex zones of gall and liver and via the headgen zones on the lungs and the diaphragm.

The pelvis treatment is the treatment of the area of the bellies, origins and insertions of the long back extensor between chest and pelvis, the cross and transverse abdominal muscle groups and in the insertion area of the gluteal muscles.[121]

During the shoulder treatment the therapist massages the origins of the rhomboid and scapula muscles, as well as the lower scapula angle. There is an intersection with the maximal points of the heart reflex zone here. Also the serratus lateral muscle.

During the treatment of the anterior trunk both chest muscles are being massaged, the diaphragm tone is being altered by compression and the abdominal muscles are being treated. The pelvic floor is stretched in supine position and the “flanks” in a lateral position.

The neck treatment conduces to the loosening and in – depth massage of the trapezius muscle. The therapist follows the tensions up to the upper vertebra of the neck. By means of this technique a stretching of the whole tissue via the distension of the cervical spine originating at the back of the head is achieved.[122]

[118] cf. Fischer, K., Kemann- Huber E., (bewusster Atem), p. 148 ff.
[119] cf. Schmitt, J., (Atemheilkunst), p. 462 ff.
[120] cf. Ibid., p. 462 ff.
[121] cf. ibid., p. 473 ff.
[122] cf. Schmitt, J., (Atemheilkunst), p.499ff.

4.3.2. Active treatment

The active respiratory gymnastics is the counterpart of the passive respiratory massage- consisting of yoga exercises where breath is considered the central device for the advancement of concentration, immersion and the development of mental and spiritual abilities.[123]

Several different side treatments concerning alimentation, climate treatment, acupuncture etc. complement the treatments mentioned above.

4.4. Respiratory therapy/Respiratory treatment- what is that?

Because I treated several singers and all of them reported about a clear improvement of their voices, Dr. Lisa Malin[124] gave me the idea to document these realisations by means of a study. It was in her interest to have a comparison group, which should be treated by means of respiratory therapy, too. Malin wanted to treat them herself. Because I did not know which respiratory therapeutic techniques she was going to use, I decided to ask her about these techniques in an interview.[125]

According to Malin, 2006 the experience and the development of one's own breath are central to the respiratory therapy. Becoming aware of one's own respiratory rhythm offers the opportunity for an encounter with oneself. The respiratory movement (inhalation, possibly respiratory break) can bring into flow again states of tension (such as stress, physical tenseness, exertion resulting from depressing experiences) that are obstructive to the respiratory development.

By body-related stretching, pressure and impulses respiration is strengthened in such a way that body regions and perception areas are re-connected and via experience brought back into the consciousness. Breath is accompanied by the hands and goes into the development of the respiratory spaces. A loosening benefits the muscle tone and aids the straightening. Via a developed respiratory force we experience breath substance, which makes a body-mind connection transparent.

Wherever the muscular plating/blockade in the front and back area of the lungs obstructs breathing in and out- and thus the respiratory movements- purging and cleansing cannot happen sufficiently. If a long lasting blockade is released – e.g. by means of releasing and activating the area of the intercostal musculature- the purging process starts increasingly and thus mucus formation increases in the same way. By means of actively accompanying breath with the hands, i.e. of the respiratory movement into the respiratory spaces and therefore also into the flanks, all of the parts of the lungs (including vacuoles and vesicles where oxygen is replaced by blood) develop greater activity.

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[123] cf. Schmitt, J., (Atemheilkunst), p.511 f.

[124] Dr. Malin is a trained respiratory therapist und teaches breath- and body-training at the University of Music, Vienna as well as music therapy and formation of new energetic models and methods at the Gamed- Academy for integrative medicine.

[125] A detailed rendition of the interview is to be found in the appendix of this paper, cf. p. 88f.

Respiratory treatment was chosen for the study because it is suitable better for comparing it to the osteopathic treatment than active respiratory techniques, although respiratory treatment structurally differs from the osteopathic treatment. Respiratory therapy enables us to at best see the actual state of the respiratory volume, the respiratory rhythm, the bodily penetrability and how the respiratory movement streams through the body, i.e. which parts of the body are connected. Not only the actual state becomes evident, but also the mutability, which is not enforced from the outside but shows how the body can admit the next step due to a process of understanding and allowing.

The hands of the therapist may accompany, assist and sometimes demand but they shall not ask too much of the patient. The whole process must be accompanied by a conscious observation of and feeling for breath and body.
Drifting away into a dream world is inappropriate here.

By concentrating on this breath-body process- to let loose and integrate something new- the tension desired for singing can be reduced temporarily. This means that an active transition must be created or enough time must be allowed that the new things become integrated and connected and thus the tension desired is established again.

During the lessons there are active exercises, which means that students never reach a state of such a deep relaxation as they do when being (respiratory) treated. Thus during everyday exercises small steps are admitted again and again. A senior student told me that, whenever she had a singing lesson after the respiratory training, she did not have to warm up- only on one occasion, when a deep relaxation was necessary, she had to work on the relaxation of the back so that the respiratory movement could stream through a greater part of the spinal column. This means she had to dissipate an 'everyday tension' in order to reach an active permeability. In this case the student needed several hours to build up the tension necessary for the day.

Middendorf and Richter[126] let, according to their work (active exercising), begin with unhearable tones and then start with phonation that is not enforced, especially not concerning the volume, but created from the inside. Escribano, who starts with a childlike slurring with a loosed tongue and then adds the voice, takes in articulation later on. As the experience and the consciousness of the breath are being trained, we include the person. The body has to be connected to the person, which means to the personality and one's own character. When respiratory resources/ respiratory spaces, permeability etc. are active, more active qualities are available to this person.

During the respiratory treatment body and respiratory event are worked on for 40 minutes. Afterwards there is a rest of five minutes. Generally spoken after about 30 minutes a new development in the patient shows, which means there are still 10 minutes left for an active integration and then there is the five – minutes rest in which one should feel again what happened/changed.[127]

[126] cf. Richter, H., (Atemwelten), p.9ff.
[127] cf. Interview with Dr. Lisa Malin in the appendix of this paper (p. 88 f).

4.5. Respiratory treatment for the study 'singing'

Malin (2006) describes the process of the respiratory therapeutic treatments she conducted for the study as follows:

During the treatment the test persons are lying either in prone or in supine position- whereby they may decide themselves on the chronological order. The therapist tests the quality of the breath. The respiratory work begins wherever there is strength in the body and where breath flows at best. From there the therapist proceeds to other parts - always staying connected to the patient's breath.

Mostly the hands of the therapist accompany the breath through many parts of the body- he/she feels how attendant the patient is in his/her body and thereby connected to his/her own breath – and how the different parts of the body are being flowed through by breath.

Then the therapist concentrates more on the blockades, if they are ready for being released yet. At releasing the blockades stretching, pressure and movement of e.g. arms, legs and head are used. Thereby breath can develop, a true breathing in becomes possible – 'a way is opened up', or a releasing and calm breathing out appears. Breath can also arise in form of a developed prolongated expiration and a reflectory inspiration. The aim of the respiratory work is, however, not to release blockades but the development of tension, easiness, space, dedication, flow of energy etc.

5. Comparison: osteopathic concept – respiratory therapeutic concept

Basically a philosophical aspect which puts the unity of body, spirit and soul and their interaction in the centre of consideration underlies both concepts.

The philosophy of respiration therapy is illustrated by the following quotes:
"Atmend erleben wir uns unmittelbar als Körper-Geist-Einheit. Ich atme also bin ich – diese Gewissheit liegt unserem Leben zugrunde und trägt es. Was zuerst gelehrt werden muss, ist der Atem – so spricht Kung-fu-tse."[128]
["breathing we directly experience ourselves as unit of body and spirit. I breathe, therefore I am – this certainness underlies our live and carries it. What has to be taught first is breathing – so Kung-fu-tse says."]

"Wir lassen unseren Atem kommen, wir lassen ihn gehen und warten, bis er von selbst wiederkommt. Eine willentlich eingesetzte Atembewegung hat jedoch nicht die hohe Qualität wie jene, die von selbst aus Körper/ Seele/ Geist als Ganzem quillt."[129]
["We let our breath come, we let it go and wait, until it comes back on its own. However, a deliberately inserted respiration movement has not such a high quality as the breath movement that swells of its own accord out of body/ soul/ spirit."]

[128] cf. Ehrmann, W., (Atemtherapie), p. 22.
[129] cf. Middendorf, I., (Atemlehre), p. 19.

The concept of osteopathy described by Still:
"…No man or woman can tell you what it means more than to say that it is a system of engineering the whole machinery of life harmoniously by keeping open all the communications with the brain and overcoming all stoppages of blood from the heart, and other fluids. Sensation, motion and nutrition must all work at once, no minus or plus can exist in health, any more than four can go into three twice. With all parts in their normal condition, health is yours."[130]
"Der menschliche Organismus trägt in sich das Potential der Gesundheit. Wer dieses Potential erkennt und unterstützt kann Krankheiten verhindern und heilen."[131]
["The human organism contains in itself the potential of health. Whoever realises and supports this potential can prevent and cure diseases."]

Both respiratory therapy and osteopathy work according to the "holistic" rudiment by bringing the person into a condition in which he or she can command resources better and self healing mechanisms are activated. However, osteopathy, different from respiration therapy, pursues a direct or indirect "problem solution" by diagnosing a problem osteopathically after the anamnesis and the examination. This problem is treated either directly or indirectly by influencing the original structure.[132] If the body is affected by blockades and the motionlessness, disturbance of density and structure or consistence involved, it can lead to mechanical or physiological disorders. The correction of those disorders is the aim of the osteopathic treatment in terms of the principle "life is movement"[133].

Problem solution in the proper meaning of the word is not the target of respiration therapy (but often the initial point). The direct aim is the "experience of the conscious breathing" and the consequent holistic improvement. On the basis of this experiences the choice of techniques and the progress of therapy is decided.[134]

In osteopathy respiration and voice are highly rated but are not the centre of attention.

In respiration therapy it is assumed that the respiration movement is transmitted all over the whole body. That means that this respiration movement is actually noticeable.[135] This concept resembles the universal osteopathic concept of respiration and circulation. Every organ is influenced by breathing since every cell depends on the supply with oxygen, glucose and other substances that are necessary for their metabolism.[136]

The respiratory therapeutic concept, referred to the respiratory massage, has a regulated procedure of treatment always according to the same schema. The techniques used here are nearly identical to many other structural osteopathic techniques. An example therefore is the concrete treatment of myogelosis and the influence by means of trigger points and dermatomes.

[130] cf. Still, A., (Still), p. 57.
[131] cf. Still in Liem, T. / Tsolodimos, C., (Osteopathie), p. 60.
[132] cf. Liem, T., Tsolodimos, C., (Osteopathie), p. 69 and Greenman, P., (Greenman), p. 24.
[133] cf. Ligner, B., (Thorax/Lunge), p. 1.
[134] cf. Fischer, K., Kemann-Huber, E., (bewusster Atem), p. 9 ff.
[135] cf. Höller-Zangenfeind, M., (Stimme), p. 29.
[136] cf. Greenman, p. 26.

In osteopathic treatment there is no schema that is the same at every care and there are no global requirements, which techniques or which combinations of techniques should be used at which disorders.[137] Aim of the osteopathic treatment is the search for the main lesion and its treatment. At this the osteopath can use the techniques described in this thesis under point 1.2. et seq. That means it is possible that a patient is treated in one session only cranio-sacrale, in another primary visceral and structural – a treatment with the technique which has the most efficient consequence at this moment. The detection of the appropriate technique is subjected to the experience of the osteopath.[138]

Of course, the respiratory massage according to Schmitt is only a section of respiration therapy – as well as structural osteopathy is also just a partition of an osteopathic treatment. All active treatment techniques – named "breathing gymnastics" by Schmitt[139] – can not be compared to an osteopathic treatment as it is a purely passive treatment technique. This fact does not mean that those exercises cannot be recommended.

6. Methodology of the 'Study singing'

While talking about the development of the 'study singing' we- that means Prof. Claudia Visca, Dr. Lisa Malin and I- came to the realization that a number of 40 test persons would be realistic for this study (because of the temporal investment for the students).

Number of test persons planned: 40, actual number: 14, 13 tested, one case of illness.

The fact that in the end only 14 test persons were tested developed from the remarkable temporal investment the students had to make and from the circumstance that being looked over by the 'critical eye' of a singing professor and two observers during the test poses a great challenge. And last but not least because of the comparison to colleagues that was inevitable during the study. Nevertheless it is worth mentioning, that the University of Music breeds about 140 students a year, which means that around 10% of the students of one year participated in the study.

To conduct the study the students were divided into two groups. These groups were my group 'Hempel' and the group 'Dr. Malin'. The voices of both groups were tested in the beginning by recording them by means of an audio engineering programme. For control purposes the tests of both groups were repeated on another day. Afterwards the group 'Hempel' was treated osteopathically by myself and then tested a third time. The group 'Malin' was treated in terms of a respiratory treatment and then tested a third time, too.

During all the tests a professor (Prof. Visca) of the University of Music, Vienna acted as an observer. She documented the process as well as the changes.

[137] cf. Liem, T., Tsolodimos, C., (Osteopathie), p. 71.
[138] cf. Barall, Lehrbuch der visceralen Osteopathie, Band 2, p. 1.
[139] cf. Schmitt, J.L., (Atemheilkunst), p. 461.

The results of both groups were compared by means of the records of the audio engineering programme, as well as by means of the documentation by Prof. Visca. Furthermore the students were asked to write their own personal feedback.

It should be displayed that an osteopathic treatment influences the human voice.

6.1. Test persons

The choice of test persons took place according to the following inclusion and exclusion criteria. All singing students of the University of Music, Vienna (about 140 per year)[140] served as the main unit.

6.1.1. Selection criteria of the test persons

Inclusion criteria for the test persons were the following:

- All test persons are singing students of the University of Music, Vienna who have been studying voice since three years minimum.
- All test persons are between 20-30 years old.
- Both, male and female students are being tested.

The following exclusion criteria were applied:

- None of the test persons is under a current medical treatment concerning voice, singing or respiration and under no current osteopathic treatment of any kind.
- None of the students suffers from airways- or phonation diseases.
- Test persons are neither smokers nor do they drink alcohol regularly.
- The test persons do not feel organically ill, neither at the time of the audio-engineering test nor at the time of the osteopathic treatment.
- The test persons do not take medication regularly.

Because of the specially requested inclusion criteria the selection of the test persons happened via a so called ‘nonprobability sampling’- consequently nothing was left to chance.

Students of the University of Music (department of solo singing) of Dr. Lisa Malin were asked if they were interested in taking part in the present study. About 50

[140] cf. http://www3.mdw.ac.at/ (homepage of the University of Music).

students were asked, 14 of which agreed. Because of a health-related dropping out which could not be replaced in the group ‘Hempel’, thirteen were actually tested.

6.2. Testing conditions for the study

In the following I would like to outline in detail the conditions under which the present study came into being. Explaining the practice should lead to the interpretation of the tests.

6.2.1. Variables

Within the scope of the ‘study singing’ some variables were used. The independent variables (independent) describe the object of investigation, which is not influenced further in the course of the study.
The dependent variable (dependent), however, is that factor, that is influenced by the independent variable in terms of the correlation of cause and effect.

Within the scope of the “study singing” the following variables were used.

6.2.1.1. Independent

The independent variable of the ‘study singing’ is, in the group of osteopathy, the osteopathic treatment of the test persons; in the group of respiratory therapy it is the respiratory therapeutic treatment. The osteopathic treatment, which is the basis of this work, is not influenced any further in the course of the study and represents the examined intervention for achieving an influence in terms of the working hypothesis („an osteopathic treatment does have an influence on the human voice“).

After carrying out a thorough osteopathic examination, an exact anamnesis and inspection each test person was treated individually in terms of the osteopathic holistic approach. This means that the situation of a ‘normal’ osteopathic treatment was created instead of specifically treating the same structure (e.g. diaphragm or cervical fascia, to influence the voice) of each and every student.

6.2.1.2. Dependent

The examined dependent variables were gathered on the one hand by means of recording with the aid of an audio engineering programme and on the other hand by means of a written documentation of the singing professor (Prof. Visca) as well as by means of a feedback questionnaire filled in by the test persons.

The following dependent variables were used:

- Singing of an arbitrary note
- Singing a triad on the vowels „i“, „u“ and „a“

- Maximum phonation of a tone
- Written documentation of the music professor
- Written feedback of the students by means of a feedback questionnaire
- Result of the audio engineering programme

6.2.1.3. Comparison group

The independent variable is defined by means of the so called ‘comparison group’. The comparison group is the group that is not influenced by the independent variable and thus demarcates the effect of the independent variable on the influenced dependent variables against ‘coincidences’.
In the ‘study singing’ the comparison group consists of those test persons that were not treated osteopathically but were treated in respect to respiratory techniques before the third test series. So the group ‘Malin’ represents the comparison group of the present study.

6.2.1.4. Reliability and validity of measurements

Reliability and validity of measurements are necessary premises for the significance of a study.

Reliability means the dependability of the measuring process and of the measuring device. The test has to be reproducible and must be consistent under the same or similar testing conditions.

Validity is the measure in which the chosen instrument measures what it should measure. Validity defines the diagnostic significance of a test.

For the ‘study singing’ following dispositions were made to achieve the highest possible reliability:

- Measurements always took place in the same room and on the very spot of this room.

- The same audio engineering programme was always used in the same way at all tests

- A sound engineer, who ensured the functionality of the programme and who recorded all trials in the same way, attended all the tests

- The three test series were identical (arbitrary note, traid, maximum phonation of a tone)- this was controlled by the singing professor who was present at the tests.

The validity of the measurement instrument was ensured by the inspection of a sound engineer.

6.3. Conduct of the tests

Before the treatment all of the 14 test persons underwent the same test twice. This test was repeated in the same way after the osteopathic or the respiratory therapeutic treatment, respectively in order to test the effects of the treatment on the results.

The test execution process was arranged as follows:

- The test person sings any arbitrary note- arbitrary in relation to tone pitch as in relation to the tone itself.

- The test person sings a triad on the vowels ‘i’, ‘u’ and ‘a’ whereby Prof. Visca decided that the pitch of the tone used by the student during the first test has to be used during the second and third test as well in order to guarantee the comparability of the tests.

- Maximum phonation of a tone- the student decides on pitch and volume himself/herself with the aim to hold the tone longest possible. The length of the tone is the only appraisal criterion.

The test was recorded by means of an audio engineering programme in order to draw a graphic comparison between the results. Moreover Frau Prof. Visca attended the tests to ensure their comparability and to document the results from her point of view. After the treatment and the subsequently conducted third test series all of the students wrote their own personal feedback.

6.3.1. Technical documentation

As mentioned above an audio engineering programme was used for the documentation of the tests. In order to make the course of investigations comprehensible a short description of the programme follows:

Recording took place by means of a large-area capacitor microphone. Because of its fidelity of frequency and its high measuring sensitivity this microphone provides a high recording quality. For the remote power supply and the linear processing of the signal a microphone amplifier was used.

Recording happened on the one hand via a DAT recorder and on the other hand, with the aid of a sound card, via a PC. Recording happened digitally by means of a 24 bit/ 96kHz transformation. Two recording media were used in order to guarantee data security by means of such backup facilities.[141]

[141] details on the process sequence cf. the process depiction in the appendix of this paper (p. 88ff).

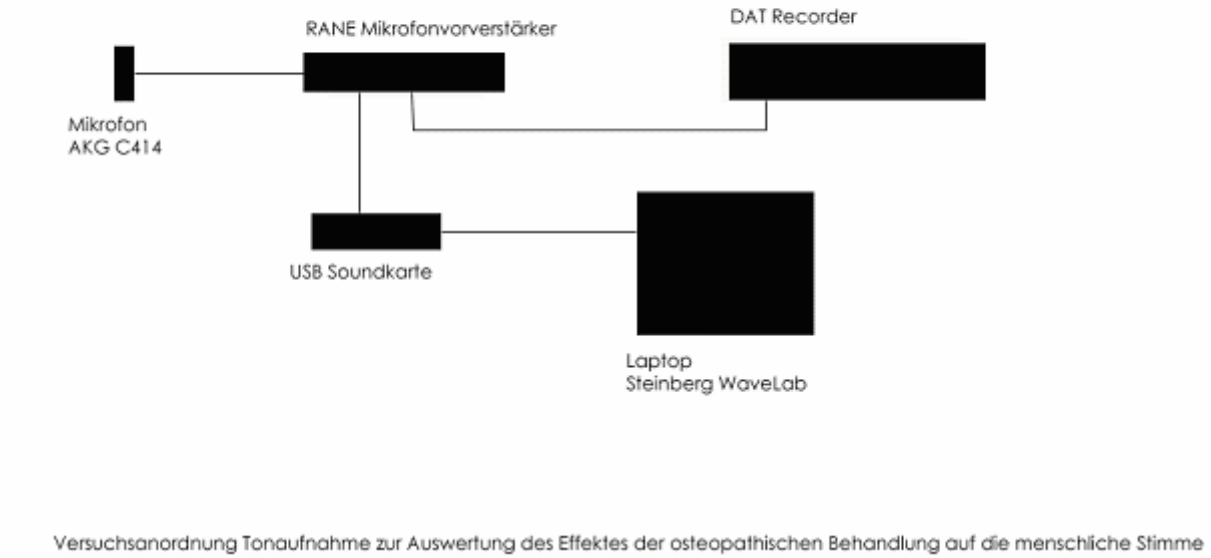

Figure 6- Description of the process of the test set-up for the recording

The recorded wave –form data was 'translated' to graphs with the aid of a frequency-analysis software, which depicts all frequencies rendered. The x-axis shows the frequency range that was sung (measuring unit Hz); the y-axis shows the volume (measuring unit dB). In that way the analysis of the triad that was sung is depicted.[142]

With respect to the graphics I furthermore have to state the following:

The graphics show two curves. The blue curve is a compressed average curve of the tests before the treatment. The red curve shows the results of the third singing test (in each case after the treatment).

[142] cf. exemplary graph in the appendix of this paper. (p.88ff).

