

What Water Resistance Therapy (WRT) strategies can support vocal health and the release of vocal tension in singing students?

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Introduction

My rationale for this study is my desire to acquire further tools that promote vocal health and support my students in safely achieving the voice to which they aspire. When studying singing, I received little instruction on vocal health or tools to support tension release. If I had, I might have avoided my own diagnosis of Muscle Tension Dysphonia (MTD). I want my students to be empowered with strategies to help them care for their voices and avoid unnecessary tension.

Water Resistance Therapy involves blowing bubbles or vocalising through a straw into water (Guzman, 2021). It is the most widely used exercise in the semi-occluded vocal tract exercise (SOVTE) family for voice therapy (VT) and training (Guzman, 2021). Sovijärvi first explained the method in the 1960s, using a resonance glass tube (Simberg and Laine, 2007; Amarante-Andrade et al, 2016). It has since been adopted by Speech and Language Therapists (SLTs) and advanced by voice scientists (Amarante-Andrade et al, 2016).

Through VT, I was taught to use WRT therapeutically but remained somewhat sceptical. However, initial review of the literature suggests WRT potentially offers many benefits for tension release and vocal pathology prevention (Da Silva et al, 2019). Moreover, in the literature, reduction of vocal tension and promotion of vocal health appear to be common goals and arguments *for* the use of SOVTEs, such as WRT. To investigate, this study will first look at the frequency of muscle tension in singers before exploring the potential of SOVTEs, particularly WRT. To avoid bias, since I am close to the topic, I will interweave reflective practice based on Borton's (1970) 'What? So what? And now what?' model. This model was also presented by Driscoll in 1994 (NursingAnswers.net, 2018) and Rolfe (2001), making it a secure choice. I will also reflect on my personal WRT experience with Kolb's learning cycle (Kolb and Kolb, 2018). Terminology definitions are listed in a glossary in Appendix B.

Muscle Tension Incidence Rate

Singers are often considered "vocal athletes" as the job requires demanding muscular coordination (Pestana, Vaz-Freitas and Manso, 2017, p.722; Kwok and Eslick, 2019, p.58; Savareh et al, 2023, p.875). Professional voice-users tend to have a higher vocal load compared to the general public (Pestana, Vaz-Freitas and Manso, 2017) meaning that they are more at risk of vocal issues (Cohen et al, 2009; Kang et al, 2020; Savareh et al, 2023). Of the many disorders, MTD is the most common seen in voice clinics (Sielska-Badurek et al, 2017). In a meta-analysis conducted by Pestana, Vaz-Freitas and Manso (2017) on the Prevalence of Voice Disorders in Singers, self-reported dystonia at some stage of their careers had a prevalence of 46.09%. Another meta-analysis by Michelle Kwok and Guy D.

Eslick (2019) showed similar evidence that singers were susceptible to laryngeal pathology and symptoms relating to overuse and misuse. The most prevalent condition was described as “laryngeal pain” (Kwok and Eslick, 2019, p59), which although was not explained further, could suggest tension relating to tongue, jaw and/or extra-laryngeal muscles. The evidence above supports a strong rationale for continued research into the release of muscle tension in singers. Although my student demographic is predominantly non-professionals, the findings remain relevant because many perform or aspire to sing professionally. I aim to arm them with knowledge that could help prevent pathology and support their vocal health, should they pursue voice further.

SOVTEs: Scientific Findings

An explanation of SOVTEs can be found in Appendix C and definitions in Appendix A.

SOVTEs with frontal occlusions raise airflow resistance (Guzman, 2021), causing an increase in intraoral pressure and supraglottic pressure (or back pressure) above the glottis (Hijley and Pinto, 2021). Simply put, air pressure generated by the lungs (subglottic pressure) travels up underneath the glottis and interacts with the vocal folds before continuing upwards to the mouth. Due to the occlusion, not all air can be released, meaning intraoral pressure builds behind the lips. This pressure therefore travels back towards the vocal folds, converting to supraglottal pressure as it collects above the glottis. The increase of supraglottal pressure in relation to subglottic pressure causes several reactions:

1. Intraglottal pressure (between the vocal folds) increases, providing extra “cushioning” where they meet in oscillation (Hijleh and Pinto, 2021, p.334).
2. The top edges of the vocal folds are separated, lowering collision stress (Smith and Titze, 2017; Titze, 2018).

Both points above lower the risk of hard vocal fold impact and increase “vibration economy” (Savareh et al, 2021), which supports injury and fatigue prevention (Titze, 2006).

