

Module 4 and 5 Assignment (BMPF7013)

by

Gökçe Kutsal

(1911199)

University of Wales Trinity Saint David

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1. The Portfolio

1.1. Introduction and Rationale

My main aim in this independent study is to conduct a thorough investigation of the existing literature on ‘twang’, ‘pharyngeal narrowing’ and ‘tongue root activity’ to gain a deeper understanding of these parameters in the voice production mechanism. As a singer and a private vocal coach to Contemporary Commercial Music (CCM) singers, actors and voice-over artists, I have encountered twang numerous times in contemporary voice models such as Estill Voice Training and Complete Vocal Technique. In the beginning, my assumption was that there would be numerous studies on this topic, as twang is a widely used term and it is discussed extensively in professional circles. I also predicted there would be a consensus on the definition and possible applications to teaching.

In the aforementioned contemporary voice models, ‘twang’ is described as an increase in higher frequency content caused by the narrowing of the aryepiglottic sphincter (AES) (Steinhauer, McDonald Klimek and Estill, 2017; Sadolin, 2019, 2020). However, it is not possible to move the epiglottis in isolation and in order for epiglottis to move, the tongue root must move as well (Ballentine and Obert, 2019; Obert, 2019). Throughout voice pedagogy history, twang has been subjectively described as singer’s formant, squillo, ring, brightness, forward placement, pharyngeal voice, lighter sound colour or even nasality (Yanagisawa *et al.*, 1989; Sundberg and Thalén, 2010; Kayes, 2013; Sundberg, 2014; Heidemann, 2016; McGlashan, Thuesen and Sadolin, 2017; Perna, 2020; Sadolin, 2020). As a result, reviewing current research on twang has yielded conflicting terminology, descriptions and voice qualities.

During my previous studies, I had encountered an educational video by clinical voice pathologist Kerrie Obert (Obert, 2019). In this video, Obert questioned the relationship between the ring in the voice and narrowing of the AES. Instead, she proposed that the tongue

root was responsible for narrowing the AES. She also proposed two different approaches to twang, one being the narrowing of the AES while the second is a pharyngeal narrowing that results in closing of piriform sinuses and thus removing the anti-resonance effect of open piriform sinuses in the 4 kHz – 6 kHz range (Titze and Story, 1997; Bozeman, 2014a; Ballentine and Obert, 2019; Obert, 2019; Perta, Bae and Obert, 2020) while providing acoustic energy boost between 2500 - 4300 Hz (Yanagisawa *et al.*, 1989; Titze and Story, 1997; Perta, Bae and Obert, 2020). This proposal piqued my interest as it goes against the majority of current voice models. As I started experimenting with ‘twanging’ at two distinctly different levels of the vocal tract myself and with my clients, I noticed Obert’s proposal to have some validity and decided to explore this further in my studies.

Due to my background in acoustics, the approach to this study will include examining literature from several disciplines, ranging from classical pedagogy, contemporary voice models and acoustics to clinical voice pathology research. As a result, I need to gain better understanding of the International Phonetic Alphabet (International Phonetic Association, 2015) and “Absolute Spectral Tone Colour” chart and approximate formant locations by voice types (Bozeman, 2014b).

In my teaching practice, I occasionally demonstrate vocal acoustics using a spectrogram to my clients if they show interest or if they are visual learners. In my preliminary explorations, I clearly saw the effects of different twang strategies in the spectrogram analysis. Particularly, pharyngeal narrowing seems to increase all harmonics above 2 kHz, like a broadband increase in energy, up to the top of the spectrum. In contrast, full or partial tongue root engagement, which narrows the AES, appears to increase the energy of harmonics between 2 kHz – 4 kHz without an increase in energy above 5.5 kHz or 6 kHz. These are consistent with findings presented in currently available literature

(Yanagisawa *et al.*, 1989; Bozeman, 2014a; Ballentine and Obert, 2019; Obert, 2019; Perna, 2020).