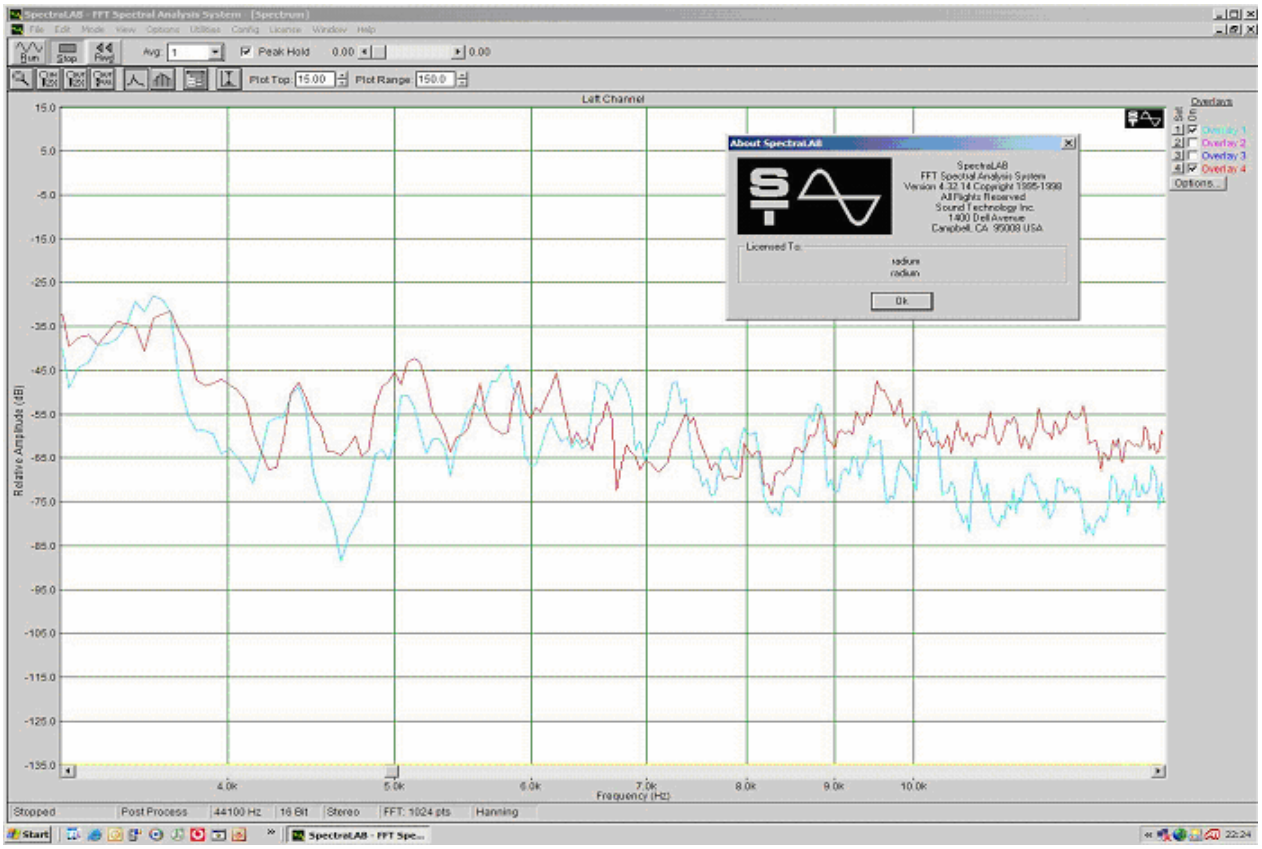

Figure 7- graphic interpretation of the audio engineering programme

Always the first tone of the triad was analysed- particularly in order to depict changes in the voice volume as well as in the purity of voice. In another graph the whole triad was pictured in order to give a complete picture of the test series and to make it comparable- here especially with regard to the voice volume.

- The change of volume of the fundamental tone and the corresponding overtones (e.g. more gauge at a frequency or a rounder curve display a fuller tone- in the range of the fundamental tone as well as in the range of the overtones)

- The sung tone pitch over the 'swing' of the curves in the corresponding frequency ranges

6.3.2. Documentation

6.3.2.1. Documentation Prof. Visca

The documentation of the singing tests was conducted by Prof. Visca.[143] The first and the second test took place before the osteopathic treatment. The third test, however, was conducted after the osteopathic or the respiratory therapeutic

[143] Prof. Visca is vocal professor at the University of Music, Vienna.

treatment, respectively. The documentation done by Prof. Visca took place simultaneously to the recording by the audio engineering programme.

In addition to the test person, Prof. Visca, Dr. Malin, the sound engineer and myself were present at the tests.

Prof. Visca paid special attention to the following aspects:

- Tone pitch
- Does the test person 'hit' the tone
- Sound of the voice
- Volume of the voice
- Psychological state of the test persons

1) A. - female

First test: asymmetric jaw
Second test: silent, nervous, position of the chin, tone slipping
Third test: laughed after treatment, richer voice

2) B. - female

First test: higher note
Second, third test: lower and more relaxed, longer

3) C. - male

First test: sang too low, always the same key, long note too low
Second test: too low
Third test: in the mood for singing „I would like to soing now", trembling, agitation in the voice better

4) D.- female

First test: had to try at first test
Third test: a lot of mucus, sang in a lower voice, vibrato was more regular

5) E. - male

First test: sang always the same tone
Second test: squeaking (too low tension of the vocal cords), cracking of voice, Balance of tension and relaxation not ok, more piano
Third test: arbitrary tone was a third lower, voice was more balanced, sang much softer

6) F. - female

First, second test: closed vowel
Third test: open vowel, a lot of mucus, holds the long tone longer, let the tone fade out

6.3.2.2. Documentation of the osteopathic treatment- Gregor Hempel

The documentation of the osteopathic treatment is depicted in detail in order to show that I did not only specifically treat the respiratory system and the vocal system but carried out my treatment according to the holistic principle of osteopathy.

1) A., female, aged 23

- Problems, disorders

Currently none, problems in the cervical vertebra 5 years ago, 2 days in the hospital for medical check, x-ray: found out that vertebra of the neck and of the chest shifted, saw a physiotherapist for exercises, therapy with an osteopath, everything: NAD, now: neck tension after long walks with a rucksack

- Diseases: no

- Accidents: one fall over the bike; both side bands on both feet overstretched

- Operations: tonsils, polyps

- Preferred pitch of voice:

Mezzo, middle voice

- Profession: Student in the second year, before: 1,5 years singing student in Salzburg

- Sports

Jogging, biking, 4 hours per week

- Sleep

Wakes up at three o'clock

- Energy

Active in the evening

- Digestion

NAD

- Allergien: keine

- Gyn

NAD

- Osteopathic findings:

T 10,11 in flexion; first rib on the right side blocked while inspiration, left and right kidney fixed posteriorly, respiratory pattern generally left more than right, SSB torsion left, good vitality, good quality, good midline, right fibula caudal

- Osteopathic treatment

Structural: Lift T 10,11 ; right fibula thrust to cranial

Cranial
SSB torsion indirectly functionally released; root of the diaphragm relaxed left and right at the level of L2,3;

Visceral: left kidney retrorenal fascia mobilized

2) B., female, aged 21

- Problems, disorders

1 ½ years ago shortness of breath, therapy with Dr. Malin, notices now very sensitively where it is blocked, 1 year without any problems

- Diseases: no

- Accidents: had hip bruise at the right side when aged 17

- Operations: Tonsils, adenoids aged 5

- Preferred pitch of tone:

Within the first octave from a1 to c2;

- Profession: Student in the third year

- Sports

2 years of regular Hatha Yoga, music gymnastics, hiking

- Sleep

Sleeps through all night

- Energy

tired between 14 and 16 o'clock

- Digestion

NAD

- Allergies: none

- Gyn

NAD

- Osteopathic findings:

First right rib in inspiration, T 7/8 in flexion, rotation left; L2/3 in flexion, rotation right, left kidney fixed posteriorly, respiratory pattern costal arch left does not go into inspiration well; SSB: Sb rotation right, good vitality, good quality

- Osteopathic treatment

Structural: Lift T7,8, Lumbarroll L2,3 right; first rib on the right manipulated in prone position; left costal arch in supine position mobilized towards inspiration by means of recoil;

Cranial
SSB functional by dura tension compensation C0/ S1

Visceral: retrorenal Fascia left released

3) C., male, aged 23

- Problems, disorders

Has never been treated, sleeps not well when the bed is in bad condition, has got a funnel chest, exercised a lot between the age of 18 to 20: pectoral and abdominal muscles, thus more stability, has got the feeling that the thorax is less flexible at some days;

- Diseases: had several problems with the right knee joint: CT, small baker's cyst, lots of fluid

- Accidents: metacarpal 1 right, small toe left, both ankle joints lateral ligament

- Operations: Appendix aged 11; 2 wisdom teeth right

- Preferred pitch of tone

Between A before middle C and middle D

- Profession: Student in the fourth year

- Sports

Basketball, tennis (professionally) between the age of 16 and 18, beach volleyball, swimming

- Sleep

Often wakes up, 3-4 times a night

- Energy

Feels sick when he eats too much, apart from that: active in the morning

- Digestion

NAD

- Allergies: grasses, rye grass, animal hair,

- Osteopathic findings:

Right knee-joint fixed in external rotation, sternum very inflexible, caudal less movable than cranial, scoliosis starting from T6 in rotation right; T6 blocked, cardia blocked, thoracic respiration caudal very limited, quality of tissue good, limited vitality

- Osteopathic treatment

Structural: Lift T6,7 ; Recoil sternum cranial and caudal, 11. and 12. rib mobilized on both sides, right knee- joint internal rotation recoil

Cranial
SSB direct decompression, midline built up[144]

Visceral: Cardia to diaphragm recoil

4) P.S., female, aged 29

- Problems, disorders

Physical: no; hardenings in the abdomen at the level of the pylorus, developed the idea of protruding the belly, now works on softening the abdomen, always tries to keep thorax open at the bottom, has never been treated osteopathically, when aged 12 an orthopedist detected that one vertebra is blocked, often feels pain in the iliosacral joint right and left

- Diseases :no

- Accidents: no

- Operations: none

- Preferred pitch of tone

Soprano, likes to sing high, likes to sing difficult old italian music

- Profession: Student in the 6th year

- Sports

A lot of biking, mainly in town

- Sleep

Good, when bed is in good condition

- Energy

Weakness and lack of energy around 4 p.m. when she gets up early; when she gets up late full of energy the whole day

- Digestion

Good, eats everything, does not tolerate sweet pepper

- Allergies: none

- Gyn

PMS

[144] Note by the patient: 'If I was a bottle I'd have more neck and belly now.'

- Osteopathic findings:

Posterior type, T8,9 in flexion; right hip-joint pain during internal rotation, thoracic respiration uncomplaining, abdominal breathing constrained; SSB good in flexion bad in extension, pylorus pressure-sensitive, costa 12 very little flexible on both sides, quality: NAD, reduced vitality

- Osteopathic treatment

Structural: Lift T8,9 leads to a strong emotional reaction[145], has got the feeling that she can breath deeply into the body;

Cranial
Build-up of midline, opening of the lateral ventricles via the liquor system[146] ;
Costal arch right and left, lower thoracic aperture[147]

Visceral: no treatment

5) P.S., male, aged 25

- Problems, disorders

Voice often gets too much pressure, thus becomes tired quickly. Somebody told him that his back muscles are not trained, his ultimate ambition is to sing in the high tessitura, to sing without pressure; while playing the organ the right musculature tenses up and he cannot release the tension;

- Diseases

Suffered from asthma when he was a child until aged 16/17; also had an immunodeficiency as a child, pneumonia three yrs. ago

- Accidents: no

- Operation

Inguinal hernia when he was six weeks old

- Preferred pitch of tone:

Tenor, middle voice – upper middle voice, singing deep seems to be unpleasant;

- Profession: Student in the third year

- Sports

Currently no, before fitness studio

- Sleep

Goes to sleep late, cannot sleep sometimes, maybe has high blood pressure

[145] Note by the patient: „Feels incredibly free“
[146] Note by the osteopath: at building up the Midline SSB goes far into extension, subsequently ventricles open up laterally.
[147] Note by the patient: had the feeling that the ribs open up better.

- Energy

4/5 p.m. very tired, perks up around 6 p.m.

- Digestion

NAD, eats everything, stool 2 - 3 times a day

- Allergies: none

- Osteopathic findings:

T6 bis 11; in flexion blocked on both sides, costal arch badly moves right and left in inspiration, liver is inflexible, left hip-joint less flexible than right one, sternum does not go well caudally during inspiration

- Osteopathic treatment

Structural: Dog T 6,7; Lift T8 to T10; recoil lig. sternopericardiaca inferior, mobilisation of right and left costal arch with recoil towards inspiration; Triggerband erector spinae at level: T4 to T9; trigger point hernie right trapezius in supine position;

Cranial
SSB compression directly released;

Visceral: recoil lig. sternopericardiaca inferior, liver: mobility (recoil), und motility improved; stretching: lig. vertebroplorale

6) F., female aged 23

- Problems, disorders

Currently no, a year ago already treated by Gregor Hempel because of a cicatrice coming from an open abdominal wall (due to an operation when she was a baby),
A year ago she underwent the treatment in order to find out about the cicatrice and also to clarify whether she needs shoe lifts or not.

- Accidents: no

- Operations:

Abdominal wall as a baby, abdominal wall defect with constipation

- Preferred pitch of tone:

Alto/ mezzo

- Profession: Student in the fourth year

- Sports

Swimming, nordic walking, biking, spinal column gymnastics

- Sleep

Sleeps through all night

- Energy

good

- Digestion

Good- minor flatulence, problems after heavy food

- Allergies: none

- Gyn: NAD

- Osteopathic findings:

Both kidneys posteriorly fixed; umbilicus goes left inwards in direction of the cicatrice; first rib on the right stands cranially fixed, both hips do not go well in external rotation right more than left, SSB (Sutura Sphenobasilaris) torsion, right midline loses direction at navel-level; quality very slow, vitality: NAD
thoracic respiration: NAD, caudal abdominal breathing: worse; L1/2 lateral left, L3/4 rotation right

- Osteopathic treatment:

Structural: L1/2 left, lumbarroll, via lateral flexion, L3/4 right, lumbarroll, via rotation, first rib on the right towards caudal anterior in prone position

- Cranial

SSB midline built up, connection to the navel[148]

- Visceral: no

N.Z.: sick

6.3.2.3. Feedback questionnaire

As the test persons were recorded by the audio engineering programme before as well as after the osteopathic treatment, there are objectively measurable results concerning a change of the voice. For me it was especially interesting if the test persons experienced the same changes the audio engineering programme showed, implying also the results of Prof. Visca.

In the following I will literally cite the feedback of the students who were osteopathically treated.

1) A. female

„Ich empfand die Behandlung als sehr angenehm. Während ich bei der Durchführung des ersten Tests relativ nervös war – sei es durch meine zeitlich knappe Ankunft nach einer langen Fahrt von München nach Wien oder was mich beim Test erwarten sollte - , war nach der Behandlung genau das Gegenteil der Fall: Sie hatte einen sehr beruhigenden Einfluss auf mich. Einerseits habe ich mich sehr zentriert und entspannt gefühlt, sodass mich nichts mehr beunruhigen konnte, andererseits hätte

[148] Statement by the test person: 'I am lying more relaxed now.'

ich mich am liebsten schlafen gelegt – ich war also fast zu entspannt, um zu singen. Vielleicht mag das auch daran liegen, dass mein Körper sich ständig in einer Überspannung befindet und nicht gewohnt ist, entspannt zu sein? Für mich selbst würde ich die passive bzw. mechanische Behandlung der Osteopathie anschließend mit einem aktiven Part (z.B. Einsingen oder Übungen für die Aktivität des Körpers, Atmung etc.) verbinden, bevor ich mit dem Singen beginnen würde. Auf alle Fälle halte ich die Osteopathie für eine gute Option, um die Basis für ein funktionierendes Instrument herzustellen."
[I found the treatment very pleasant. While I was relatively nervous during the first test- maybe because of my short arrival after the long journey from Munich to Vienna or because I did not know what would happen- after the treatment just the opposite was the case: it had a very calming influence on me. On the one hand I felt very centred and relaxed like nothing could unsettle me and on the other hand I would have liked to go to sleep immediately- so I was nearly too relaxed to sing. Maybe that is because my body permanently is in a state of surge and is not used to being relaxed? For myself I would combine the passive or mechanic osteopathic treatment with an active part (e.g. warm-up before singing or exercises for the activity of the body and breathing etc.) before singing. However, from my point of view osteopathy is a good option to establish a functioning instrument.]

2) B. female

„Vor eineinhalb Jahren war ich schon einmal in osteopathischer Behandlung gewesen und meine letzte Sitzung lag ungefähr ein Jahr zurück. Ich freute mich daher schon sehr auf den Termin, da kurz zuvor meine alten Spannungen am Rücken und im Speziellen bei drei Wirbeln zurückgekehrt waren. Ich hatte schon die ganze Zeit versucht, meinen Spannungsgefühlen in diesem Bereich durch bestimmte Yogaübungen Abhilfe zu leisten, oder hatte meinen starken Bruder gebeten, mich wieder einzurenken, wusste und merkte aber, dass das nicht ausreichend war.
Ich beschrieb dem Osteopath also meine sensible Stelle und er bestätigte mir die Verspannung in dem Bereich. Auf 2 verschiedene Arten renkte er mir mit lautem Knacksen mein Wirbel wieder ein, was ich wirklich sehr genoss und worauf ich mich schon die ganze Zeit gefreut hatte. Endlich waren die lästigen Spannungen weg. Anschließend legte ich mich hin und er legte seine Hände unter meinen Kopf und die Hüfte. Ich lag einfach nur ruhig da und genoss die Entspannung in meinem Rücken, das spannungsfreihe Liegen und die sanfte pulsierende Wärme in meinem Körper. Mit der Zeit ließ ich immer mehr los, mir fielen immer mehr Stellen auf, die ich noch völlig unnötig unter Spannung hatte und ich entspannte auch diese Bereich. Natürlich stand ich kurz vor dem Einschlafen, als man mich sanft darauf hinwies, dass die Zeit gleich vorbei sei. Zufrieden setzte ich mich auf und bemerkte dabei eine kleine Restspannung in dem vorher behandelten Bereich des oberen Rückens. Noch einmal renkte mich der Osteopath ein und als ich dann aufstand hatte ich ein wohliges Gefühl von Wärme, Schläfrigkeit und Entspannung."
[One and a half years ago I was already under osteopathic treatment and my last sitting took place about a year before the test. Therefore I was looking forward to the treatment as shortly before my old back tensions, especially in the region of three vertebrae, returned. I had already tried all the time to relief these feelings of tension by means of special yoga exercises or asked my strong brother to adjust me but knew and felt that that was not enough. I described my sensitive parts to the osteopath and he attested the tension in this part of my body. In two different ways he adjusted my vertebrae with a loud crack – what I really enjoyed as I was looking

forward to that all the time. Finally these annoying tensions had gone. Afterwards I lied down and he placed his hands under my head and under my hips. I just laid there quietly and enjoyed the relaxation in my back, the tensionless lying as well as the smooth pulsing warmth in my body. Over time I was able to relax more and more, and I noticed that other parts of my body were under unnecessary tension and I relaxed these regions as well. Of course I was just before falling asleep when I was told that time was over. Happily I sat up and noticed a little tension in my upper back that was treated shortly before. Once again the osteopath adjusted me and when I got up I had a warm and fuzzy feeling of sleepiness and relaxation.]

3) C. - male

„Es ist interessant zu sehen, wie man mit kleinen aber gezielten „Eingriffen" große Effekte hervorbringen kann. Ich war die Befindlichkeit meines Körpers gewohnt- im Nachhinein hatte ich das Gefühl, ein wenig körperlos zu ein, etwas nicht mehr tragen zu müssen, was ich vorher unwissentlich mitgeschleppt habe. Wäre ich eine Flasche, so hätte ich nun einen etwas weiteren Hals und ein bauchigeres Erscheinungsbild. Auch die Tips für die Dehnungen, die ich selber durchführen kann, werden mir sehr weiterhelfen. Vielen Dank für die Behandlung. „
[It is interesting to observe which great effects small but specific procedures can have. I was used to feel my body- afterwards I felt a bit disembodied, like I did not have to carry a weight any longer that I was dragging along unconsciously all the time. If I was a bottle I would now have a wider neck and a more bellied appearance. Also the tips I got for further stretching will help me a lot. Many thanks for the treatment.]

4) D. - female

„Die osteopathische Behandlung war toll! Mein Atem vor allem fühlt sich ganz anders an- tief, entspannt, nicht blockiert beim Einatmen sondern schön elastisch kann sich der Brustkorb öffnen."
[The osteopathic treatment was great! My breath feels completely different- deep, relaxed, while breathing in my chest does not feel blocked any longer but can open elastically.]

5) E. male

„In meinem Fall besteht permanent die Gefahr, dass ich meine gesungenen Töne versuche, mit Gewalt zu kontrollieren. Aber auch im Alltag, auch bei anderen Tätigkeiten, neige ich dazu, unnötig viel Kraftaufwand einzusetzen. Das, und vielleicht in nicht geringem Ausmaß auch das Orgelspielen- eine der ungesündesten Körperhaltungen- führten zu Verspannungen und Verkrampfungen im Körper.
Nach den kurzen und ein wenig schmerzvollen Momenten der Behandlung waren meine Blockaden größtenteils gelöst und meine Stimme konnte sich frei entfalten. Auch meine Atemkapazität hatte sich bemerkbar gesteigert."
[I permanently run the risk of trying to control the tones I sing. But also in everyday life I tend to use too much strain. That and maybe also the unhealthy poise while playing the organ led to tensions and cramps in the whole body. But after some short and a little painful moments during the treatment my blockades were largely released and my voice could develop freely. Also my respiratory capacity increased perceivably.]

6) F. female

„Besondere Aufmerksamkeit erhielt meine Narbe am Solarplexus- Bereich (Bauchnabelfehloperation nach der Geburt), bei ihrer „Bearbeitung“ fühlte ich meine Energie im Körper losgehen, eine feines „Zittern“, das überall durchging. Anschließend empfand ich im Liegen eine angenehme Offenheit, Weichheit (bis auf den Schulter- Nackenbereich, den ich immer am hart“näckigsten“ bei mir spüre. Auch meine Zeitwahrnehmung änderte sich irgendwie- ich werde langsamer nach der Behandlung.“
[My cicatrice (after birth) in the region of the solar plexus received special attention, when it was ‘treated’ I felt energy released in the whole body, a slight ‘tremble’ that ran through my body. Afterwards I felt a pleasant openness and softness (apart from the shoulder and neck region which I always feel most tenaciously). Also my perception of time has changed somehow- I become slower after the treatment.]

7. Results

During all my examinations and treatments I have never had in mind the improvement of my patients breathing or of their voice. I only watched out for an osteopathic lesions and treated them. Interestingly the different patients showed the same osteopathically relevant themes. In the following interpretation I will elaborate on the anatomic coherences between the treated region and its impact on the human system.

7.1. Data interpretation

The results obtained by means of the tests were interpreted according to two different aspects.

On the one hand technically, with the aid of an audio engineering programme. A detailed description of this procedure is to be found in chapter 6.3.1. of this paper.[149] Furthermore by means of measuring the length of the maximum phonation time of a tone. These results are depicted by means of graphs and explained in the appendix of this work.

On the other hand the subjective perception of the music professor and the individual feedback of the students were incorporated.

Also the osteopathic diagnosis and conclusion were evaluated.