3. Transglottal pressure is reduced, lowering phonation pressure threshold (Smith and Titze, 2017; Hijleh and Pinto, 2021) and allowing for easier phonation (Hijleh and Pinto, 2021).
4. Intraoral pressure increase encourages a palatal lift (Hijleh and Pinto, 2021, p334).

A lifted palate creates more desirable sound quality (Austin, 1997; LeFevre, 2015) and a more open throat (necessary to avoid tension/constriction) (O’conner, 2022). Janice Chapman, a highly respected pedagogue, in her book *Singing and Teaching Singing* (2016), refers to a “puffy cheek” SOVTE as having this same desired lift of the palate and consequently alleviating issues such as pressed phonation, tight facial muscles and compressed pharyngeal space (Chapman, 2016, pp319-20). The puffy cheek exercise is

produced by voicing a breathy 'w' sound and allowing air to build behind the lips, keeping them in a puffed-up position (Chapman, 2016, p319).

The above findings are relevant to singers because the interaction of pressures leads to increased inertia within the vocal tract (Titze, 2006). An inertive vocal tract is desirable as it is indicative of less muscular reactivity and likely, therefore, less tension (Hijleh and Pinto, 2021; Guzman, 2021).

Why WRT?

WRT appears to exemplify the best of what SOVTEs have to offer (Saldías et al, 2019) by ranking top in terms of intraoral pressure values and producing ten-times the amount than that of a hum (Maxfield et al, 2015). WRT differs from the other SOVTEs I have used, as the water creates an extra source of vibration (externally from the bubbles, as well as internally from the vocal folds) (Saldías et al, 2019; Guzman, 2021). This double-source vibration is frequently described as initiating a "massage-like effect" (Saldías et al, 2019, p.2; Meerschman et al, 2019, p.57; Guzman et al, 2020, p.588; Keltz and McHenry, 2020, p.734.e8; Guzman, 2021) which loosens laryngeal muscles (Morris, 2024). This is caused not only by oscillation of water bubbles but oscillation of air bubbles into the vocal tract, creating movement in the cheeks and laryngeal tissues (Guzman, 2021). This is supported by a Sielska-Badurek et al study (2017) where Laxvox tube (WRT) was evidenced as tangibly improving muscular tension in the throat when performed as part of a combined approach to VT. It also improved jitter and shimmer values and vocal ranges after a 10-15 session treatment programme (Sielska-Badurek et al, 2017). Jitter and shimmer are acoustic parameters (see glossary) that are useful in describing vocal characteristics (Teixeira, Oliveira and Lopes, 2013). Jitter values, for example, tend to be higher when there is less control of vibration and more vocal tension. The fact jitter values improved further supports WRT's efficacy for tension reduction.

Additionally, water submersion further supplements existing resistance properties of a straw (as opposed to leaving the distal end unsubmerged) (Guzman et al, 2016; Da Silva et al, 2019; Titze, Maxfield and Cox, 2022). The depth of submersion may be less (to lower resistance) for particular therapeutic purposes, as opposed to more for vocal training (Thomas, 2024). This is supported by the Meerschman et al (2019) study on dysphonia in singers, where water was deliberately kept to 2cm during WRT. Six out of eight participants described more comfortable vocalisation after a session, however, the authors hypothesise that a greater depth may have yielded even better results due to higher intraoral pressures (Meerschman et al, 2019). This may be the case, but there is also a possibility that higher resistance would have led to further constriction/tension for dysphonic voices (Thomas

2024), negating the point of the VT. For my students without diagnosed pathology, I would theorise that 2cm may not provide optimal resistance. However, Koufman et al (1996) suggested that even healthy singers present with higher levels of muscle tension compared to the general population due to the higher demand on their vocal systems. My students are not professionals so their vocal load is lighter, however, WRT at low submersion may still be relevant depending on their perception of vocal tension. Further study solely on healthy singers could better confirm this.

Additionally, straws create artificial lengthening of the vocal tract (Titze, 2006; Meerschman et al, 2019), which increases the desirable supraglottic pressure and inertive reactance discussed previously (Titze, 2006; 2018; Meerschman et al, 2019; Hijleh and Pinto, 2021). The elongation also encourages a lower larynx (Amarante-Andrade et al, 2016; Saldías et al, 2019; Little, 2020; Echternach et al, 2020) which is associated in classical singing with more relaxed vocal tract positioning (LeFevre, 2015).