Contemporary voice models such as CVT and EVT (Yanagisawa *et al.*, 1989; McGlashan, Thuesen and Sadolin, 2017; Steinhauer, McDonald Klimek and Estill, 2017; Sadolin, 2019, 2020), along with other voice research (Sundberg and Thalén, 2010; Perta, Bae and Obert, 2020), suggest that twang contributes to higher sound pressure levels, vocal intensity, greater brightness, clarity, energy, expressivity and better intelligibility. However, my experience as a CCM teacher is that the majority of my clients are reluctant to experiment with twang in their speaking and singing practices as they worry about coming across as annoying, nasal, loud or intrusive. I believe this is partially caused by the conflicting terminology and descriptions they are frequently exposed to.

Hence, the goal in this study is to analyse the prevailing definitions, descriptions and audio examples of twang to better understand its relationship to pharyngeal narrowing, AES narrowing and tongue root engagement.

1.2. Planned Programme of Study

The aims of this project are:

- To widen my understanding of different twang mechanisms as it relates to CCM genres,
- To gain a deeper understanding of the acoustic effects of twang using spectrogram analysis,
- To obtain clearer auditory understanding of different twang components,
- To critically research the latest studies and available information related to twang, as well as its practical applications to the voice studio.

The objectives of this project are:

- To thoroughly investigate the existing primary source material such as books and peer-reviewed journal articles for studies on twang,
- To consider twang's definition and its place in practitioners' approaches to CCM, comparing and contrasting with the findings from primary sources,
- To evaluate the effects of any conflicting information or discrepancy in terminology on students' learning,
- To assess the need for consistent terminology and identify any gaps in existing literature for further studies.

The proposed timeline for this study:

- August 2020 – Topic will be discussed and narrowed down with Tutor
- September 2020 – Preliminary literature review, aims and objectives
- October 2020 – Further research into literature and non-primary sources
- November 2020 – Analysis of literature along with audio examples
- December 2020 – Completion of assignment and draft submission
- January 2021 – Reviewing and final submission

1.3. Literature Review Process

The definition of a literature review is “a more or less systematic way of collecting and synthesizing previous research” (Baumeister & Leary, 1997, as cited in Snyder, 2019; Tranfield, Denyer & Smart, 2003, as cited in Snyder, 2019) with the main goal being an integration of findings and perspectives from numerous studies. Critical evaluation of the literature and findings is important to avoid weaknesses in literature reviews (Cooper, 1989).

In previous studies, I have engaged in electronic source analysis with various combinations of keywords such as ‘vocal’, ‘twang’, ‘aryepiglottic sphincter’, ‘tongue root’, ‘singing’, ‘voice’ and ‘acoustics’. Results included peer-reviewed articles from esteemed journals on voice and singing, educational videos, lectures and books written by highly regarded practitioners and voice researchers. Sifting through and analysing these sources allowed a thorough understanding of the currently available literature and differing approaches to twang.

After the preliminary literature review, it became evident that the current research and voice models lack common terminology and a clear definition of twang. To be more precise, there appears to be two distinct approaches to ‘twang’ in the literature and practitioners’ practice. The first definition refers to a narrowing of AES only (Titze and Story, 1997; Titze, 2001; McGlashan, Thuesen and Sadolin, 2017; Steinhauer, McDonald Klimek and Estill, 2017; Estill, McDonald Klimek and Steinhauer, 2018a; Sadolin, 2019, 2020), whereas the second one suggests twang has a component of pharyngeal narrowing (Ballentine and Obert, 2019; Obert, 2019; Perta, Bae and Obert, 2020). It is possible to produce these gestures separately in the vocal tract (Perta, Bae and Obert, 2020). The fact that both of these gestures are referred to as ‘twang’ in the literature, vocal technique circles and teaching studios, appears to cause confusion and misunderstandings among singers and voice teachers. Given the differences in terminology, a systematic approach would not be suitable for the purposes of this study (Snyder, 2019a).