All those factors lead to the extensive evaluation of the results of each test person which can be found in chapter 7.1. within the data interpretation.[150]

All those results show that an osteopathic treatment influences the human voice, which is shown by the following points:

[149] cf. p. 44 of this paper.
[150] cf. p. 56ff of this paper.

- Increased voice volume (louder voice)
- Purer, softer voice
- Different length of the maximum phonation time of a tone

On average the maximum phonation time of a tone rose from 19,1 seconds to 20,4 seconds in the group of osteopathically treated test persons.[151]

[151] cf. chapter 7.4. of this paper (p.83).

7.2. Data interpretation of the osteopathic group

Graphical representation of the testing results:

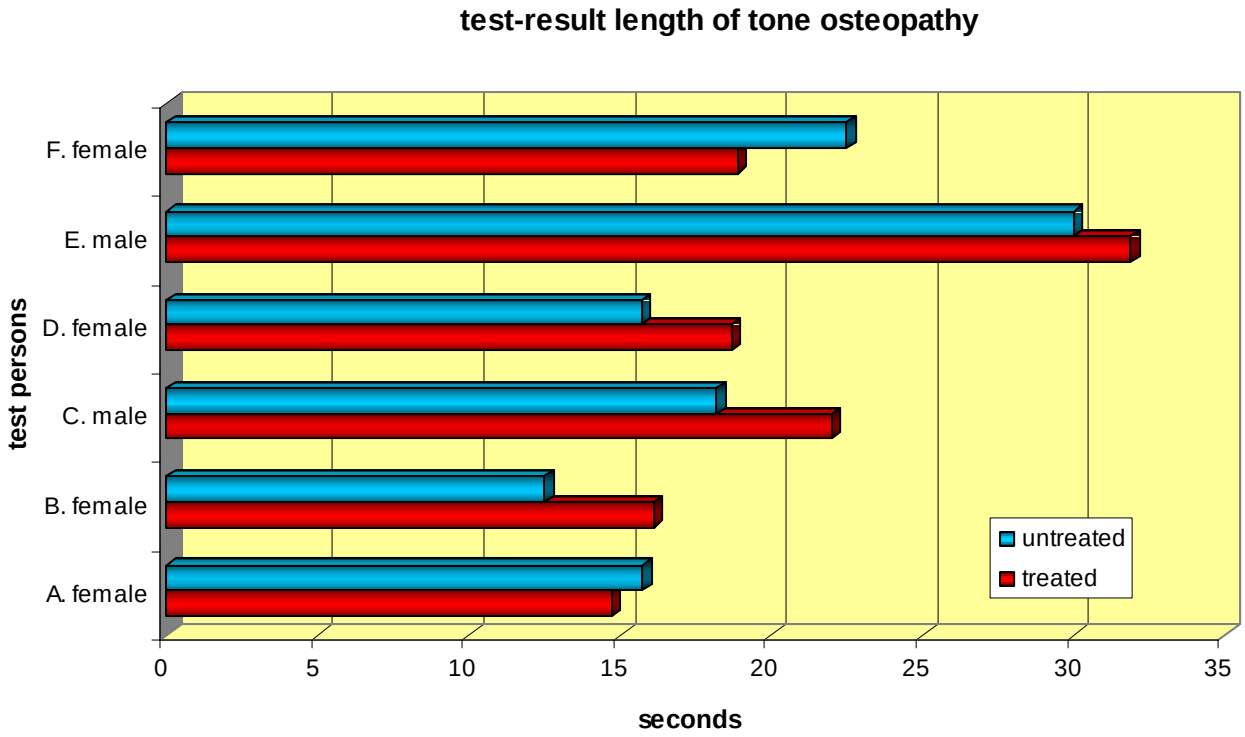

Figure 8- length of tone osteopathy

	1st test-untreated	2nd test-untreated	3rd test-treated	average untreated	Diff. to treated	
A. female	14,8	16,7	14,7	15,8	-1,1	better
B. female	16,6	19,8	22,0	18,2	3,8	better
C. male	21,5	23,5	18,9	22,5	-3,6	worse
D. female	21,6	38,4	31,9	30,0	1,9	better
E. male	11,9	13,1	16,1	12,5	3,6	better
F. female	17,2	14,2	18,7	15,7	3,0	better

Figure 9- data basis length of tone osteopathy in seconds

1. A. female

- **Maximum phonation time of a tone**

Result: before treatment test 1: 14,8 seconds
before treatment test 2: 16,7 seconds
after treatment: 14,7 Sekunden

Generally this patient was able to hold the tone for a relatively short time, even shorter after the treatment, worst result compared to the other test persons.[152]

- **First note in triad**

Until a frequency range of 1.500Hz the note is softer than before the treatment. This is especially striking at a frequency range between 1.000 and 1.500 Hz. From 1.500 to 2.000 Hz the note has got more volume.
Between 300 and 500 Hz and especially from 600 to 800 Hz the note is definitely clearer and thus shows more overtones.

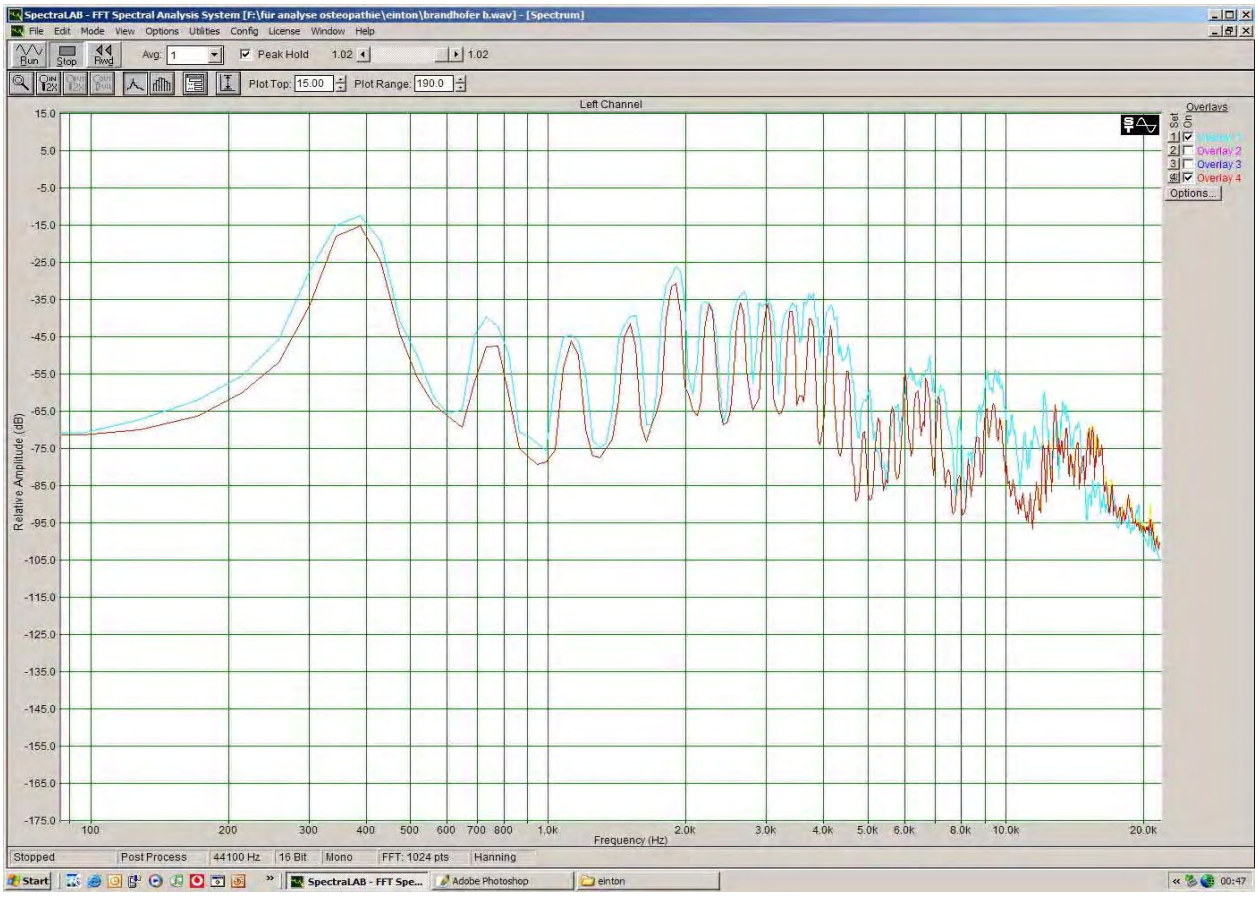

Figure 10 – 1st test person osteopathy - A. female- first tone triad

[152] cf. Figure 8 of this paper (p.58).

- **Test Triad**

After treatment the patient sang with lower voice in deeper pitches of tone but with much higher voice in high pitches of tone (above 1.000Hz). Generally clearer vibrations can be found.

The results correspond to the changes subjectively perceived by Prof. Visca.

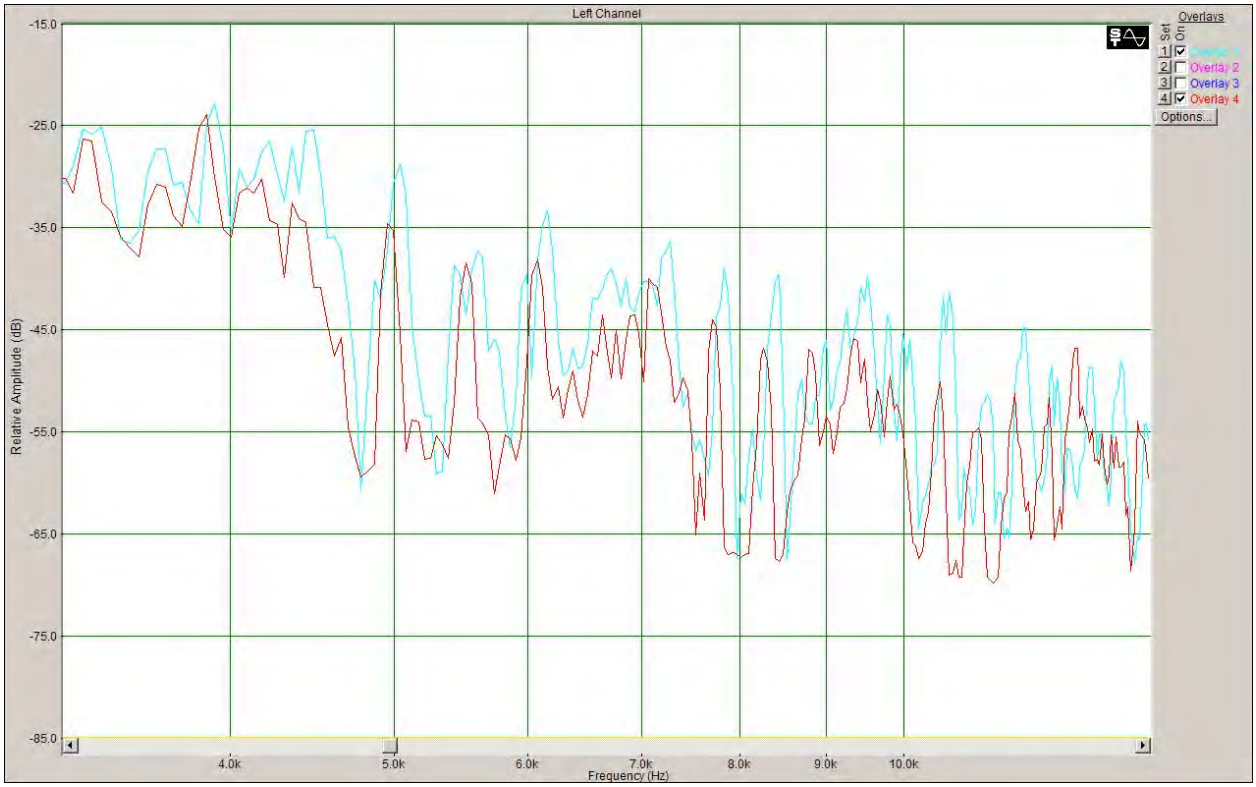

Figure 11 – 1st test person osteopathy- A. female – compressed triad

- **Documentation Prof. Visca**

Especially the relaxation of the patient after the treatment (she was less nervous), as well as a fuller voice and a better mental impression were pointed out.

- **Feedback of student**

Relaxation during and after the treatment, would need some kind of activation after the treatment before she starts singing, tired after treatment.

CONCLUSION:

On the one hand the test person appears to sing better (purer, calmer and partly louder). On the other hand she would need some sort of 'activation' before singing. This would explain the shorter tone after the treatment.

- **Osteopathic coherences, that have influenced the results**

The patient appeared uneasy and gave the impression of being a classic 'liver-type'.
lift T10,11 – Effect on kidneys and peritoneum, as well as stomach and small intestine, important connection of kidneys cranial renal pole and diaphragm

Cranial: diaphragm muscle right and left relaxes at the level of L2,3
SSB torsion released, free circulation of the liquor, thus effect on the emotional system
Visceral: left kidney, retrorenal fascia → direct impact on the diaphragm

2. B. female

- **Maximum phonation time of a tone**

Result: before treatment test 1: 16,6 seconds
before treatment test 2: 19,8 seconds
after treatment: 22,0 seconds

- After treatment there was a significant prolongation of the maximum phonation time of a tone.[153]

- **First tone triad**

The evaluation after the treatment showed volume peaks at 300 Hz and between 400 and 600Hz, which clearly top the measurements before the treatment. A clear tone becomes obvious between 100 and 200 Hz. Between 300 and 500 Hz the curve does not only show a greater volume but also a clearer voice.

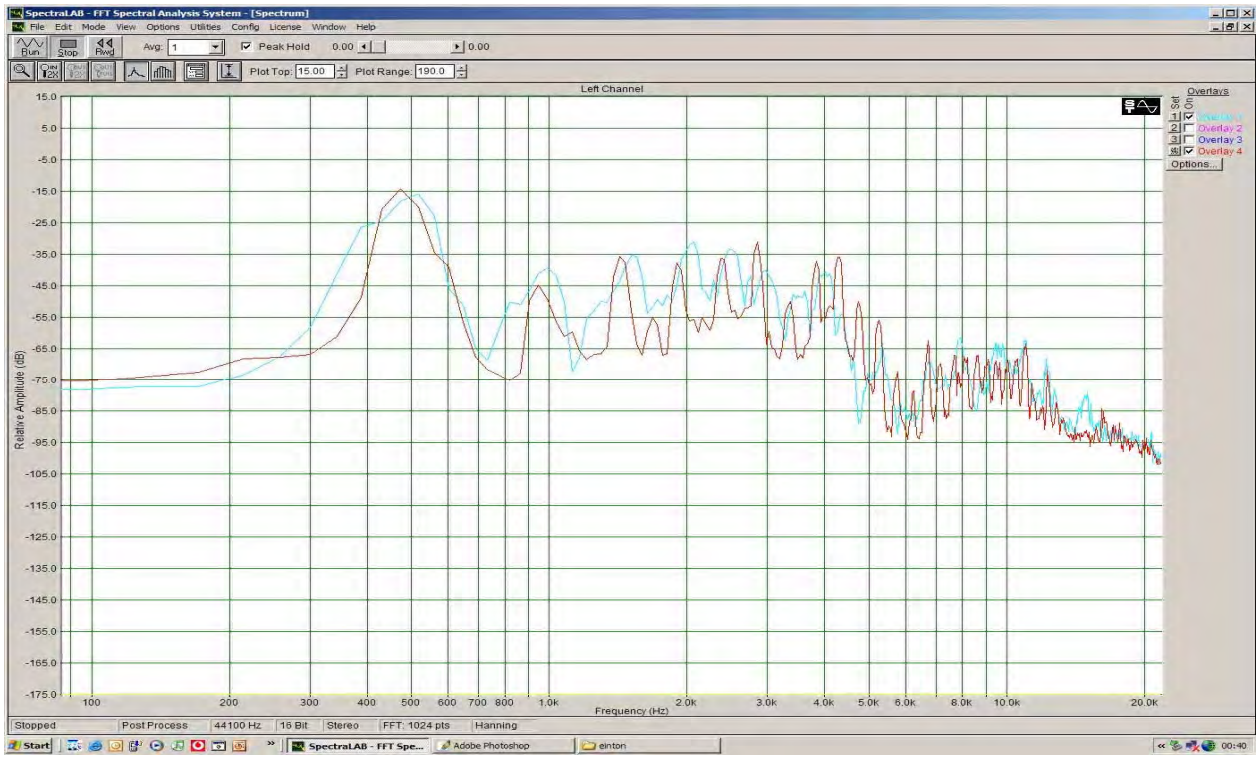

Figure 12- 2nd test person osteopathy- B. female - first tone triad

[153] cf. Figure 8 of this paper (p.58).

- **Test Triad**

The graph shows an elevated voice volume after the treatment, especially at lower pitches. With regard to high frequencies the curve is nearly identical before and after the treatment.

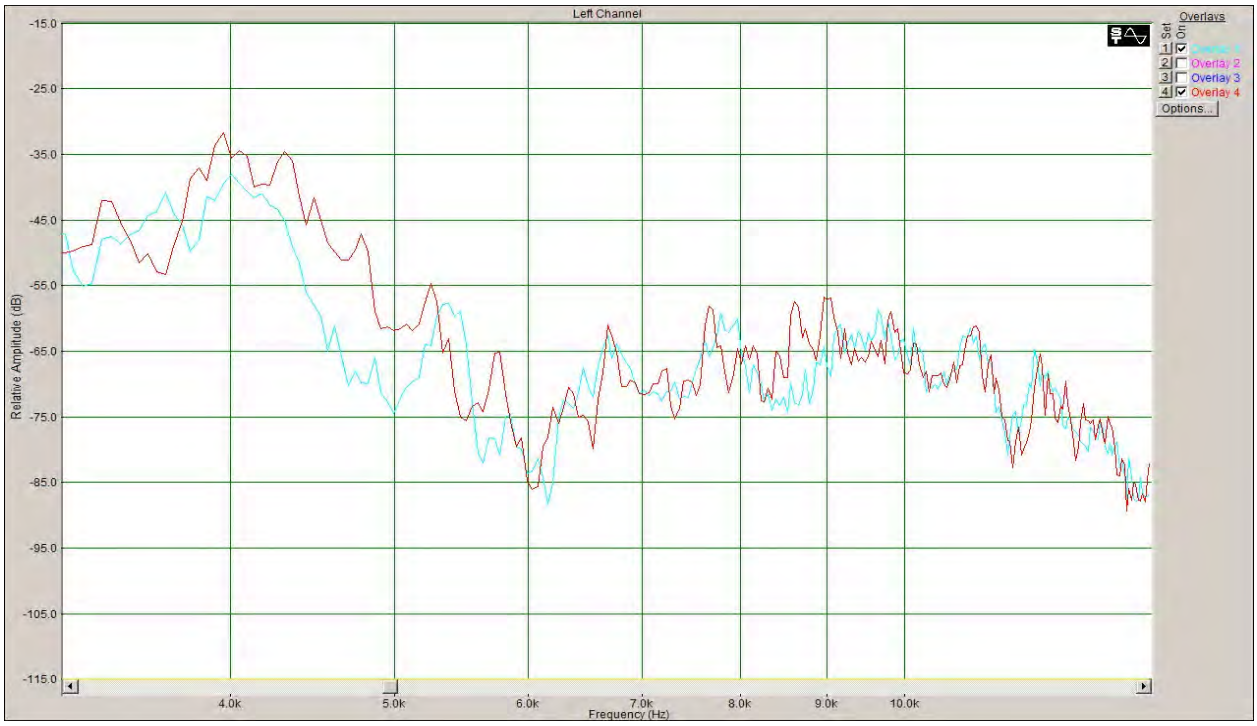

Figure 13- 2nd test person osteopathy- B. female- compressed triad

- **Documentation Prof. Visca**

It was pointed out that the voice sounded deeper and more relaxed and that the tone was held longer.

- **Feedback student**

Relaxation in the back, a general feeling of unwinding and deep relaxation

CONCLUSION:

- The patient is more relaxed after the treatment and the voice appears to have a better volume, especially in deeper ranges. Between 300 and 500 Hz the tone is clearer. The maximum phonation of a tone could be held longer than before the treatment.

- **Osteopathic coherences that have influenced the result**

B. is very alert and knows, because of previous therapies, a lot about her own body.
structural: Lift T7,8: influence on stomach, pancreas, liver, diaphragm, spleen,
Lumbaroll: L2, 3 : influence on the diaphragm root
First rib manipulated, influence via M. Scaleni as auxiliary respiratory muscle on respiration, influence on cervical and brachial plexus,
left costal arch mobilized- leads to a change of the strain in stomach and spleen;
Cranial: SSB funktional via dura tension, balance occiput/sacrum leads to deep relaxation

Visceral: retrorenal fascia released on the left- leads to a better flexibility of kidney and diaphragm.

3. C. male

- **Maximum phonation time of a tone**

Result: before treatment test 1: 21,5 seconds
Before treatment test 2: 23,5 seconds
after treatment: 18,9 seconds

The length of the maximum phonation time of a tone has shortened.[154]

- **First tone triad**

After the treatment the diagram shows remarkably more volume. This is notably striking from 400 to 1.500 Hz and between 1.800 Hz and 2.000 Hz. Referring to purity both diagrams are relatively symmetric.