Straw length and diameter also affect flow resistance and resulting levels of intraoral pressure (Smith and Titze, 2017, Meerschman et al, 2019; Guzman, 2021). Titze's research (2017; 2018) evidenced that straws with larger diameters create less resistance than smaller ones. Length is much less effective in changing resistance, unless the diameter is very small (2.5mm or less) (Smith and Titze, 2017). Therefore, in most cases, diameter is the most vital component for changing resistance (Amarante-Andrade et al, 2016; Guzman et al, 2016; Titze, 2018; Da Silva et al, 2019).

One aspect absent from the above studies is how enduring positive effects of WRT are. In both Meerschman et al', (2019) and Sielska-Badurek et al' (2017) studies, voice function tests were taken *immediately* after performing WRT with no mention of longer-term effects. WRT benefits have been accused of being short-lived (Echternach et al, 2020; Hornakova, 2023), which aligns with my own experience. However, Echternach et al (2020) state the remedy is frequency of performance, suggesting that WRT should be performed multiple times a day to influence muscle memory. Research by Saldías et al (2019) on healthy singers, offers some support to WRT's longer lasting benefits. Aerodynamic, electroglottographic, and acoustic measures were tested both immediately after a WRT vocal warmup and again after a vocal loading task and compared to a OVT warmup. The outcomes implied that the WRT warmup group were more successful at avoiding vocal fatigue (Saldías et al, 2019). This study is perhaps the most applicable to my practice, since it involved direct relation to the singing voice and the participants were without pathology. This led me to conclude that WRT as a consistent practice and/or warmup has potential, so the next section will explore this further.

Vocal Warmup

The 2019 study by Saldías et al supports a common theme in the literature that SOVTEs are beneficial as a vocal warmup (Portillo et al, 2018; Little, 2020; Savareh et al, 2023). Warmup exercises are evidenced to decrease muscle tension in healthy singers (Koufman et al, 1996) and prevent the likelihood of injury (Savareh et al, 2023). In a study by Savareh et al (2023), muscle tension was tested in healthy singers before and after SOVTE based warmups. Electrodes were placed at the infrahyoid and suprahyoid muscles to measure muscle reactance, and results showed a reduction in muscular activity in both regions. Participants also expressed that phonation was easier. This study echoes the findings of Saldías et al (2019), reinforcing that SOVTE warmups lead to tension reduction. Hijleh and Pinto (2021) additionally claim that heightened flow resistance from WRT has the potential to aid breath conditioning and that increasing the work of the respiratory system acts as a valuable warmup (Hijleh and Pinto, 2021). It also offers a safe way for training singers to learn breath pressure management without the danger of high impact singing hindering vocal health (Hijleh and Pinto, 2021).

To summarise, WRT appears a positive and healthy vocal warmup since the perceived benefits likely carry over into *immediate* singing and may even protect against vocal loading induced tension and fatigue (Saldías et al, 2019). I was therefore keen to strategize the use of WRT as a warmup to implement in future lessons. However, on using my reflective model, I noted in my reflective journal that although I had a better understanding of the ‘what?’ (WRT) and ‘so what?’ (the positive scientific findings), I was less sure of the ‘now what?’ (how to apply the learning in lessons) (Borton, 1970; Driscoll, 1994; Rolfe, 2001). How should I choose and control WRT variables for my vocal needs, or indeed my students’? This question was so far unanswered by what I had read and led me to follow Kolb’s Learning Cycle (Kolb and Kolb, 2018) to reflect on my previous experience of WRT.

Kolb’s Learning Cycle:

1. Experience: I looked back on my experience of performing WRT with a range of straw lengths, diameters and depths.
2. Reflection: I had observed more openness in my throat and a feeling comparable to the “massage-like effect” (Meerschman et al, 2019, p.57; Guzman, 2021) when using a 10mm diameter straw at 1-2cm submersion. I tended towards throat discomfort when using wider straws. Narrower ones didn’t initiate the massage sensation but seemed helpful for vocal clarity.

3. Conceptualising: Initially, my SLT Laura Thomas (2024) recommended a wider straw (13mm) to avoid exacerbating constriction, but I found that a slightly narrower straw provided a more comfortable sensation. This led me to reflect that it seems important to tailor WRT conditions to the individual and that initially I may not have been utilising optimum conditions for my voice. Da Silva et al (2019) supports this by stating it is more effective if the appropriate tube is selected according to the voice-user's needs immediately. I reflected that my students do not have MTD and therefore likely have diverse needs.
4. Planning/Implementing: I planned to research geometric straw properties and WRT variable adjustments to suit diverse needs. Online, many demonstrations do not control important variables necessary for optimum performance (Guzman, 2021), therefore I reflected on the need to better understand variable adjustments myself to ensure my students benefit.