From my previous studies and familiarity with paradigms and frameworks, I am aware of my personal preference for pragmatic and hermeneutic approaches to research as they relate to my own teaching practice and background as an acoustics specialist (Guba and Lincoln, 1994; Mackenzie and Knipe, 2006; Morgan, 2007; Creswell, 2014; Crowther *et al.*, 2017). Hence, this study will be based on a narrative critique and analysis of existing

literature and other relevant sources (Snyder, 2019a; Stratton, 2019). The aim of this study is to assess and critique the existing literature on ‘twang’, therefore a hermeneutic approach with a narrative review would be appropriate due to its focus on critiquing the readily available data while allowing for the subjective interpretation of the researcher (Manen, 2007; Brown, 2010). I believe a narrative review is suitable for the research I aim to conduct as its applications include identifying “theory and frames of thought on a topic” while also justifying a research topic (Stratton, 2019). This approach is more favourable given the strict time limitations as it allows the researcher to determine which literature to include in the study, thus, it is a less time intensive approach. Due to its unstructured nature and lack of systematic synthesis, it has the disadvantage of being not reproducible along with risking bias as the relevant literature selection is determined by the researcher (Stratton, 2019). This study will also include a documentary analysis, which is “a systematic procedure for reviewing or evaluating documents” (Bowen, 2009). It is often used alongside other qualitative research methods. In such studies, drawing upon multiple sources of evidence is expected.

A literature review can be considered as a research methodology in certain contexts with 4 phases (Snyder, 2019a). The first phase should include defining the research questions the review will address. Thus, the following questions were formulated:

- What is the definition of twang in different models and pedagogic approaches?
- How does its meaning and use differ among researchers and practitioners?
- What is the acoustic profile of twang in the spectrogram? Does it differ with various models and approaches?
- Is there a consensus among practitioners on twang?

My preliminary research revealed that the existing primary source literature on twang is scarce and limited in scope. However, singing teachers all over the world have been teaching this concept for more than a century (Garcia, M. as cited in Steinhauer et al., 2017;

Helmholtz, H. as cited in Ballentine & Obert, 2019). With this knowledge, I realised the need for gaining a deeper understanding of what is currently being taught by other teachers, with a specific focus on the information my clients are exposed to in this technology age. As the topic would be raised often in sessions with my clients, I knew about their preference for watching videos of voice teachers on YouTube for new insights and information on vocal health and technique. This led me to conduct an exploratory search on the platform to gain insight into the information available on twang.

Unexpectedly for me, there were numerous videos in several languages about this topic and a significant number of those had view counts higher than 40.000, some of which over 297.000, at the time of my writing. Upon viewing some of these videos, it became clear to me that voice teachers indeed had different descriptions of twang, along with different voice qualities as examples. Existence of numerous videos was an advantage for this study.

When primary sources are limited or fractured, the researcher might consider adding other sources of knowledge that would otherwise not be considered appropriate for an academic study. This ‘grey literature’ refers to “diverse and heterogeneous” materials that are not subjected to traditional academic review processes (Adams, Smart and Huff, 2017). It is composed of knowledge pieces that are not produced by peer-reviewed processes and published outside peer-reviewed media (Lawrence *et al.*, 2014). This may include newsletters, presentations, book chapters, webinars, videos, blogs, emails and other forms of informal communication (Adams, Smart and Huff, 2017). Traditional scholarly research, which are published in high quality and peer-reviewed journals are referred to as ‘white literature’. Nonetheless, researchers have recognised the importance of broadening their knowledge base beyond academic journals (Adams *et al.*, 2015, as cited in Adams, Smart and Huff, 2017; Sharma *et al.*, 2015, as cited in Adams, Smart and Huff, 2017). In a way, it is sensible to think that individuals outside academic circles are also capable of producing high