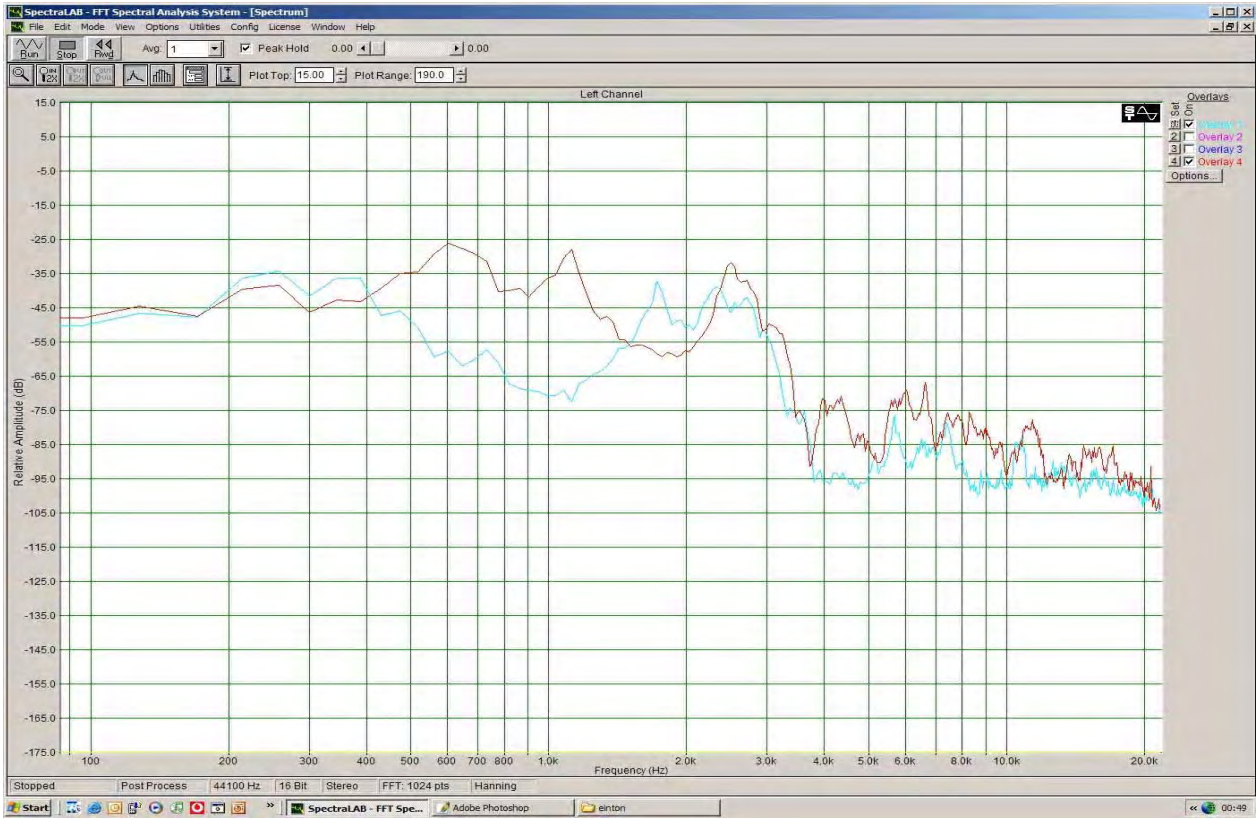

Figure 14- 3rd test person osteopathy- C. male- first tone triad

[154] cf. Figure 8 of this paper (p.58).

- **Test triad**

The graph shows a remarkable improvement of the voice volume in all ranges.

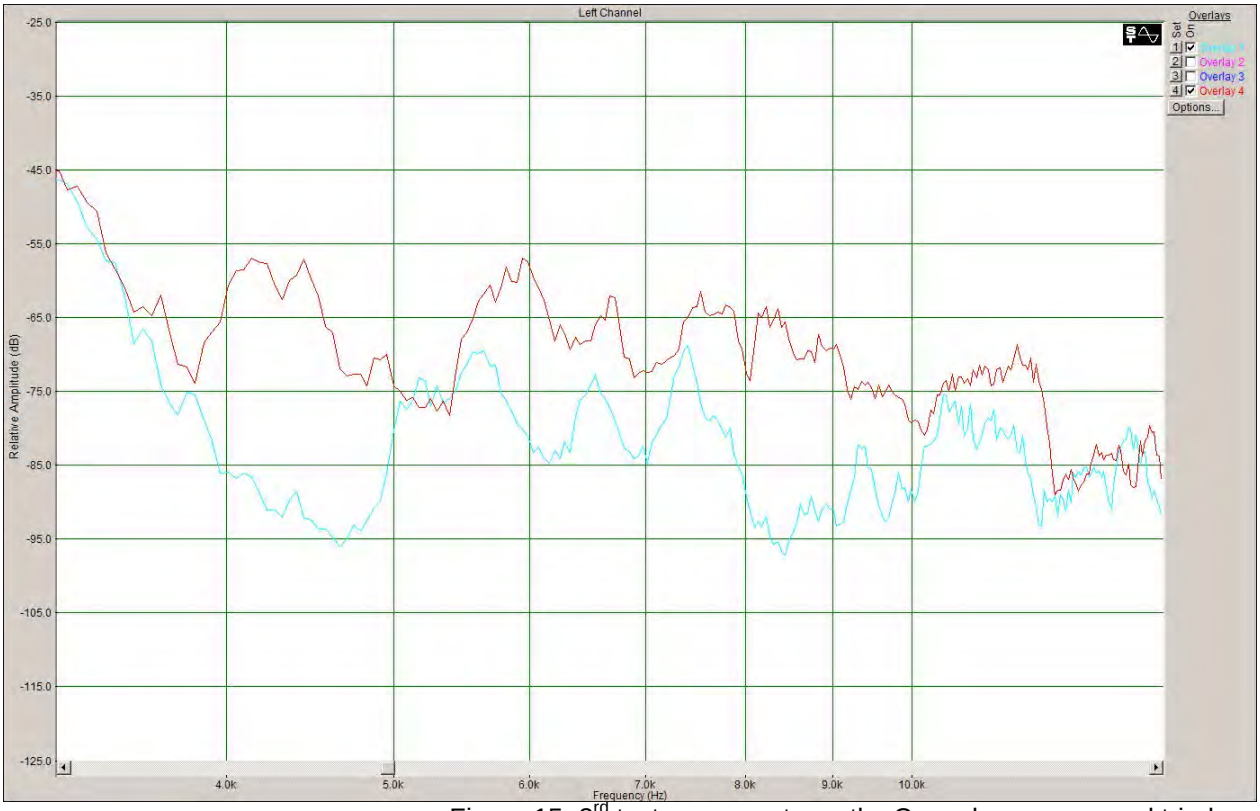

Figure 15- 3rd test person osteopathy C., male- compressed triad

- **Documentation Prof. Visca**

A calmer, less 'fluttering' voice and an increased passion for singing were emphasized.

- **Feedback student**

Relaxation of tensions enables a better flow of energy in the body.

CONCLUSION:

After the treatment there was a massive increase of the voice volume in all frequency ranges.

The patient feels a better flow of energy in his body.[155] All these measurable and documentable improvements did, however, not lead to an extension of the maximum phonation time of a tone - this tone became shorter.

- **Osteopathic coherences that have influenced the results**

Structural:

Lumbaroll T6/7: influence on diaphragm, lungs, stomach, liver and spleen

[155] „If I was a bottle, I had more neck and belly now."

Sternum recoil: influence on Lig. Sternopericadiaca superior and inferior; therewith connection to the pericardium
11th and 12th rib mobilized: leads to a better flexibility of the costal part of the diaphragm.
Cranial: SSB decompression: leads to a better flexibility of the membranes.
Visceral: Cardia recoil: influence on better flexibility of the stomach inlet in order to increase flexibility relative to the diaphragm.

4. D. female

- **Maximum phonation time of a tone**

Result: before treatment test 1: 21,6 seconds
before treatment test 2: 38,4 seconds
after treatment: 31,9 seconds

Although the maximum phonation time of a tone was shorter than during the second test it was, nevertheless, longer than at the first test. On average the result definitely improved (from 30 to 31,9 seconds).[156]

- **First tone triad**

Concerning purity and volume both curves do not show any greater variances. Only between 900 and 1.000 Hz there is a slight increase of volume, but then, between 1.000 and 1.200 Hz a slight decrease.

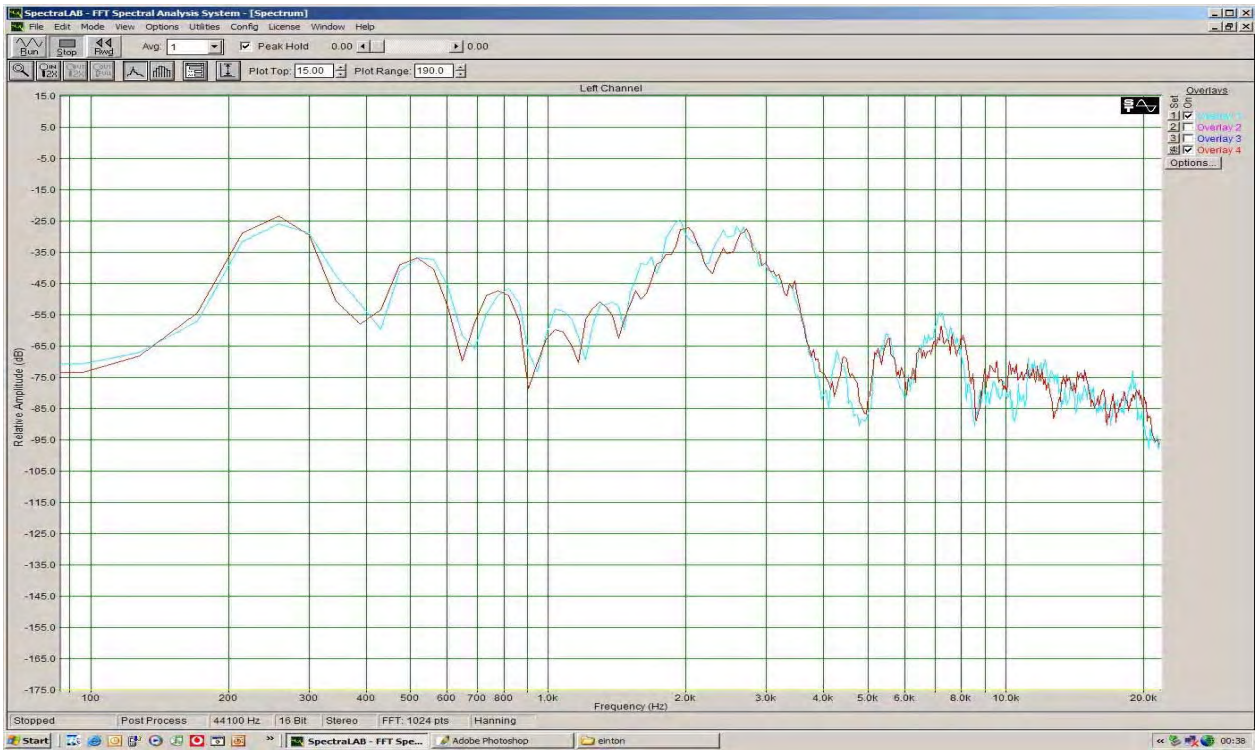

Figure 16- 4th test person osteopathy- D. female- first tone triad

[156] cf. Figure 8 of this paper (p.58).

- **Test Triad**

The curve shows a remarkably louder voice- especially in deeper frequencies- a slight decrease in the middle voice, getting better again in the higher vocal ranges.

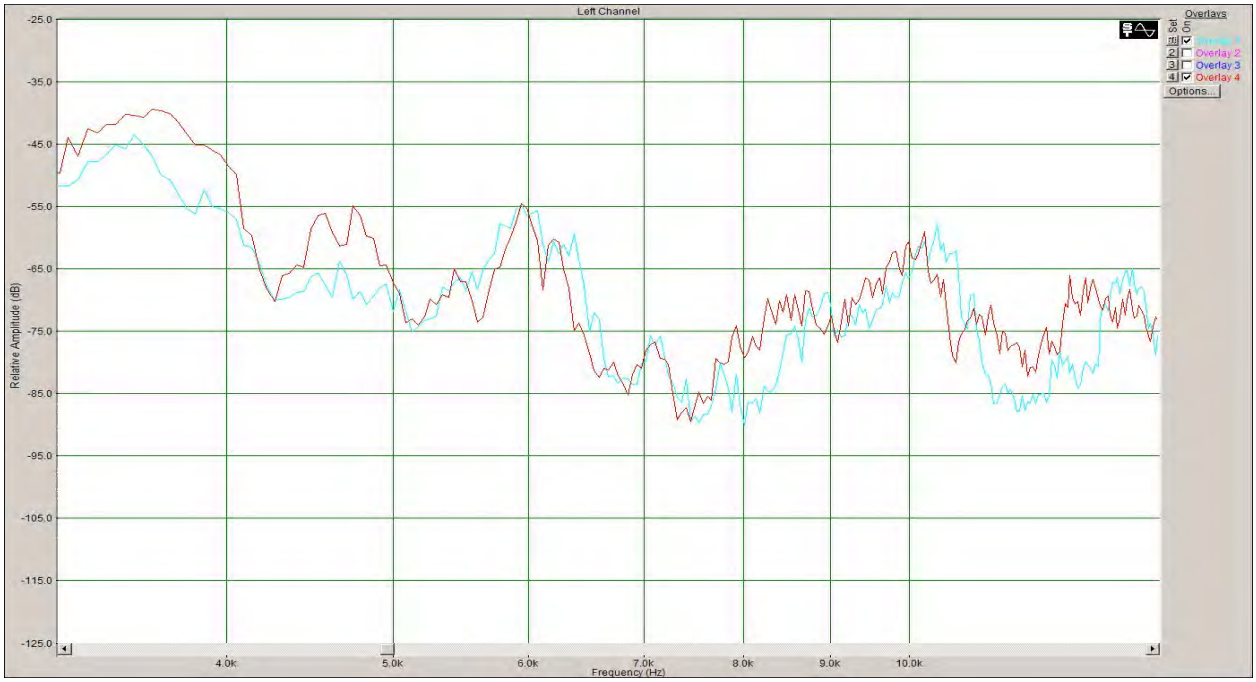

Figure 17- 4 th test person osteopathy- D. female- compressed triad

- **Documentation Prof. Visca**

The more regular vibrato after the treatment was emphasized.

- **Feedback student**

Free, deeper and relaxed breath, elastic chest.

CONCLUSION:

The patient shows a remarkable improvement of the voice, especially in higher and low ranges. This was also noted by Prof. Visca.

The patient reacts emotionally to the manipulation and states that she feels incredibly free and that she has got the feeling that her ribs open up better. Regarding the maximum phonation time of a tone there is also an improvement- tough to a slighter extent.

- **Osteopathic coherences that have influenced the result**

D. is a typical posterior type of posture with a clear fixation at the level of the pylorus.

Structural: T8/9: to influence the diaphragm, lungs stomach, spleen and liver

Cranial: Work via the liquor system, inspiration and expiration of the right and left costal arch and the lower thoracic aperture, in order to ‘open’ more on the one hand and to bring more dynamism into the system on the other hand.

5. E. male

- **Maximum phonation time of a tone**

Result: before treatment test 1: 11,9 seconds
before treatment test 2: 13,1 seconds
after treatment: 16,1 seconds

The patient could hold the tone for a relative short time during test 1 and 2. After the treatment, however, a considerable prolongation of the tone appeared.[157]

- **First triad**

D. starts singing with lower voice after the treatment, which however gets louder faster than before the treatment. The curve shows more volume between 900 and 1.100 Hz, the voice gets lower for a short moment just to get louder from 1500 Hz on. Between 200 Hz and 300 Hz the tone appears to be purer.

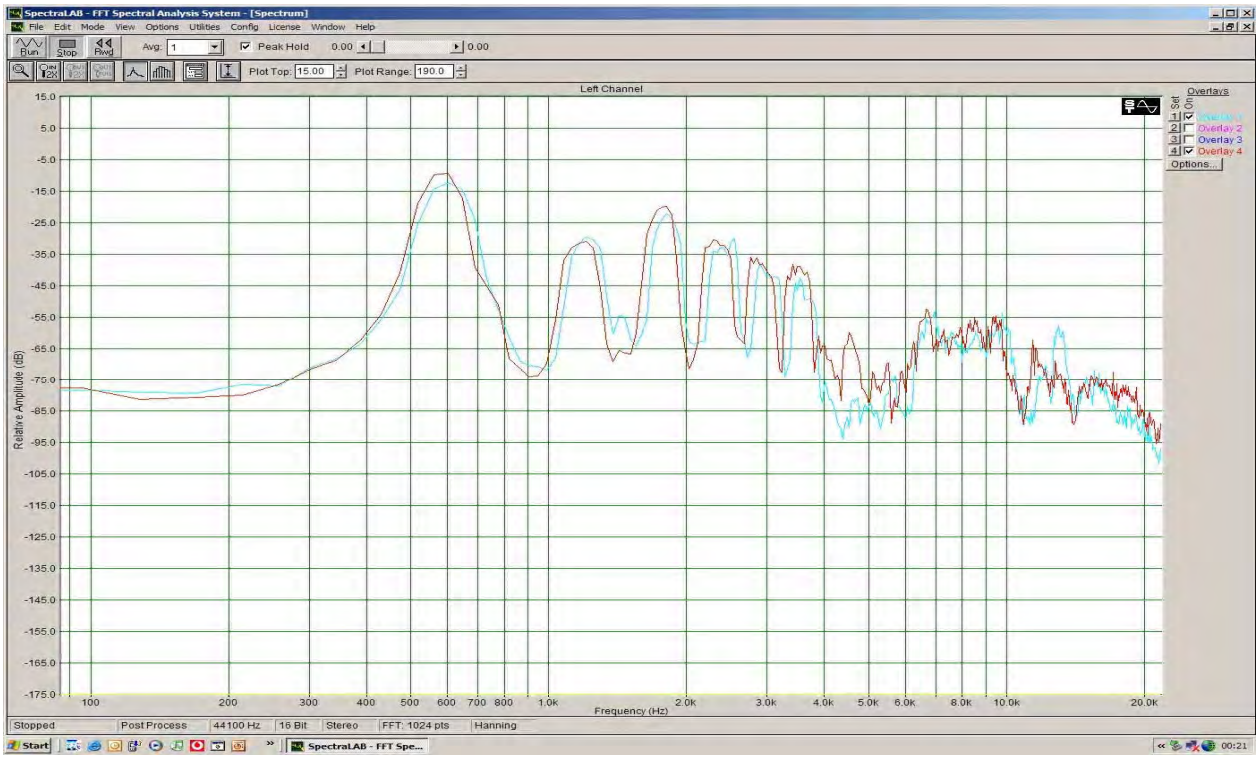

Figure 18- 5th test person osteopathy- E. male- first tone triad

- **Test triad**

The triad shows a much better voice volume at nearly all frequencies (pitches) of the voice. The spectrum is softer and more regular.

[157] cf. Figure 8 of this paper (p.58).

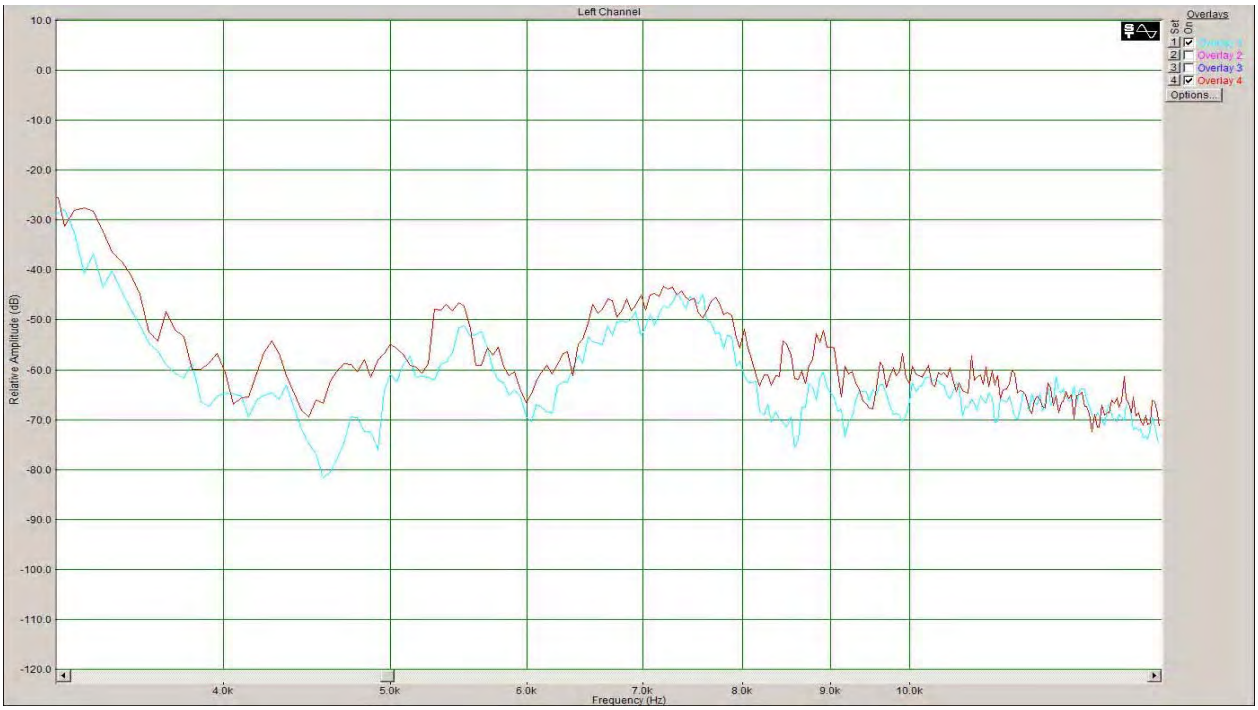

Figure 19- 5 th test person osteopathy- E. male – compressed triad

- **Documentation Prof. Visca**

Prof. Visca pointed out that the voice sounded deeper, more harmonic and softer after the treatment.

- **Feedback student**

Relaxation of tensions and cramps in the body and in the mind (let go of control). Relaxation of blockades, voice can develop freely, respiratory capacity remarkably increased.

CONCLUSION:

A classic example for a extraordinary improvement of the voice in nearly all frequency ranges (louder, fuller); a tenor who can finally breath into abdomen and into ribs. Thus an amazing enlargement of the maximum phonation time of a tone is obvious.

- **Osteopathic coherence that have influenced the result**

D. can only breath sternal according to anamnesis. The thorax is very stiff.

Structural:

Dog T6,7: Influence on liver, stomach, spleen, adrenals, diaphragm

Lift T8 to 10: Influence on diaphragm, liver, kidneys pancreas, eyes

Trigger point treatments: right trapezius releases first rib: influence on cervical and brachial plexus and scalenus muscles.

Recoil inferior sternopericardiac ligaments: influence on the pericardial sac, resulting in relaxation of the esophagus and cervical fascia.

Visceral:

Direct visceral influence on the liver by means of recoil and improvement of the motility.

Cranial
SSB compression released, thus the body can become wider in inspiration and expiration.

All these treatments lead to the fact that the patient can breath better or deeper, respectively because the thorax opens up better downwards. Thoracic and abdominal breathing is possible fort he first time.

6. F. female

- **Maximum phonation time of a tone**

Result: before treatment test 1: 17,2 seconds
Before treatment test 2: 14,2 seconds
after treatment: 18,7 seconds

After the treatment there was a remarkable prolongation of the maximum phonation time of a tone.[158]

- **First tone triad**

The curve generally shows more volume after the treatment. The tone is softer and purer between 100 Hz and 200 Hz and striking between 400 Hz and 500Hz and between 700 Hz and 800 Hz.