Following Kolb's learning cycle helped me to reflect on what I was yet to understand about WRT application. This informed my next avenues of research, the findings of which I present below.

A Deeper Look at Geometric Straw Properties

Titze, Maxfield and Cox (2022) found that a long, 2.5-3mm diameter tube was best for high resistance training. Narrow diameter is supported above by Smith and Titze (2017). Titze, Maxfield and Cox (2022) state that narrower straws should be used for broadening the vocal tract and encouraging the top of the vocal folds to spread (this reduces collision trauma, as discussed previously). They did acknowledge that lower resistance, larger diameter straws are initially useful for those who have difficulty with higher pressures or are new to SOVTEs (Titze, Maxfield and Cox, 2022). Overall, though, they insist that higher resistance straws lead to significantly more benefits. This will be important to keep in mind when applying WRT in lessons.

This finding led me to examine my bias, since the straws I had utilised were less resistance inducing. Kolb's cycle helped me reflect on my own experience and then recognise the need to focus in on the literature, since my experience would likely differ to my students. However, when researching singers' straws on the market, the leading brands also had larger diameter. Vocal Tubes (35cm L, 13mm D), Lax Vox (35cm L, 10mm D) and Ray Vox Resono (30cm L 11mm) D, all present diameters significantly higher than the 6mm highest in the Titze, Maxfield, and Cox (2022) and Saldías et al (2019) studies. Laxvox and Vocal Tubes do not explain why their dimensions were chosen, but Saldías et al (2019) acknowledge that wider diameters are associated with an intensification of the WRT massage effect, so this may be one explanation. On the websites of popular straws discussed above, dimension choices aren't explained. Rayvox have the most transparent information on their website and cite many of the same papers included in my review. They

state that each person has a unique “starting pressure” to cause vocal fold vibration, so will have a different optimum flow resistance (Rayvox, 2024, paragraph 5), a reason why they sell a customisable straw. Their standard straw though is similar in diameter to a 10mm one included in the Guzman et al (2016) study, which yielded the best results at 10cm submersion in water when tested on a range of voices: healthy, pathological, singers or non-singers. This, along with the other popular brands suggests that 10cm diameter or similar appears a sensible choice, especially for tension release (Saldías et al, 2019). However, evidence also strongly supports smaller diameters for voice training (Saldías et al, 2019; Titze, Maxfield and Cox, 2022; Boder, 2023). At this stage of my learning, when suggesting a straw for a student, I would ensure I listen closely to their sensory feedback and adjust as necessary, since there appears to be varying information. Additionally, following Kolb’s cycle with my students may be a useful way to reflect on their individual experience and improve application accordingly.

Water Submersion Depth

Deeper water submersion appears to necessitate higher levels of vocal fold adduction by raising resistance flow (Guzman et al, 2006; Saldías et al, 2019). Guzman et al (2006) conclude that individuals with low vocal fold adduction would benefit from deeper submersion, whereas lower submersion would benefit those with hyperadduction. Hyperadduction is one presentation of hyperfunctional dysphonia (Tang, Mor and Blitzer, 2019) and Sovijärvi (quoted by Guzman et al, 2006) suggested that in the case of hyperfunctional voice, 1-2cm submersion is optimum compared to 10-15cm for those with vocal fold paresis. Although this was a study on voice disorders, I postulated that the same rule could be loosely generalised to two types of singers I come across in my practice. The first presents with pressed phonation, which could be a sign of hyperadduction, and the second presents with breathiness, which could indicate hypoadduction (Spencer et al, 2011; Regner et al, 2012; McKenna et al, 2020). Therefore, part of my strategy for applying WRT could take this into account when choosing submersion depth for each individual.