quality work (Gibbons *et al.*, 1994; Adams, Smart and Huff, 2017; Winter, 2020). Advantages of including grey literature in studies are addressing publication bias in peer-reviewed media (Hopewell *et al.*, 2007, as cited in Adams, Smart and Huff, 2017), exposure to potentially relevant and valuable material from other disciplines and also from real-life practices. In contrast, some of the disadvantages might be the lack of an abstract, which might result in longer time frames for sifting, along with questions of quality due to unknown training, experience and background of authors. The main sources in this review will be videos, which are called 2nd Tier Grey Literature by Adams, Smart and Huff (2017). These sources have moderate retrievability and moderate credibility. The main drawback of including videos in this study is that there is limited background information available on the practitioners creating these videos. Hence, their level of skill or expertise, or their qualifications cannot be determined with ease or certainty.

However, these practitioners have gained a worldwide audience and have reached significantly high view counts. Thus, their teachings may greatly influence singers and other practitioners. As per my personal experience with my clients, the inconsistent use of terminology in these videos results in confusion among voice users. As a result, I believe it is important to analyse the grey sources available on this topic in a documentary analysis (Bell and Waters, 2018). These videos will allow me to gain insight into teachings of other practitioners so that their compatibility with the peer-reviewed research available on twang can be analysed. I believe it is important to include knowledge and opinions from those who have been practicing for years (Schön, 1983).

The main method of finding and accessing practitioner videos is the search engine of YouTube. With the search engine, it is possible to sort videos by view counts. Thus, the purposeful sampling strategy will be convenience sampling, followed by purposive sampling to find videos that are best representative of the teachings of other practitioners (Lincoln and

Guba, 1989; Hoepfl, 1997). It is important to acknowledge that the algorithm of this search engine tailors videos to each viewer's interests, meaning that the same keywords may produce different search results for different users according to their search history and previous viewings (Youtube Creator Academy, 2020). To avoid biased results, a new user was created on the computer and the website was accessed from a private browser window without pre-existing cookies.

The method of analysis will include downloading audio files from YouTube videos and analysing them using the spectrogram in a specialist acoustic analysis software, VoceVista Video Pro (Sygyt Software, 2021). According to my previous review of literature, the two distinct approaches to twang proposed by Obert should present differently in the spectrogram. Pharyngeal narrowing alone should result in add brightness to the voice through “a concentration of acoustic energy around 3 kHz” (Yanagisawa *et al.*, 1989), an increase in energy between 2 kHz – 4 kHz (Titze and Story, 1997; Bozeman, 2014a; Ballentine and Obert, 2019; Obert, 2019; Perta, Bae and Obert, 2020) or an increase in energy in the 4 kHz – 7 kHz range (Perna, 2020). According to these sources, brighter harmonics after 2 kHz that appear like a broadband increase in energy, up to the top of the spectrum, should indicate pharyngeal narrowing. In contrast, tongue root engagement and therefore narrowing of the AES would be present as anti-resonance in the 4 kHz – 6 kHz range (Obert, 2019). Therefore, in the spectrogram, brighter harmonics should be visible at 2 kHz – 4 kHz, without an increase in energy at or after 6 kHz. Through an analysis of descriptions, exercises and spectrogram views, I aim to explore and critically evaluate the similarities and differences in practitioners' approaches to twang.

Because my main goal in this review is to analyse the online practitioner practice examples to compare and contrast with relevant research, I approach this study as an acoustics specialist, a voice pedagogue but also as a singer. I have first-hand experience on

how misleading or confusing incorrect terminology might be for a singer. As a result, I acknowledge that I might be biased about the terminology used by other practitioners in online videos. Therefore, I aim to deepen my understanding of twang while also being objective in my analysis.