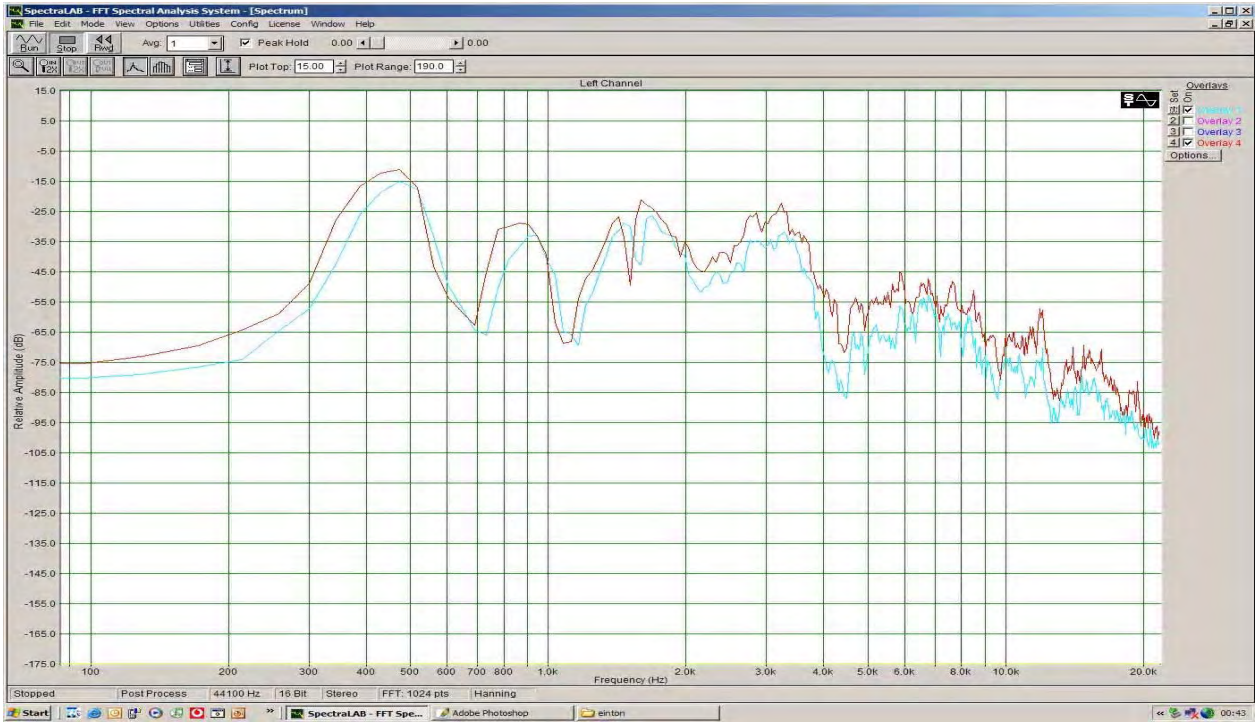

Figure 20- 6th test person osteopathy- F. female- first tone triad

[158] cf. Figure 8 of this paper (p.58).

- **Test Triad**

The graph shows the most remarkable improvement of all test persons. After the treatment the voice appears to have more volume in the whole voice spectrum. Also the maximum phonation time of a tone was much longer after the treatment.

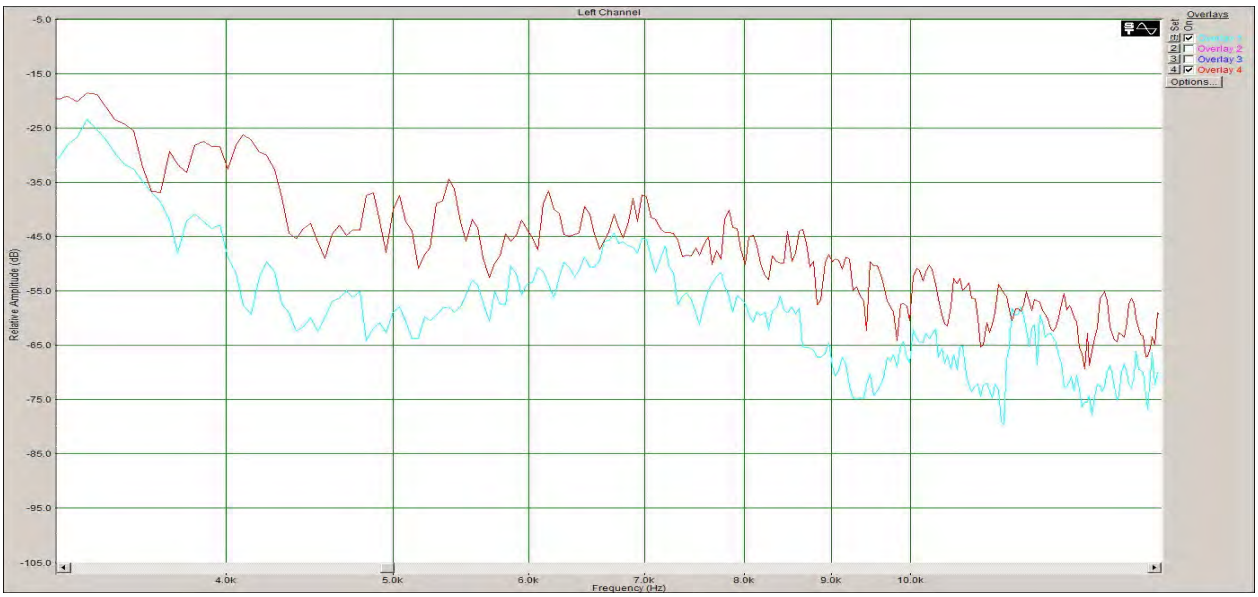

Figure 21- 6th test person osteopathy- F. female- compressed triad

- **Documentation Prof. Visca**

She emphasized that after the treatment an open vowel could be noticed (it was close during the test before the treatment) furthermore the tone could be held longer. After the treatment the test person faded out the tone.

- **Feedback student**

Openness and smoothness after the treatment, feels energy stream through the body during the treatment.

CONCLUSION:

The test person shows the most remarkable improvement of the voice volume of all the osteopathic test persons, because the voice shows more volume in all the frequency ranges. The length of the maximum phonation time of a tone improved as well. Particularly at the range from 400 Hz to 800 Hz the voice is purer and softer.

- **Osteopathic coherences that have influenced the result**

<u>Structural:</u>

Lumbaroll L1/2: influence on the kidneys; L3/4: Lumbaroll: because of influence on the right diaphragmatic crus on the right hand side, via the kidney, forward relaxation in direction of the diaphragm.

First rib on the right hand side manipulated: influence on cervical and brachial plexus and via scalenus- muscles effect on the auxiliary respiratory muscle, influence on cervical fascia

Cranial: SSB midline built up, connection to the navel, as the navel is the basic energy center of our body he influence on the midline leads to a better energy in the body, By means of the work on the midline the patient became more ‘centred’.

7.3. Results of the comparison group

Graphic representation of the testing results:

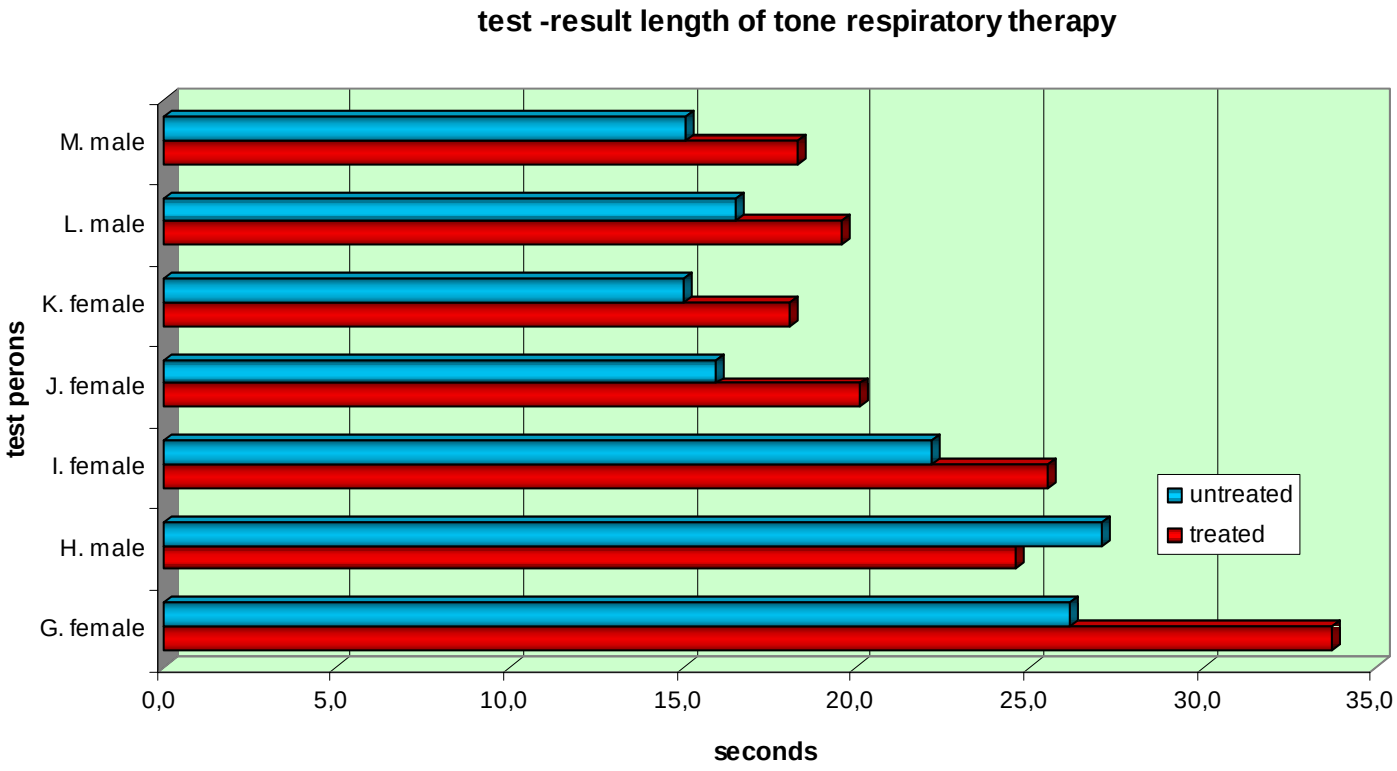

Figure 22- tone lenght respiration therapy

	1st test- untreated	2nd test- untreated	3rd test- treated	average untreated	Diff. to treated	
G. female	12,7	17,3	18,1	15,0	3,1	better
H. male	25,5	28,6	24,6	27,1	-2,5	worse
I. female	15,7	17,3	19,6	16,5	3,1	better
J. female	17,2	12,9	18,3	15,1	3,3	better
K. female	25,5	26,8	33,7	26,2	7,6	better
L. male	19,1	25,3	25,5	22,2	3,3	better
M. male	13,7	18,2	20,1	16,0	4,2	better

Figure 23 – Data base tone lenght respiration therapy in seconds

1. G. female

- **Maximum phonation of a tone**

result: before treatment test 1: 12,7 seconds
before treatment test 2: 17,3 seconds
after treatment: 18,1 seconds

After the treatment the maximum phonation time of a tone appeared to be longer.[159]

- **First tone of the triad**

The curve shows an enlargement of the volume- espiecially in the range from 400 Hz to 500 Hz. In the range from 200 Hz to 300 Hz the tone is cleaner.

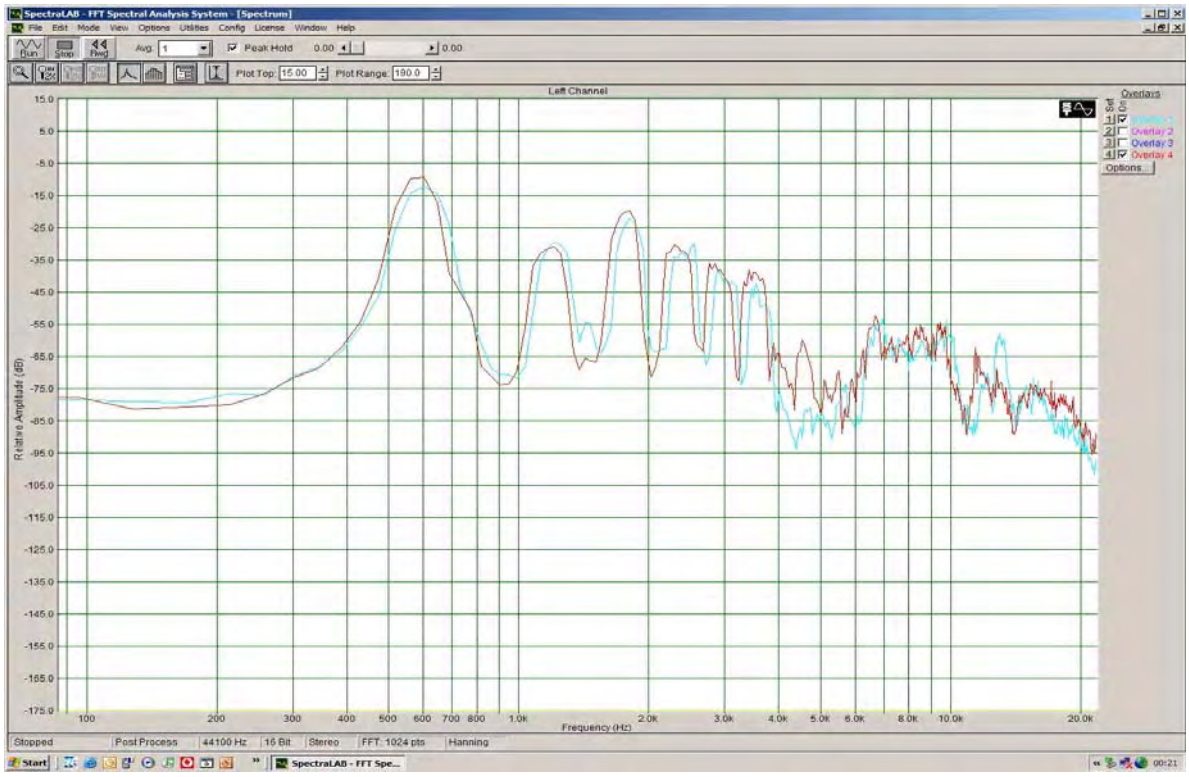

Figure 24-1st test person respiration therapy- G. female- first tone triad

[159] cf. figure 22 of this thesis (p.71).

- **Test Triad**

The graphics shows a distinct enlargement of the volume – particularly in the deeper frequencies (up to 550 Hz). Above 600 Hz the results vary between louder and than again softer.

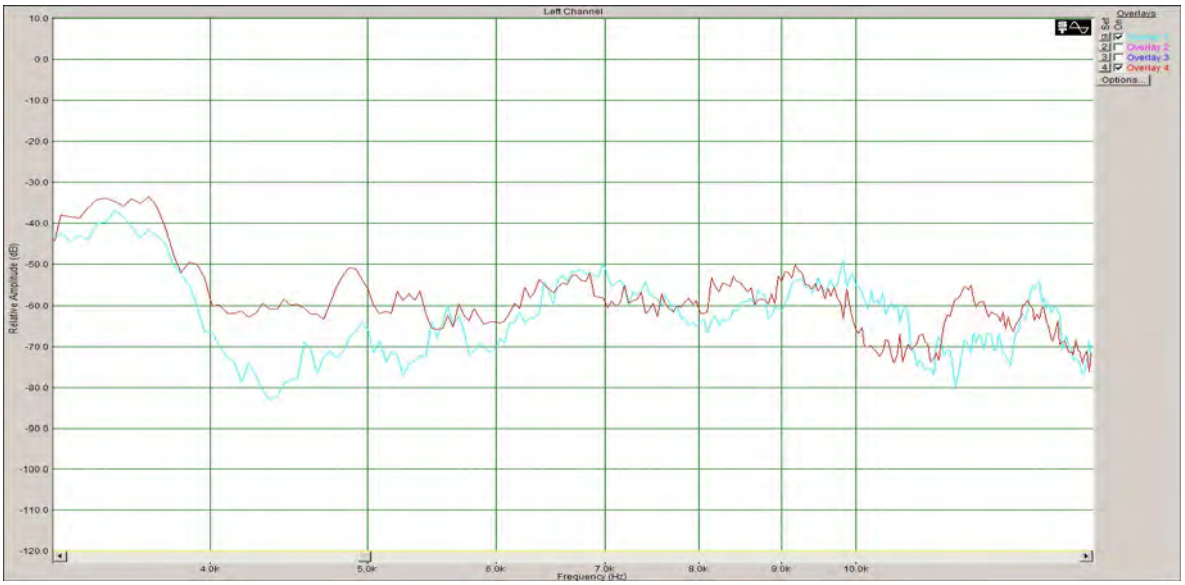

Figure 25- 1st test person respiration therapy- G. female- compressed triad

2. H. male

- **Maximum phonation of a tone**

result:		
	before treatment test 1:	25,5 seconds
	before treatment test 2:	28,6 seconds
	after treatment:	24,6 seconds

After the treatment the maximum phonation time of a tone appeared to be shorter.[160]

[160] cf. figure 22 of this thesis (p.71).

- **First tone of the triad**

In the diagram the larger volume in every frequency range dominates – especially during the start of singing and in a frequency range from 100 to 300 Hz.

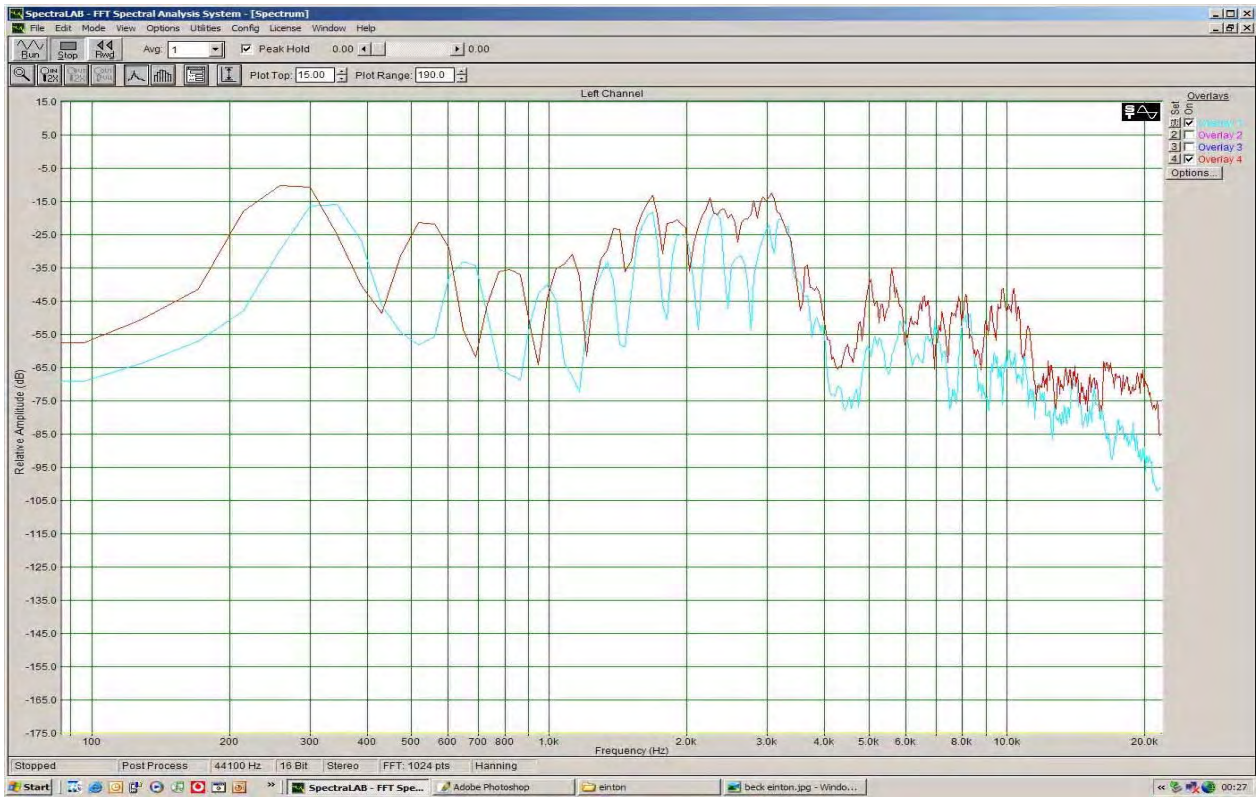

Figure 26- 2nd test person respiration therapy- H. male- first tone triad

- **Test Triad**

The graphic shows consistently more volume in every range.

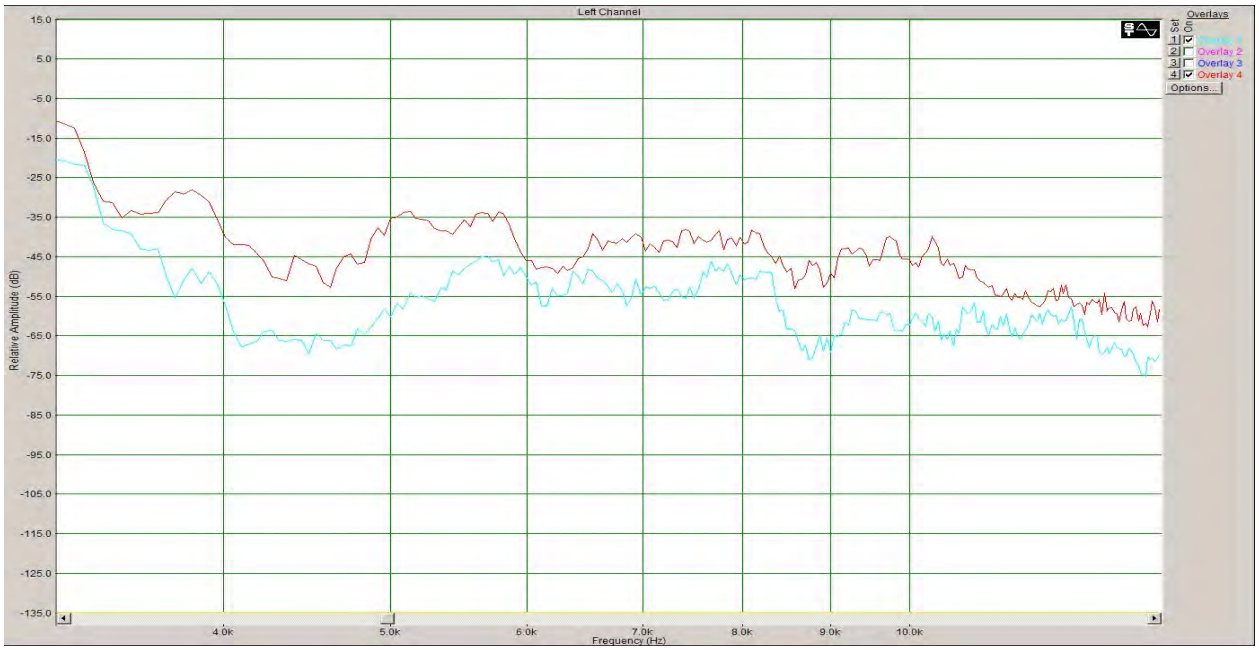

Figure 27- 2nd test person respiration therapy- H. male- compressed triad

3. I. female

- **Maximum phonation of a tone**

result: before treatment test 1: 15,7 seconds
before treatment test 2: 17,3 seconds
after treatment: 19,6 seconds

After the treatment the maximum phonation time of a tone appeared to be considerably longer.[161]

- **First tone of the triad**

The curve shows a consistently softer tone – exception is a little enhancement of the volume in the range from 1.400 Hz to 1.500 Hz. In the range from 800 Hz to 900 Hz the tone seems to be clearer after the treatment.