However, when Calvache et al (2020) studied WRT effects on normal and hyperfunctional subjects, they found the best vocal economy results to be at 10cm submersion (3cm was also measured) *regardless* of their vocal health status. This contradicts Sovjarvi and Guzman’s findings that 1-2cm is best for those with hyperfunction and hyperadduction. In the Calvache et al study, it is specified that those with hyperfunction were mild cases, which could offer a possible explanation for why they coped well with higher resistance. Yet, during VT for my own ‘mild hyperfunction’, depths of 1-2cm were recommended, and I find this most beneficial. Titze, Maxfield and Cox (2022) offer a further endorsement for 10cm submersion, and as this is a study solely on healthy voices, it is likely

more relevant to my practice. Bearing all of this in mind, I would be inclined to suggest 10cm depth as a gold standard but will likely trial lower depths for those with pressed phonation or higher tendency to tension - especially since a leading brand (Laxvox) also suggest 1-2cm submersion with potential increase to 4-7cm. A major limitation in the data above is that participants across all studies are almost entirely non-singers. Therefore, more specific research on how WRT depths affect training classical singers with differing vocal characteristics (breathiness/pressed phonation) would be needed to better establish individualisation of WRT.

Strategies: How Should WRT be Used?

In a lecture by Guzman (2021), he refers to eight exercises that can be performed through WRT:

1. Bubbles without pitch
2. Vocal tract configuration changes – i.e. more vertical depth to lip shape
3. Low hum sustained pitch
4. Glissandos
5. *Messa di voce*
6. Accents
7. Song melody
8. Prosody (speech melody)

1,2,3,4 and 7 were presented to me in steps during VT with Thomas (2024). Morris (2024) similarly advised me to build up in steps, starting with bubbles without pitch, then adding hums and glissandos in sets of threes. Since this was presented in a VT, I wondered if it would be appropriate for my students. After further research, I found that Laxvox present similar advice on their website, and online others advocate for a comparable process of gradual intensification in threes (Little, 2020; Ter-Agapova, 2022). This has informed my strategy below:

Step 1: *Selecting the straw*

Various straw materials have been mentioned in the studies (Guzman et al, 2006; Amarante-Andrade et al, 2016; Titze, Maxfield and Cox, 2022):

1. Resonance glass tube
2. Flexible plastic or silicon tube

3. Normal drinking straw

I would suggest a flexible silicon/plastic straw, which appears the popular choice from those on the market (Laxvox; Vocal Tubes; Rayvox). It may be easier to maintain good posture if the straw can bend slightly towards the singer (Guzman, 2021). Additionally, it is better to select a straw with a 45-degree angle (Vocal Tubes and Laxvox adhere to this) or to lift it away from the bottom of the container. If the bottom of the tube is blocked by the container, this will further supplement resistance (Guzman, 2021).

I would suggest trialling a wide diameter straw (c10mm) if the student is new to WRT (Titze, Maxfield and Cox, 2022) and then decrease diameter. I feel more inclined to trial smaller diameter on students with perceptually normal voice (Titze, Maxfield and Cox, 2022) or breathiness, as opposed to pressed phonation (Guzman et al, 2006).

Step 2: *Controlling variables*

Once the straw has been selected, variables to control include depth of water submersion, (Little, 2020; Guzman, 2021) and singer's sensation/ease of phonation (Guzman, 2021; Boder, 2023). This could be monitored through listening and discussion with the singer (Guzman, 2021). I would suggest 10cm submersion (Calvache et al, 2020; Titze, Maxfield and Cox, 2022) but may work up to this from 1-2cm for those new to WRT and/or pressed phonation (Guzman et al, 2006; Laxvox, 2024; Thomas, 2024).

Step 3: *Establishing even breath flow through the straw*

Start blowing bubbles gently through the straw *without* pitch to get used to creating even vibrations of bubbles (Ter-Agapova, 2022; Morris, 2024; Laxvox, 2024).

Step 4: *Adding pitch*

Starting with a low hum through the straw in a comfortable range towards the bottom of the voice. Repeat three times (Ter-Agapova, 2022; Morris, 2024, Laxvox, 2024).

Step 5: *Glissando*

Add a pitch glide (glissando) from low to high through the straw. Repeat three times, increasing the range gradually on each occasion (Guzman, 2021; Morris, 2024).

Step 6: Sections of songs

Humming melodic sections through the straw (Ter-agapova, 2022; Laxvox, 2024; Thomas 2024).