1.4. Critical Reflection and the Learning Process

The topic of twang first caught my attention as highly controversial in my teaching practice when I noticed resistance from my clients with concerns about nasality. From theory of reflection, I reckon it was reflection in and on action that started this process (Schön, 1983). From my previous training in contemporary voice models of Complete Vocal Technique and Estill Voice Training, I was already familiar with the concept of twang and its relationship with the aryepiglottic sphincter. My clients, on the other hand, often resorted to the ‘Kermit the Frog’ sound with back tongue activity or pharyngeal narrowing in an attempt to place the sound forward in the face. It was challenging for me to teach this concept as clients would also misinterpret the twang strategies they heard from their favourite CCM artists. This awareness, coupled with my interest in acoustics, has shaped this study as I decided to focus on twang to understand what its exact definition is and how I can utilise it better in my teaching.

At the beginning, I realised a need to deepen my understanding of what literature review is and different methods for conducting a literature review. Therefore my initial research in this study included literature not on twang but on literature review methodologies, with a focus on documentary analysis (Cooper, 1989; Mercer, 2007; Bowen, 2009; Rhoades, 2011; Snyder, 2019b; Stratton, 2019). With this knowledge, I devised a systematic literature review of primary sources. This was relatively easy to achieve as I had previously researched the majority of these sources and had notes on them in my reflection journal.

However, after a period of sifting through the primary source literature on twang and its CCM applications, I had obtained several pages of contradictory information on twang with insufficient number of vocal exercises to employ in my teaching practice. It became clear that an analysis of the current primary source material such as scientific papers and published academic studies would not suffice due to conflicting terminology. During this time, I studied the lecture video by Kerrie Obert, who introduced twang and tongue root engagement as two different concepts. At this point I believed I had identified a gap in currently available knowledge on twang. To gain a better understanding, I was compelled to include secondary sources from CCM practitioners in my research. This provided numerous exercises I could use in my practice. The clear definition of twang in CVT and EVT models allowed me to separate tongue root engagement exercises from pharyngeal narrowing exercises in the literature.

I further realised that even though I had some knowledge of contemporary voice models, my knowledge of other CCM practitioners' teachings was limited. As mentioned by Schön, the need for continuing my self-education process to further my own practice as a practitioner researcher became evident (Schön, 1983). Unfortunately, interviews with other practitioners or forming focus groups, which was the initial idea I had for a semi-structured data collection method in what would be a qualitative research project (Fern, 1982; Kitzinger, 1995; Morgan, 1996; Gill *et al.*, 2008), were not possible due to pandemic restrictions. This limitation steered my study in the direction of documentary analysis, where I decided to analyse other practitioners' already available online teachings.

Initially I had reservations about citing sources other than primary literature in my study and it compelled me to research what other forms of literature may be used in an academic study. At this point, I was introduced to the concept of grey literature by my tutor (Lawrence *et al.*, 2014; Adams, Smart and Huff, 2017). I had concerns about conducting my

study from YouTube, with source material selection taking too much time, videos being irrelevant to the topic or the unknown background of the practitioners on these videos. Nevertheless, the limited time frame of the study prompted me to create a tentative framework for source selection and analysis. Spectrogram analysis of the first few videos revealed that the methodology I had devised could work if the audio quality was sufficiently high, and that the distinction between AES narrowing and pharyngeal narrowing was clearly visible in the spectrogram. As I was discussing my research study with a fellow practitioner, I was surprised to find out that her search results on the platform's search engine were significantly different than mine. Realising that the search engine tailors results to individuals was a revelation and an inconvenience at the same time. This meant I needed to find a way to overcome the algorithm or my results would be biased. Luckily, this realisation happened before the study had progressed further. Otherwise, samples would certainly be biased. After researching online how the YouTube search engine algorithm works, I had the necessary information to avoid biased search results.

I was surprised to see the high number of videos available on twang, which was higher than one could realistically include in a study within the given time frame. To decide on how to select from this pool, refreshing my knowledge on sampling methodologies was required (Winter, no date; Berg, 2001). I could narrow the overall number of videos to include down to 10 based on view counts and availability of vocal demonstrations. This was further reduced to 8 as 2 videos did not include demonstrations without backing instruments or had consistent background noise.