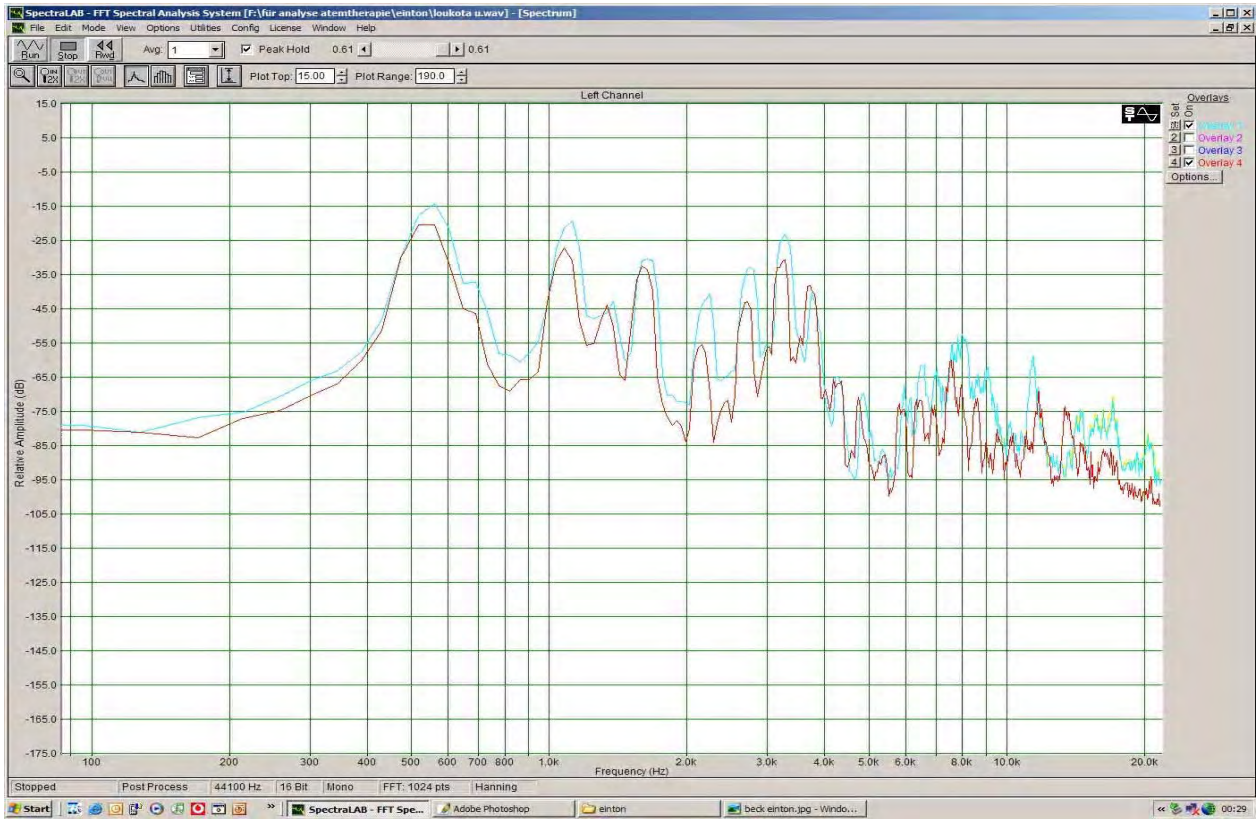

Figure 28- 3rd test person respiration therapy- I. female- first tone triad

[161] cf. figure 22 of this thesis (p.71).

- **Test Triad**

The graphics shows a louder tone in the deeper frequency range – especially between 400 Hz to 500 Hz. Above 500 Hz the curve shows a tendency towards less volume.

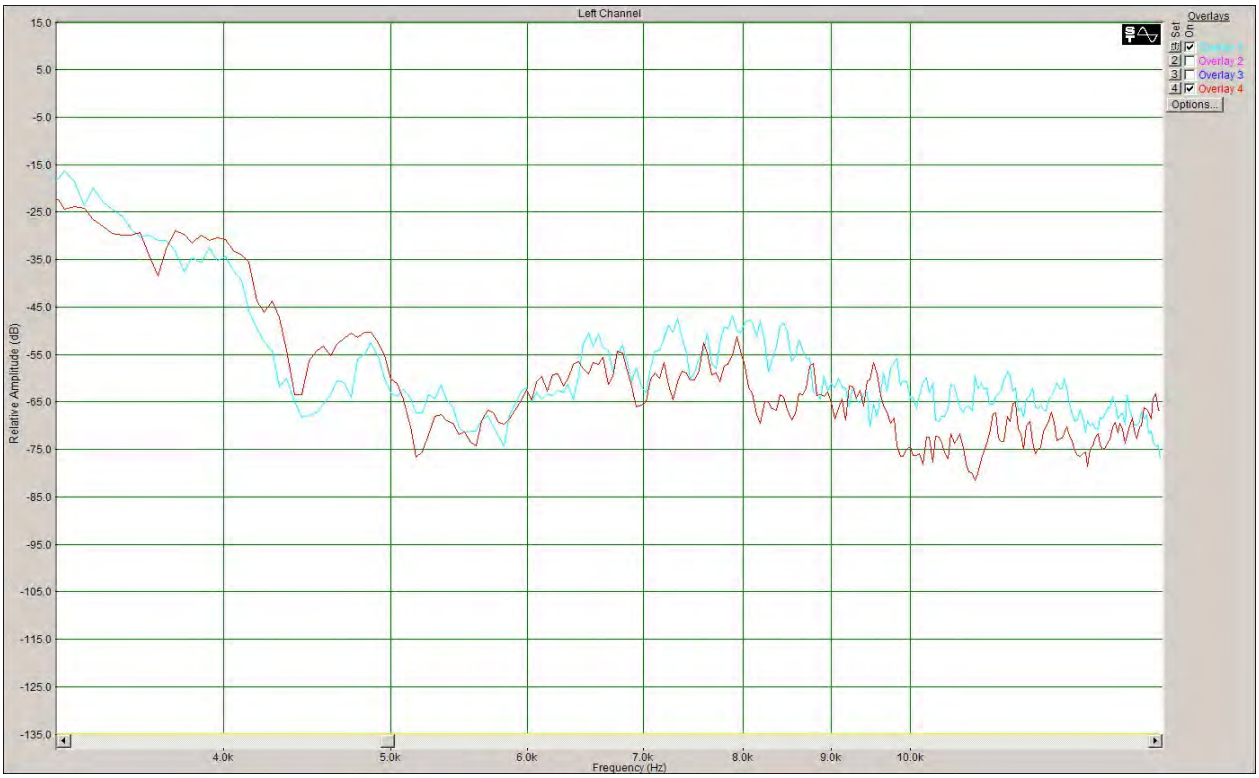

Figure 29- 3rd test person respiration therapy- I. female- compressed triad

4. J. female

- **Maximum phonation of a tone**

result:		
	before treatment test 1:	17,2 seconds
	before treatment test 2:	12,9 seconds
	after treatment:	18,3 seconds

After the treatment the maximum phonation time of a tone appeared to be considerably longer.[162]

- **First tone of the triad**

J. sung lower as before the treatment. In the deeper frequencies to 200 Hz the voice has circa the same volume than before the treatment. From 200 to 400 Hz the volume is lower, from 400 Hz on there is an increase of volume again.

[162] cf. figure 22 of this thesis (p.71).

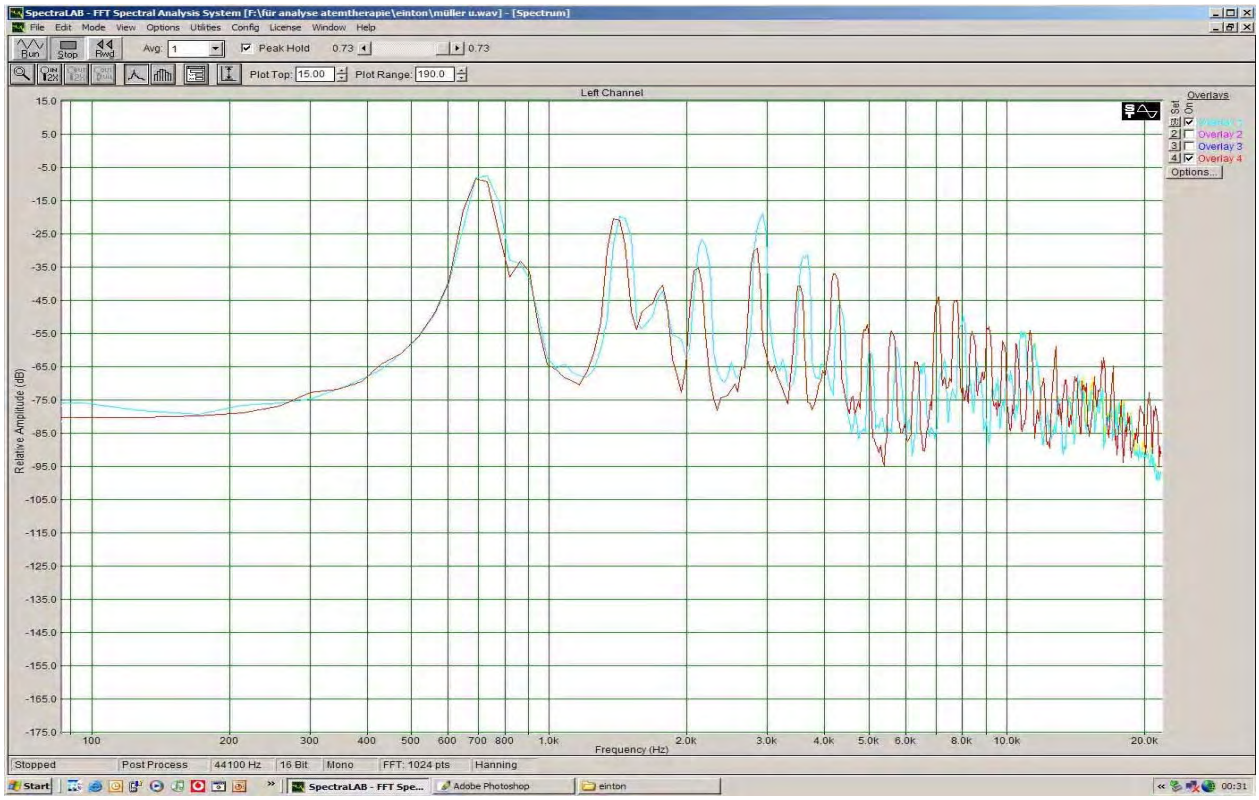

Figure 30- 4th test person respiration therapy- J. female- first tone triad

- **Test Triad**

The voice volume is varying in every frequency range.

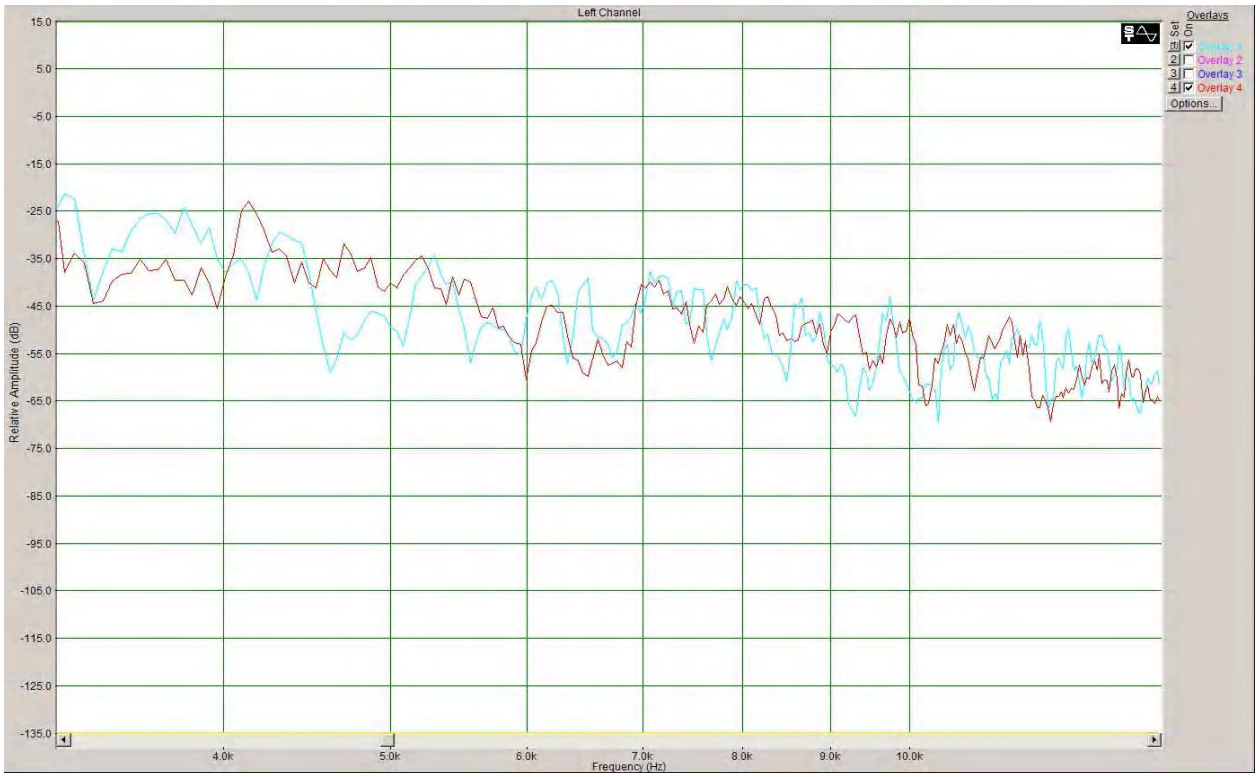

Figure 31- 4th test person respiration therapy- J. female- compressed triad

5. K. female

- **Maximum phonation of a tone**

result: before treatment test 1: 25,25 seconds
before treatment test 2: 26,8 seconds
after treatment: 33,7 seconds

After the treatment the maximum phonation time of a tone appeared to be impressivly longer. This was the best result of all probands.[163]

- **First tone of the triad**

The graphics show that there is nearly the same volume after the treatment than before. The volume about 150 Hz and between 200 Hz and 300 Hz is less than before the treatment, therefor the sung tone in this range is purer than before. Between 400 Hz and 500 Hz there is an increased voice volume after the treatment.

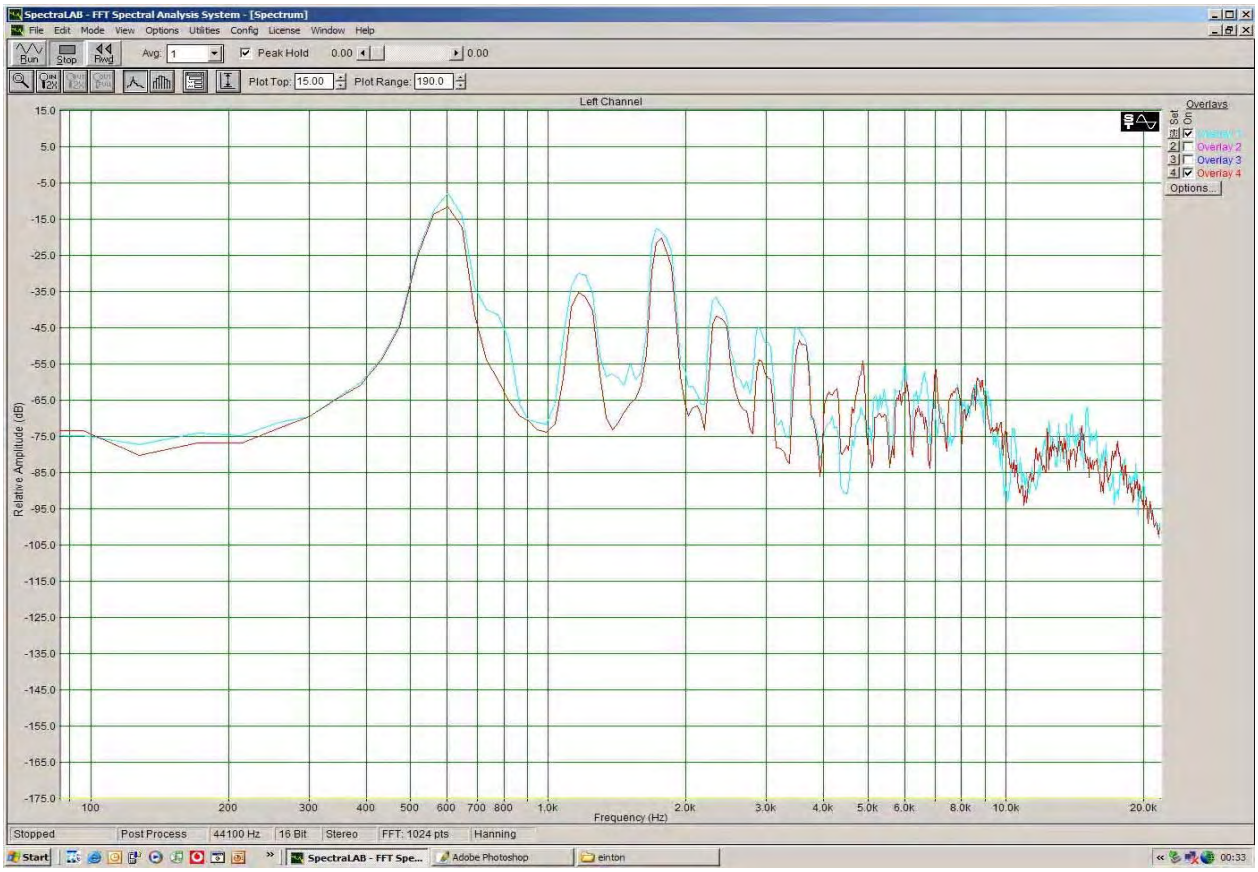

Figure 32- 5th test person respiration therapy- K. female- first tone triad

[163] cf. figure 22 of this thesis (p.71).

- **Test Triad**

The voice volume varies in every frequency ranges with a slight tendency to a higher voice volume in the frequency range up to 800 Hz.

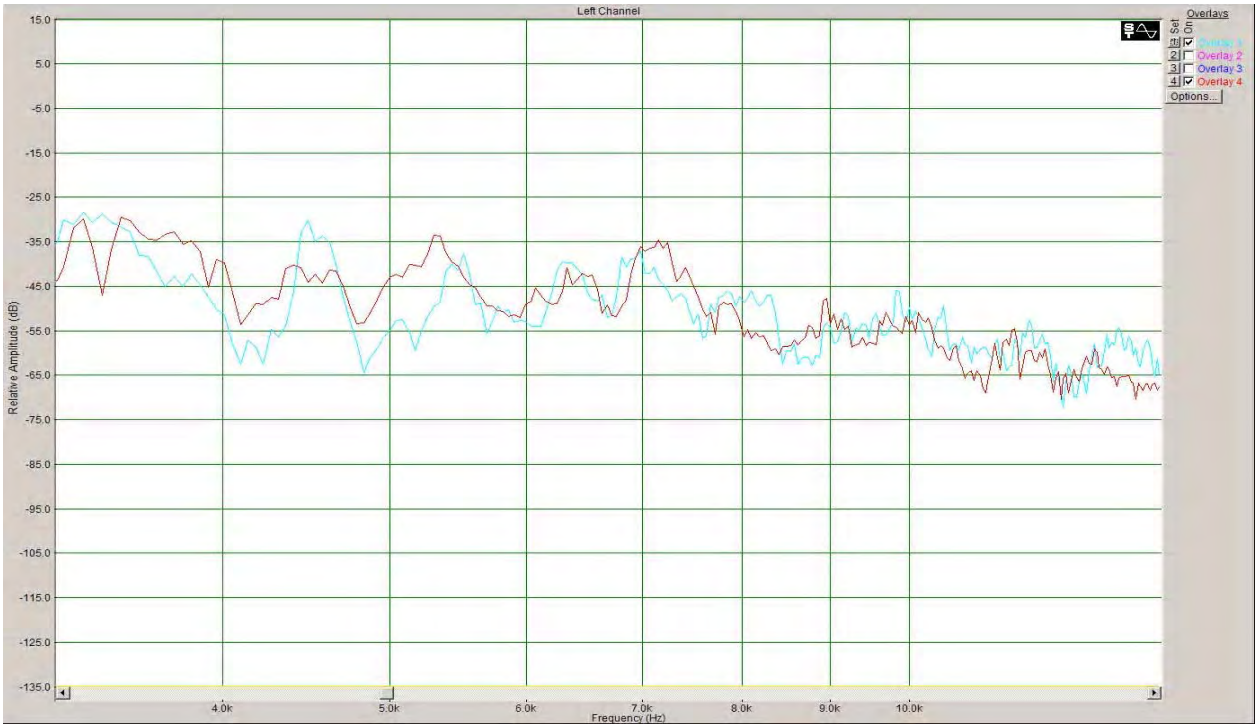

Figure 33- 5th test person respiration therapy- K. female- compressed triad

6. L. male

- **Maximum phonation of a tone**

result:	before treatment test 1:	19,1 seconds
	before treatment test 2:	25,3 seconds
	after treatment:	25,5 seconds

After the treatment the maximum phonation time of a tone appeared to be slightly longer. On average the holding period of the tone has improved for 3.3 seconds. [164]

- **First tone of the triad**

L. started to sing the triad lower after the treatment. After the treatment the voice volume is in the frequency range up to 300 Hz as loud as before it. In higher ranges – between 600 Hz and 700 Hz and especially above 1.000 Hz clearly louder. L. shows a very pure image of his voice – both before and after the treatment.

[164] cf. figure 22 of this thesis (p.71).