Conclusion

My research has led me to recognise that WRT is well-supported by the literature in encouraging tension release and as a vocal warmup strategy (Saldías et al, 2019; (Hijleh and Pinto, 2021; Guzman, 2021). I underestimated the breadth of WRT as a topic and how variable straw properties are across different studies. There was limited evidence to conclude precisely which straw conditions may be best suited to individual singers, but I learnt there are many factors we should control when performing WRT (Guzman, 2021). Since outcomes are potentially individual (Boder, 2023), I would conclude that the most important variables to monitor are the singer's sensation and ease of phonation (Guzman, 2021; Boder, 2023). This involves listening and communicating with the singer to determine whether the WRT conditions suggested work optimally for them. There is evidence to suggest that lower resistance conditions may be the safe choice for overtly tense voices and as an initial introduction to WRT (Titze, Maxfield and Cox, 2022; Boder, 2023; Laxvox, 2024). Smaller diameter and deeper submersion should not be overlooked when it comes to vocal training (Titze, Maxfield and Cox, 2022) and certain issues, such as breathiness, since strengthening the respiratory system is vital for healthy, tension-free singing (Hijleh and Pinto, 2021). This supports that WRT, whether used at high or low resistance, still works toward reduction of tension and promotion of vocal health.

I feel confident in executing my strategy in lessons; plans for which can be found in my personal development in Appendix A. However, I will continue to search for further evidence supporting the use of wider straws, since narrower ones were more readily discussed in the literature, causing me to question how the dimensions for Vocal Tubes, Laxvox and Rayvox were determined. Further studies are needed to assess wider diameters (or popular brand dimensions) on healthy singers. Future personal research will investigate the differences in optimum intraoral pressure between males and females (Boder, 2023), and exploring other WRT teaching strategies, such as cooldowns, which were beyond the size constraints of this paper.

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Appendix A:

Personal Development Plan (PDP)

Learning Focus:	Practice Development:	Timeframe:
Activity 1	Trial my strategy on my private adult and teenage students.	Ongoing
Activity 2	Reflect individually with my students on the outcomes and potential adjustments using Kolb's cycle (Kolb and Kolb, 2018).	Ongoing
Action	Assess the efficacy of the strategy across 5 students to decide whether it needs development or is worth implementing with further students.	Ongoing

Learning Focus:	Research Topic:	Timeframe:
Objective	Better time management for proceeding modules,	

	selection of module 3 topic to prepare in advance.	
Activity 1	Initial reading on teaching children and teenagers to decide whether I would like to look at this as my module three topic.	End of November
Activity 2	Watch the five ITOL certificate videos on VSC studio for 'Working With Young Voices'.	Start of December
Action	Make notes on themes potential avenues to explore for Module 3.	Mid December

Appendix B:

Glossary

Points 1-7 by Hijleh and Pinto (2021).

1. **Glottis** – The part of the larynx consisting of the vocal folds and the opening between them
2. **Intraglottal** - In the glottis; between the folds
3. **Intraoral pressure** – pressure in the mouth
4. **Subglottal pressure** – pressure below the glottis, building from the lungs
5. **Supraglottal pressure** – pressure above the glottis often called back pressure
6. **Transglottal pressure** – pressure moving through or across the glottis, calculated by subtracting supraglottic pressure from subglottic pressure
7. **Phonation Pressure Threshold** – the amount of subglottic pressure needed for the vocal folds to vibrate
8. **Shimmer** - related to “noise emission and breathiness” (Teixeira, Oliveira and Lopes, 2013, p1113). Shimmer values tend to improve when there is more efficient voicing.
9. **Jitter** - defined as “the parameter of frequency variation from cycle to cycle” of vocal fold vibration (Teixeira, Oliveira and Lopes, 2013, p1113).

10. **Glissando** – “A rapid sliding up or down the musical scale” (Merriam-Webster Dictionary, 2024).
11. **Messa di voce** – “The singing of a gradual crescendo and decrescendo on a long-sustained tone” (Merriam-Webster Dictionary, 2024).

Appendix C:

What are SOVTEs?

SOVTEs are a group of exercises used in both VT and training, performed by obstructing, either fully or partially, the opening of the mouth (Titze, 2006; Hijley and Pinto, 2021). Dr Guzman, (2021) explains that SOVTEs can be divided into three categories: Constant Semi-Occlusion, Oscillatory Semi-Occlusion and Transitory Semi-Occlusion. Examples of Constant Semi-Occlusion include Tube phonation, Tube in water (WRT), consonants V/Z/J, Nasals and Humming. Examples of Oscillatory Semi occlusions (due to the vibrational movement of the exercises) are Lip Trills, Raspberry and Rolled ‘R’ or Tongue Trills. Examples of Transitory Semi-Occlusions include articulating the sounds ‘B’ and ‘D’ however this group is predominantly used in VT (Guzman, 2021).