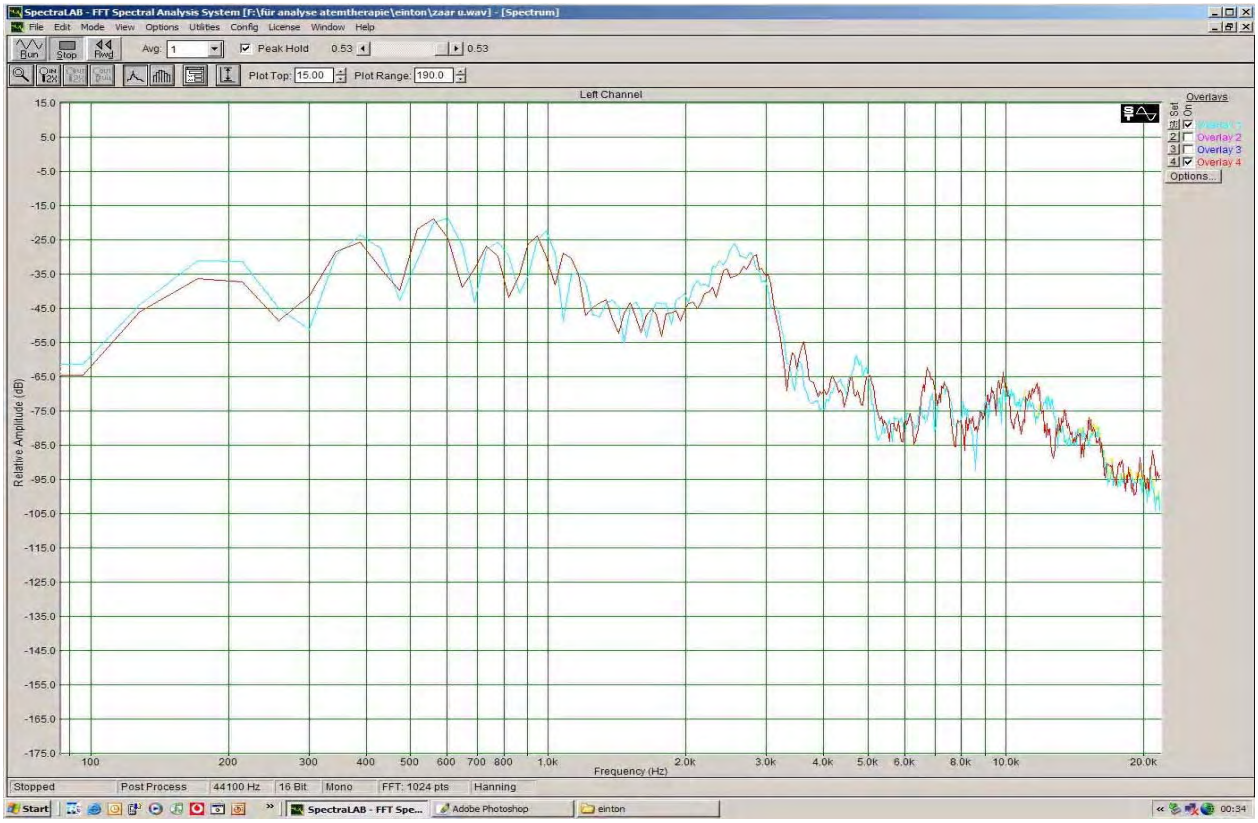

Figure 34- 6th test person respiration therapy- L. male- first tone triad

- **Test Triad**

The voice volume varies in every frequency range. Also the triad shows a steady image of the voice, whereas this could be improved a little bit after the treatment – especially in frequency ranges from 500 Hz to 700 Hz.

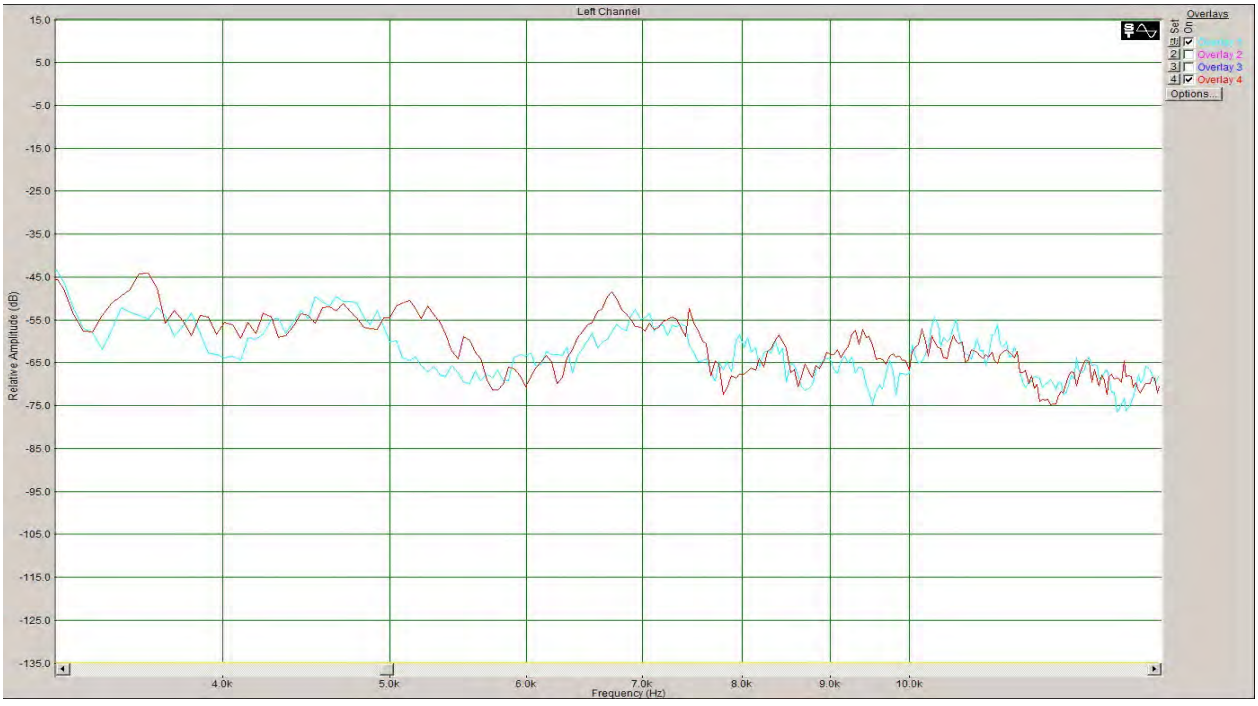

Figure 35- 6th test person respiration therapy- L. male- compressed triad

7. M. female

- **Maximum phonation of a tone**

result:	before treatment test 1:	13,7 seconds
	before treatment test 2:	18,2 seconds
	after treatment:	20,1 seconds

After the treatment the maximum phonation time of a tone appeared to be clearly longer.[165]

- **First tone of the triad**

After she started to sing the triad louder. In the frequency range up to 700 Hz the voice volume increases, to 1.500 Hz the voice is lower, from 1.500 Hz on there is consistently less volume than before the treatment. In the frequency range between 100 and 300 Hz there is a purer image of voice than before.

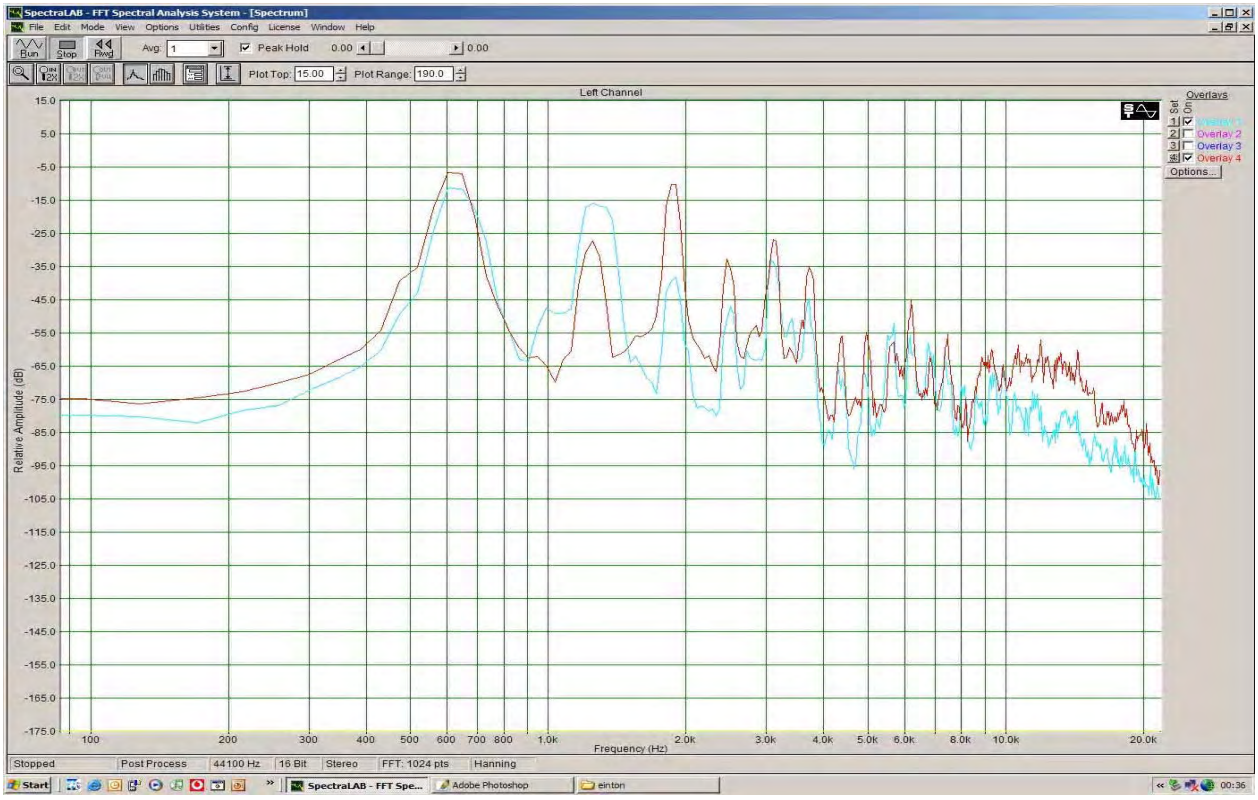

Figure 36- 7th test person respiration therapy- M. female- first tone triad

- **Test Triad**

The voice volume varies in every frequency ranges. From 900 Hz on the voice shows more volume than before the treatment.

[165] cf. figure 22 of this thesis (p.71).

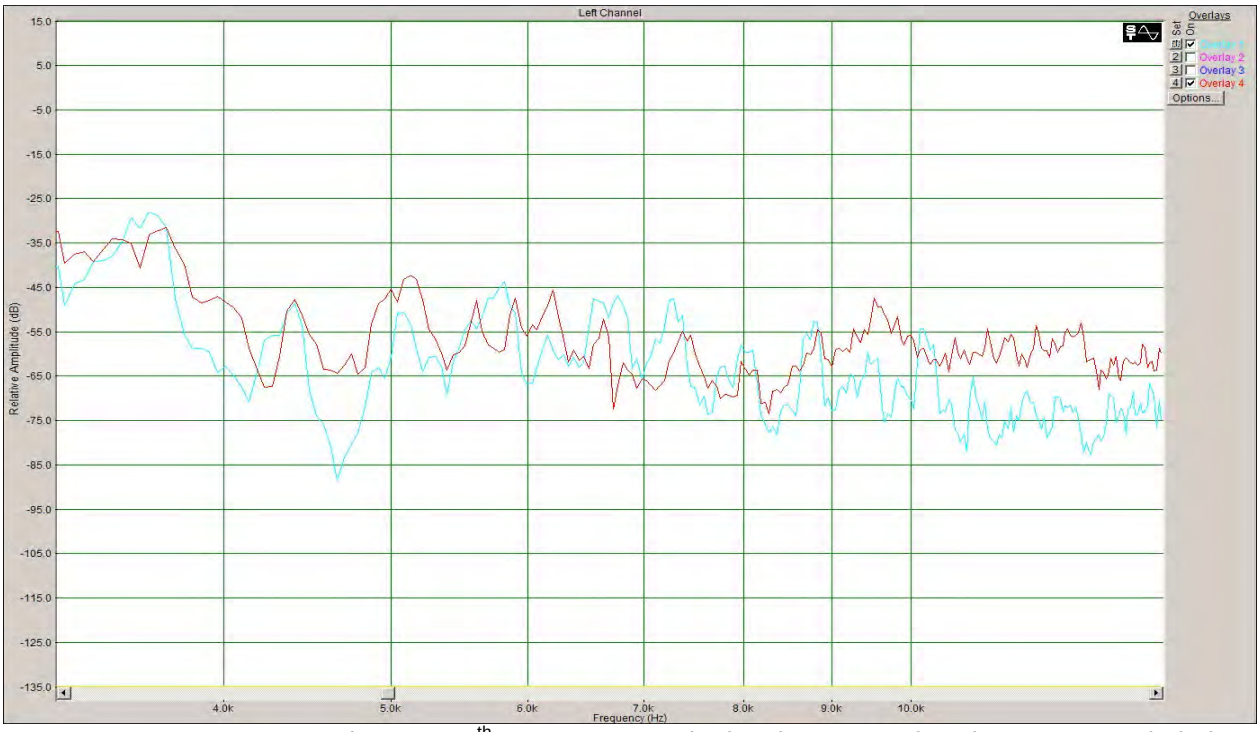

Figure 37- 7th test person respiration therapy- M. female- compressed triad

7.4. Conclusion and future prospects

Referring to the central question if an osteopathic treatment influences the human voice the following results arose:

Demonstrably an osteopathic treatment does have influence on the voice volume and the quality of the voice – equally on the lenght of the maximum phonation of a tone. As emanates from the documentation of the test persons and of Prof. Visca does the osteopathic treatment also have influence on the state of mind of the test persons.

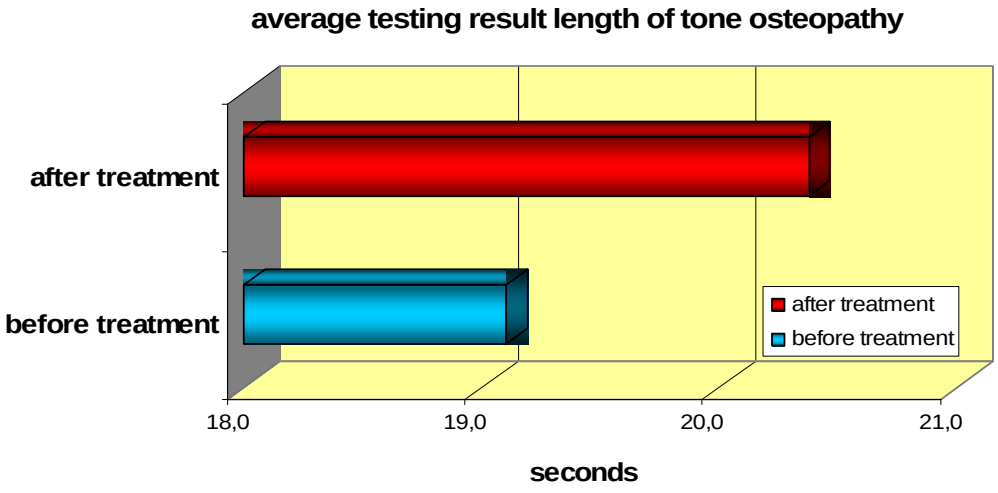

Figure 38 – average testing result length of tone osteopathy[166]

[166] For the results of respiratory therapy see appendix of this paper (p.88ff).

These results are particularly interesting because i only searched for and treated the osteopathic lesions during my treatment. My comparison group were treated respiratory therapeutically. This group showed very positive changes too.
It is worth mentioning shows such effects although breath and voice were not treated extensively. In comparison to the respiratory therapy which commits itself to breath as one determining factor of the voice similar and comparable results were achieved.

Regarding the testings I have to state that because of the many different documentations in connection with this study a great spectrum of results is existing. This circumstance enabled me to compare various results with each other and to draw continuative conclusions. I did not go into details concerning the test of the arbitrary chosen tone in my work as the arbitrary tone is not comparable to the others. The tone a singer allows conclusions concerning his/her state of mind. This was meaningful to the vocal professor but not for the study.

The ideas for the testings emerged during conversations with Prof. Visca and Dr. Malin. They were well-chosen because of their many interesting and especially measurable results. However, the suggestion if they could warm up before the tests in order to build up the muscle tone necessary was made rather often by the test persons. This would a proposal for a further study in this field.

Summary

In order to clarify if an osteopathic treatment has got influence on the human voice, a study on singing students of the University of Music, Vienna was conducted. The results are presented in this paper.

To explain the mode of action of an osteopathic treatment the osteopathic concept is described. After a chronology of the history of osteopathy the single concepts are depicted and then the osteopathic techniques used throughout the study are explained. In order to illustrate the holistic approach and the 'philosophy' of osteopathy (which allows a posterior comparison to the respiratory therapeutic concept), the principles of osteopathy are explained.

As in the present study changes in the voices of the test persons are measured and interpreted, in the next chapter the human voice (including its anatomic and functional base) is described. The organs and anatomic structures (such as larynx and the corresponding muscles, cervical fascia, lungs, heart sac, diaphragm and auxilary respiratory muscles) and their interaction which is necessary for phonation are shortly outlined.

As breath plays a very important role in the development and the nature of the human voice and as the comparison group of the present study was treated according to respiratory therapeutic techniques in the fourth chapter the respiratory therapeutic concept based on Middendorf and its techniques and philosophy as well as its differentiation from the respiratory massage is depicted. A contraposition of the osteopathic and the respiratory therapeutic concept in which similarities as well as differences are illustrated, follows.

In chapter six the study itself is presented. After a description of the methodology and a detailed explanation of the conduct of the tests, results are presented and interpreted. This is made on the one hand by means of comparative diagrams of the audio engineering programme (before and after the treatment) and on the other hand by means of comparing the length of a tone (before and after the treatment)[167] Furthermore a written documentation by the vocal professor (before and after the treatment) is evaluated. An individual feedback of each and every student describes their subjective feelings during and after the treatment.

All the testings and evaluations described show that a holistic osteopathic treatment has an influence on the human voice.

[167] As the comparison group of the study „singing" was treated respiratorily this thesis also shows grahical and verbal Analysis of the test persons treated respiratorily.

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List of Figures

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Appendix

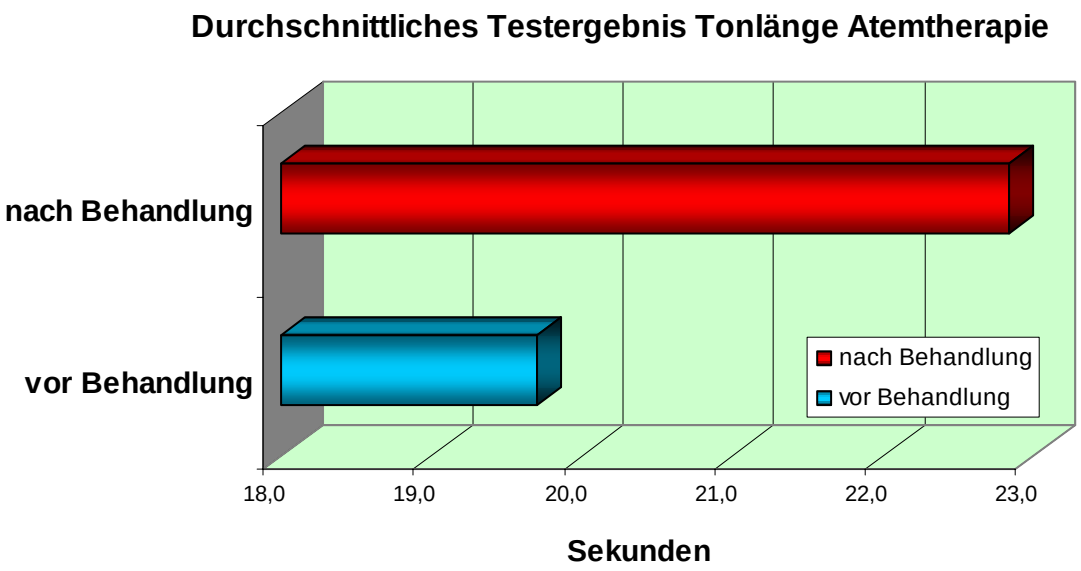

Abbildung 39- Durchschnittliches Testergebnis Tonlänge Atemtherapie

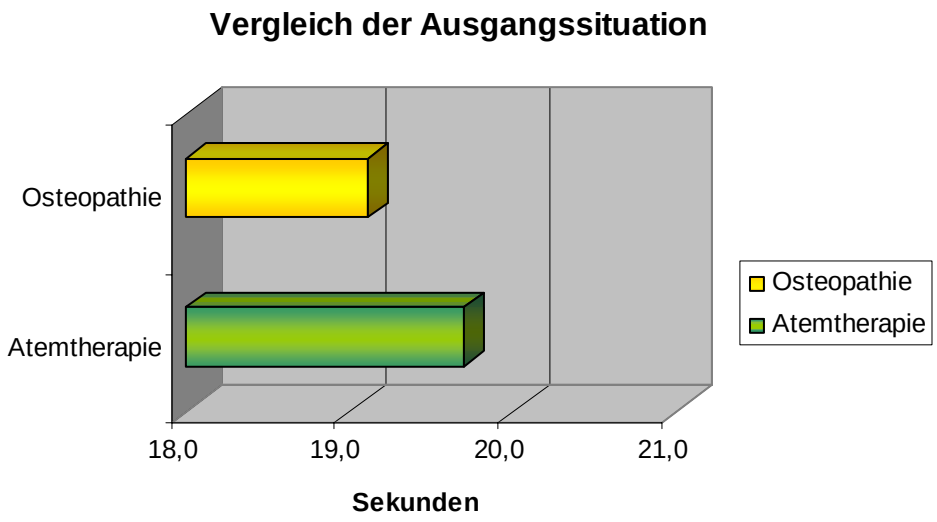

Abbildung 40- Vergleich der Ausgangssituation Tonlänge

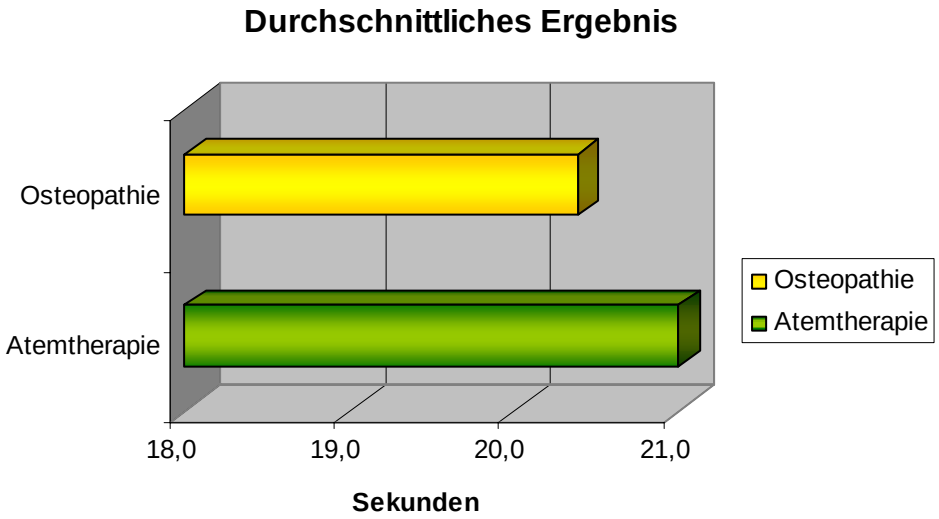

Abbildung 41- Durchschnittliches Ergebnis Tonlänge

Da der unmittelbare Vergleich der Ergebnisse der osteopathischen und der atemtherapeutischen Behandlung nicht Aufgabe und Thema der vorliegenden Studie ist, dienen die im Anhang gezeigten graphischen Vergleiche (Abbildung 40 und 41) rein der Information und der Veranschaulichung für den interessierten Leser.

Interview mit Dr. Lisa Malin zum Thema Atemtherapie und Atembehandlung

Geführt 2006 von Gregor Hempel in der „Praxis für Osteopathie“

Frau Dr. Lisa Malin lehrt „Atem- und Körpertraining“ an der Musikuniversität Wien (Abteilung Sologesang und Musikdramatische Darstellung). Sie lehrt weiters Musiktherapie und die Weiterbildung energetischer Modelle und Methoden an der Gamed (Akademie für Ganzheitsmedizin). Am Otto Wagner Spital in Wien lehrt sie Therapeutische Berührung für Personen des gehobenen Dienstes für Gesundheits- und Krankenpflege. Weiters ist sie ausgebildete Atemtherapeutin in freier Praxis.

„Frau Dr. Malin, wie würden Sie Ihre Arbeit in der Atemtherapie und Atembehandlung beschreiben, bzw. was ist Atemtherapie und Atembehandlung überhaupt.“

„Im Zentrum steht das Erfahren und Entwickeln des eigenen Atems. Das Bewusstwerden des eigenen Atemrhythmus öffnet die Möglichkeit der Begegnung mit sich selbst. Die Atembewegung (Ein-Ausatmen, evtl. Atempause) kann der Atementfaltung hinderliche Spannungszustände wie Stress, körperliche Verspannung, Anspannung durch belastende Erlebnisse, wieder ins Fließen bringen.
Durch körperbezogene Dehnung, Druck und Impulse wird der Atem gestärkt, so dass Körper- wie Empfindungsbereiche wieder angeschlossen werden und über die Erfahrung ins Bewusstsein geholt werden.
Der eigene Atem wird über die Hände begleitet und geht in die Entfaltung der Atemräume.
Ein Lösen fördert den Muskeltonus und unterstützt die Aufrichtung. Über eine entwickelte Atemkraft erfahren wir Atemsubstanz, die die leib-seelische Verbindung transparent werden lässt.

Dort, wo die muskulöse Panzerung/ Blockade im Brust und Rückenbereich der Lunge das Ein/Ausatmen - somit die Atembewegung- behindert, dort kann die Entschlackung/ Säuberung nicht oder nicht genügend stattfinden. Wird eine länger andauernde Blockade gelöst – z.B. durch Lösen und Aktivieren im Zwischenrippenmuskulaturbereich, so setzt der Entschlackungsvorgang vermehrt ein und dadurch auch vermehrte Schleimbildung.

Beim aktiven Begleiten des Atems mittels der Hände, d.h. der Atembewegung bis in die Atemräume, somit auch bis in die Flanken, entsteht eine größere Aktivität der Lunge in all ihren Räumen bis in die Vakuolen, Bläschen in denen Sauerstoff mit Blut ausgetauscht wird. „

„Frau Dr. Malin, warum haben Sie die Atembehandlung als Vergleich zur osteopathischen Behandlung der Probanden gewählt?“

„Atembehandlung habe ich gewählt, weil es sich besser eignet als Vergleich zur osteopathischen Behandlung, auch wenn diese im Aufbau anders strukturiert ist.
Die Atembehandlung ermöglicht am besten, den Istzustand von Atemvolumen, Atemrhythmus und wie weit Atembewegung durch den Körper fließt, d.h. welche Körperteile oder Bereiche angeschlossen sind, ersichtlich zu machen. Nicht nur der

Ist-Zustand ist ersichtlich, sondern auch die Wandlungsfähigkeit, die aber nicht von außen aufgegeben wird, sondern zeigt, wie der Körper durch einen Prozess des Verstehens und Zulassens an Atementwicklung den nächsten Schritt freigeben kann. Die Hände der Behandelnden dürfen begleiten, unterstützen und manchmal fordern aber nicht überfordern. Dieser ganze Atemkörperprozess muss begleitet sein von einer bewussten Atem- und Körperbeobachtung, vor allem auch durch ein Spüren.
Hier ist ein Wegdriften, in eine Traumwelt gehen, fehl am Platz.

Durch eine Konzentration auf den Atemkörperprozess – Loslassen und Neues integrieren - kann die gewünschte Spannung fürs Singen erst mal reduziert sein. Das heißt, es muss ein aktiver Übergang geschaffen werden, oder einfach genügend Zeit gelassen werden, dass sich das Neue integriert und verbindet und sich die gewünschte Spannung wieder aufbaut.

In den Übungsstunden – somit im Unterricht- findet ein aktives Üben statt und die Studenten kommen nie in eine so tiefe Entspannung wie bei einer Atembehandlung. Im Übungsalltag sind es also immer wieder kleine Schritte, die zugelassen werden. So erzählte mir eine Studentin von einem höheren Semester, immer wenn sie ins Atemtraining kam und es folgte danach eine Gesangsstunde, musste sie sich nicht einsingen – bis auf ein Mal, wo wir eine tiefe Entspannung benötigten, da wir an der Lösung des Rückens arbeiteten, so dass die Atembewegung durch einen größeren Bereich der Wirbelsäule floss. Es musste sozusagen eine Alltagsspannung abgebaut werden, um in eine aktive Durchlässigkeit zu kommen. In diesem Fall benötigte die Studentin einige Stunden, bis sich die Spannung für den Tag wieder aufbaute.

So erinnere ich mich: Prof. Ilse Middendorf und Herta Richter ließen aus ihrer Arbeit (aktives Übungsarbeiten) mit lautlosen Tönen beginnend und mit beginnender Stimmgebung nicht forcierend, vor allem in Vorsicht mit der Lautstärke, von innen her gestalten und nicht durch einen äußeren Anspruch fordern.
Marie Theree Escribano hat mit einem Lallen wie ein Kind mit gelöster Zunge beginnend und langsam erst die Stimme dazukommen lassend erst später die Artikulation dazugenommen.
Da die Erfahrung und die Bewusstheit des eigenen Atems geschult wird, inkludieren wir die Person. Der Körper muss mit der Person, d.h. auch mit der Persönlichkeit und dem eigenen Wesen verbunden sein. Wenn Atemressourcen/ Atemräume, Durchlässigkeit etc. aktiv sind, stehen dieser Person mehr aktive Qualitäten zur Verfügung.

„Wie ist eine Atembehandlung aufgebaut?“

„ Es wird 40 Minuten lang am Atem- und Körpergeschehen gearbeitet und 5 Minuten geruht. Bei den meisten zeigte sich erst nach 30 Minuten die neue Entwicklung, d.h. nach ca. 10 Minuten Zeit für ein aktives Integrieren und dann 5 Minuten Ruhen und Nachspüren.“

Details zur Atembehandlung von Dr. Malin

- **Testperson 1-G. weiblich**

Über Unterstützung der Mitte wird der untere und obere Atemraum mehr durchflossen. Die Patientin hat von Beginn an eine integrierte Atempause (Ein-/Ausatem/Atempause). Sie wirkt ruhig und der Atem ist ausgeglichen.
Langsam öffnet sich der obere Raum. Sie unterstützt es durch befreiendes Seufzen. Durch das Öffnen dieses Bereiches für die Atembewegung taucht eine neue Stimmung auf. Diese neue Durchlässigkeit lässt Fröhlichkeit und Freude aufkommen. Das Gefühl von „frei sein“ entsteht. Die Patientin öffnet die Arme und streckt sie nach außen. Am Ende ist die Studentin etwas schwindelig durch ein vermehrtes Luftaufnehmen.
Bemerkung der Studentin: „Ich spüre alles so intensiv bis in die Fingerspitzen.“
Es ist eine große Durchlässigkeit entstanden.

- **Testperson 2- H. männlich**

Es besteht ein ausgewogener Rhythmus von Ein- und Ausatem. Der Ausatem hat eine besondere Qualität „ein sich ausatmen lassen“. Selbst bei der Veränderung des Einatems indem der Einatem größer wird, bleibt im Ausatem diese Qualität erhalten. Der untere und mittlere Bereich wird von der Atembewegung durchflossen. Es hat eine gute Wirkung mit den Händen die Mitte und somit die Atembewegung in diesem Bereich zu unterstützen.
Besonders der Rücken lädt ein ihn zu lösen und mit den Händen über Unterstützen, Druck und Begleitung die Atembewegung und somit die Durchlässigkeit zu fördern. Unterstützende Hände aufs Hohlkreuz zu geben hat eine gute Wirkung. Es gibt eine Spannung im oberen Rückenbereich. Es gibt wenig bis keine Atembewegung im Rücken. Ich arbeite an einer Linderung der Spannung der Muskeln seitlich der Wirbelsäule. Ich beginne im Bereich der Nieren zu arbeiten. Dadurch wird die Atembewegung im Becken und in der Mitte stärker. Das ermöglicht, dass leichte Ausläufer der Atembewegung nach oben gehen.

- **Testperson 3- I. weiblich**

Es gibt eine gute Durchlässigkeit des rückwärtigen Beckenbereichs. Es ist sofort möglich, in ein Atemgespräch zu kommen zwischen dem Atem der Studentin und den behandelnden Händen. Sie gibt über den Atem Raum, antwortet auf Anwesenheit und Impulse der behandelnden Hände und wendet dann ihre Aufmerksamkeit wieder zu sich selbst hin. Die Mitte gibt Raum und Durchlässigkeit. Das setzt sich fort bis in den oberen Bereich. Es stellen sich lange Atemzüge ein und die Atembewegung läuft vom Becken bis in den Oberkörper. Sie „lässt sich atmen“ (eine wunderbare Atemqualität). Im vorderen Bereich zeigt sich Durchlässigkeit. Sie ist auch hier über die Berührung im Atemgespräch. Aus der Tiefe taucht Gelassenheit auf.
Sie gibt den Atemraum und nimmt ihn auch wieder. Sie antwortet auf einen Impuls von unterstützendem Druck mit Weite und Atembewegung, die bis in den Kopf fließt. Die Beine bedürfen einer Lösung und Lebendigkeit, vor allem die Knie. Es entsteht Wärme und Durchlässigkeit in den Beinen. Dadurch, dass die Beine nun besser angeschlossen und lebendig sind, zeigt sich noch mehr Weite in den Atemzügen.

- **Testperson 4 – R. M. weiblich**

Die Patientin zeigt sich als ein zartes Wesen mit einem zarten zaghaften Atem. Die Atemräume wirken wenig entwickelt. Im rückwärtigen unteren Bereich zeigt sich Atembewegung. Über „Vertrauen“ und „Angenommen werden“ geschieht über die Tiefe Lösung. Im oberen Rückenbereich gibt es Spannung. Die Schultern liegen nicht auf der Unterlage auf. Die Schultern wirken leicht nach vorne gezogen. Es gibt immer mehr Lösung. Die Patientin ermöglicht, dass die Atemzüge sich weiter nach oben hin entwickeln. Dieser Vorgang ist begleitet von einem „Glucksen“. Der Atemrhythmus ist in sich ausgeglichen. Gegen Ende entsteht ein Akzent auf den Ausatem. Dieser erhält die Qualität „abzutransportieren“ und „nach außen zu geben“. Die Behandlerin hat 10 Minuten früher die Behandlung beendet, da sie den Eindruck hatte, „es ist genug“, sonst könnte es für die Patientin zu viel werden. Diese Feststellung wurde von der Patientin bestätigt. Sie äußert sich zum Schluss „Es tut sich so viel“.

- **Testperson 5- T. O. weiblich**

Die Studentin hat einen entwickelten Atem. Sie nimmt leicht Luft, nicht zu viel, und entlässt sie ganz langsam, ohne dass sich der Willen einschaltet und ohne Druck, in gleicher langer Weise. Sie vermittelt einen selbständigen Atem.
Es zeigt sich, dass die Qualitäten „Anwesenheit“ und „Begleitung“ über die Hände der Behandlerin sich positiv auswirken. (Das wurde von der Studentin nach der Behandlung bestätigt.)
Es gibt den Eindruck, dass eine Spannung, die sich im oberen rückwärtigen Rücken und Schulterbereich zeigt, den Atemfluss nicht beeinträchtigt. Jedoch die Atembewegung zeigt die körperliche Spannung an.
Über begleitenden Druck geht ein Wirbel zwischen den Schulterblättern in die richtige Position – es knackst. Ebenso durch ein Schütteln sowie Aktivieren des Bereiches, in dem sich die Spannung zeigte, verlängert sich der Ausatem. Der Kopf fühlt sich anschließend ganz frei an und wirkt gelöst. Der Studentin steht ein in sich geformter Atem zur Verfügung, sowie eine Atemverbindung, ein Atemkanal.

- **Testperson 6- W. S. männlich**

Der Atem zeigt sich im unteren und mittleren Bereich. Der Atemrhythmus ist ausgewogen. Es gibt eine Blockierung im tiefen Beckenbereich. Eine Veränderung wird erreicht durch
a) Lösen und Öffnen der Leisten, durch ein Loslassen der Beine und ein Öffnen und Fallenlassen der Beine zu den Seiten hin. Die Beine werden von der Behandlerin bewegt und aktiviert. Der Atem wird tiefer und entlastend. Es ensteht ein Akzent auf den Ausatem. Dieser Ausatem „transportiert ab“ und „befreit“.
b) Lösung mittels der unterstützenden Hände in der Nierengegend - dadurch entlässt der Atem Spannung. Der entlassende und entlastende Ausatem ermöglicht, dass sich ein befreiender Einatem mit mehr Raum zeigt.
Tiefe Entspannung folgt. Der Atem zieht in den oberen Bereich ein und bekommt Raum. Es entwickeln sich längere Atemzüge.

- **Testperson 7-M. weiblich**

Die Atemräume können über die Berührung sofort angesprochen werden, vor allem in die Weite hinein. Die Patientin kam zur Behandlung gelaufen. Sie benutzt zu Beginn den Ausatem, um zu sich zu kommen.

Aktivität, Weite und Leistung ist spürbar, jedoch taucht bei der Behandlerin die Frage auf, ob Entspannung, in die eigene Tiefe gehen und Erholung für die Studentin ebenso erreichbar sind. Die Räume weiten sich, werden durchlässiger und der Atemfluss breitet sich aus. Später entsteht der akzentuierte Ausatem. Ein Loslassen und ein „in das Eigene gehen“ und ein „in die eigene Tiefe“ gehen kommt hinzu. Es zeigt sich ein ausgeglichener Ausatem.

Feedback der Studenten zur Atemtherapie

Testperson 1- G. weiblich

Erster Stimmtest
Ich war ein bisschen unsicher und wollte meine Stimme steuern, was eigentlich überhaupt nicht geht.

Zweiter Stimmtest
Ich war aufgeregt und immer noch steif im Atem und Stimme

Atembehandlung
Es hat sich nach einer Weile etwas im Brustbereich aufgelockert- und ich konnte plötzlich ganz durchatmen ohne meinen Atem zu steuern oder kontrollieren. Ich habe die Energie von meinem Kopf bis in die Zehen gespürt. Und ich musste lächeln- nur weil es eine Erleichterung war, das Atmen loszulassen. Es was sehr angenehm und beruhigend.

Dritter Stimmtest- nach Behandlung
Ich habe die Stimme nicht gesteuert, sondern einfach nur losgelassen. Dabei habe ich gespürt, dass sie ganz frei geklungen hat. Es ist durch die Behandlung alles viel weicher geworden und viel besser für die Stimme, aber dadurch auch beängstigend (frightening), weil ich das Gefühl bekommen habe, dass ich nicht mein Instrument steuern könnte/ aber das ist gut! Weil man/ ich lernen muss, der Stimme zu vertrauen und loslassen zu können. Alles in allem ein sehr gutes Ergebnis und sehr wichtig

Testperson 2- H. männlich

Es war sehr entspannend und interessant, seine eigenen Außengrenzen kennen zu lernen. Schwierig ist, in der Behandlung seinen Atem natürlich zu führen. Ich habe das Gefühl, ich hätte viel mehr Atemraum zur Verfügung. Dieser größer scheinende Raum wirkt seelisch beruhigend – fühle mich aber fürs Singen ein wenig zu introvertiert. Der eine Moment mit dem Druck von oben auf den Kopf wirkte eher beklemmend/ das Anziehen aber sehr befreiend.

Testperson 3- I. weiblich

Ich fand die Atembehandlung äußerst angenehm und entspannend. Mir war, bis zu dieser Studie, nicht so wirklich bewusst, was es heißt, mit dem ganzen Körper atmen zu können. Ich glaube, dass ich im alltäglichen Leben sehr gut weiß, wie ich zu atmen habe, doch durch Ihre Behandlung wurde mir erst bewusst, wie ich es noch verbessern könnte. Allerdings glaube ich, dass die Atembehandlung den Stimmtest nur willkürlich beeinflusst hat. Ich bin überzeugt, dass sich Ihre Atembehandlung positiv auf meine Stimme und mein Körpergefühl ausgewirkt hat. Aber den Stimmtest fand ich einfach zu kurz und zu nichtssagend, dass ich mir nicht vorstellen kann, dass man mit so wenig Singübungen schon feststellen kann, was, und in welchem Ausmaß sich im Körper und im Klang verändert hat.

Testperson 4- J. weiblich

Beruhigend, den eigenen Atem zu spüren- man fühlt, ob es fließt oder nicht.
Nur durch das Atmen und Loslassen wird man ruhig. Es ist schwierig, sich einfach den Händen zu überlassen, aber wenn es gelingt ist es ein wichtiges warmes Gefühl.
Es ist unglaublich, wie viel Spannungen so gelöst werden können – so, dass es fast schmerzt. Sich von oben bis unten spüren- gutes Gefühl (nicht nur äußerlich sondern auch von innen).
Im Schulter und Kopfbereich hätte ich noch mehr „entspannen" können.
Atem „geht tiefer", Resonanzräume größer und elastischer (vom Gefühl her).

Testperson 5- K. weiblich

Was ich empfunden habe während der Behandlung war erstens tiefe Entspannung und zweitens eine Expansion meiner Luftressourcen.

Entspannung
Überall wo Lisa mich berührte, konnte ich nicht anders, als loslassen. Ihre Griffe waren fest, aber nicht unangenehm/ im Gegenteil. Ich habe mich dadurch eher geborgen gefühlt. Meine Atemzüge wurden tiefer und die Pausen zwischen Aus- und Einatmen haben sich vergrößert. Öfters zu Atmen war überflüssig- es war als ob mir durch Lisas Griffe Luft eingeatmet würde.

Expansion meiner Luftressourcen
Ich musst öfters tief Seufzen oder eher durchatmen, wenn Blockaden und Spannungen aufgelöst wurden, und dadurch mehr Platz fürs Atmen war (oder mehr Platz für Luft geschaffen wurde).
Der Beweis dafür war der letzte Stimmcheck, bei welchem ich den lang anhaltenden Ton viel länger halten konnte, wie beim ersten Stimmcheck (ca. 7 Sekunden länger).
Ich habe es als sehr schwierig empfunden, nach so einer entspannenden Behandlung singen zu müssen. Ich habe mich regelrecht dazu „zwingen" müssen. Meine Muskeln haben nicht die notwendige Spannung gehabt, zu singen. Außerdem habe ich Schleim auf der Stimme gehabt, und ein klarer Ton war nicht zu schaffen.
Ein gewisser Schleim ist immer auf der Stimme aber ich nehme an, wenn die Muskeln nicht die notwendige Spannung aufbringen können, darüber hinweg zu singen, wird es hörbar.

Resümee
Direkt vor dem Singen kann ich mir schon eine ähnliche Behandlung vorstellen, vielleicht eine, die nicht ganz so entspannend ist bzw. nicht so in die Tiefe geht.
Lisa spürt ganz genau, welche Bereiche fest oder blockiert sind. Wenn man diese Bereiche vor dem Singen „aufmachen" und aktivieren könnte, ohne eine entspannende Wirkung herbeizurufen, glaube ich, dass man dadurch enorm viel gewinnen könnte (es wäre sogar eine Geheimwaffe).

Testperson 6- L. männlich

Ich finde es sehr gut, dass jemand so was (Atemtherapie) tut. Es könnten aber mehrere Gesangsübungen sein, oder ein kleines Fragment von einem Lied/ Arie.
Jedenfalls hat es Spaß gemacht, und die Atemsession war sehr angenehm.

Testperson 6- M. weiblich

Ich war Teilnehmerin der Atembehandlung. Die Behandlung war sehr angenehm und entspannend. Sie wurde in einem kleinen Zimmer abgehalten und hat 40 Minuten gedauert. Es war eine Massage jener Teile meines Körpers, die auf den Atem Einfluss haben. Nachdem die Therapeutin, meinen Bauch, Brust, Rücken und Beine massiert hatte, wurde mein Atem größer und ich war ruhig. Die ganze Behandlung hat sehr großen Einfluss auf meine Stimme gehabt. Der Klang ist voll geworden und ich konnte ihn länger halten.

Dokumentation Ergebnisse Atemtherapie durch Prof. Visca

1.Testperson, G. weiblich

Stress bei erstem Test, beim zweiten Test Bruststimme benutzt- das ist die bequemere Lage für sie.
Beim dritten Test relaxter. Der Klang war in ihr geschwungen, Untertöne in Bruststimme sehr schön im Körper. Hat selber gesagt, dass sie keine Kontrolle habe.

2.Testperson, H. männlich

Atem im mittleren Test am besten. Im ersten Test ist der Ton gesunken. Beim zweiten Versuch Internationsproblem (= Ton zu tief gesungen).
Dritter Test: immer noch Internationsproblem; Ton regelmäßiger geschwungen, konnte nicht so lange den Ton halten.

3.Testperson, I. weiblich

Beim ersten und zweiten Test war sehr viel Zunge in der Stimme. Beim dritten Test klang die Stimme freier.

4.Testperson, J. weiblich

Atem viel besser bei drittem Test. Beim dritten Test war die Stimme kräftiger und J. hatte besseren Bodenkontakt.

5.Testperson, K. weiblich

Sehr nasal bei den Tests. Bei drittem Stimmtest leiser, Vibrato regelmäßiger, Nasalität verbessert.

6.Testperson, L. männlich

Wusste, welchen Ton er singen wollte. Zweiter Stimmtest- zu sehr Kehle gesetzt, zu sehr gefestigt.
Dritter Test: besser gestanden, hat vorher gegähnt, Kehle lockerer, hat gekiekst, hatte viel Schleim, viel gelockert

7.Testperson, M. weiblich

singt kein reines a, beim dritten Test Schleim, unterentspannt