At this point I was undecided on whether to include or remove another video since 2 videos were produced by the same practitioner. My review of sources on documentary analysis did not provide a definitive guidance on this issue. Upon examining the differences between these videos, the 3-year time gap between them and the knowledge presented caught

my attention. In the first video, the practitioner presents a definition to twang with quite brief vocal demonstrations. In the second one, the explanation is deepened with quotations and references, along with two vocal exercises. As a result, I decided to include both videos in the analysis. Unforeseen by me at the time, this posed difficulties in the presentation of findings with 8 videos but 7 practitioners. If I were to conduct this study again, I would decide against the inclusion of the second video and instead find another video with a different practitioner. In future studies, I will certainly keep this in mind.

The findings table and discussion part of the assignment took more time than previously anticipated, which required constant revisions as I would notice an important element must be added after analysing a few videos and needed to go back to the first videos again for that bit of information. In a sense, this process was similar to the systematic cycles of action, as in the ‘Look-Act-Think’ model, since it had an action phase with gathering and analysing the information followed by a reflection phase (Berg, 2001; Reason and Bradbury, 2008; Hine, 2013; Winter, 2019). However, I believe the visual and auditory components of videos made analysing them quite enjoyable.

While working on this assignment, I had doubts about having specialised too much. Especially I had concerns about the applicability of my study to my teaching practice since the acoustic component of this study is quite technical. My use of the spectrogram in my teaching studio is limited to a few select students who display interest in acoustics and mechanics of the voice. Therefore, even though I enjoy working on twang with a spectrogram very much, I doubted the practical use of my findings.

Once the study was completed and this assignment was being written, I had the opportunity to briefly share my findings with a client who had previously resisted twang with concerns of sounding nasal. After sharing audio examples with him, along with anatomical explanations of both strategies, he decided to train them separately in new songs using a

spectrogram. He even asked for permission to record a portion of our session so that he could practice replicating the strategies we worked on with a spectrogram app on his smartphone. This was quite exciting for me since we have been working on twang for a few months with little progress and after that turning point, his concerns about nasality were cleared and his progress was not hindered by self-limiting thoughts.

At the end of this study, I can confidently say that it has expanded my vocabulary and toolkit greatly for teaching the two distinct strategies of twang to my clients. My reflection on this experience has highlighted some areas where modifications to my approach might result in improvements. The process of reflection, with different models of reflection in mind, has also helped me notice my own thought process and areas where further research is necessary to deepen my understanding. I believe this study has improved my competence and the knowledge I gained as a result of this research will aid my future studies greatly.

2. The Written Assignment

2.1. Introduction

The main aim of this independent study is to conduct a thorough investigation of the existing literature on ‘twang’, ‘pharyngeal narrowing’ and ‘tongue root activity’ to gain a deeper understanding of these parameters in the voice production mechanism, along with its applications to CCM teaching practice. As a singer with more than 13 years’ experience and a voice pedagogue for the last 5 years, I have experienced first-hand the misunderstandings about twang and its relationship with tongue root activity. In my previous literature review studies, I noticed several different descriptions for twang such as singer’s formant, squillo, ring, brightness, forward placement, pharyngeal voice, lighter sound colour or nasality (Yanagisawa *et al.*, 1989; Sundberg and Thalén, 2010; Kayes, 2013; Sundberg, 2014; Heidemann, 2016; McGlashan, Thuesen and Sadolin, 2017; Perna, 2020; Sadolin, 2020). As a result, reviewing current research on twang has yielded conflicting terminology, descriptions and voice qualities.

In contemporary voice models, such as CVT and Estill, twang is said to be a necessary component of healthy voice production that results in easier and freer voice use (Steinhauer, McDonald Klimek and Estill, 2017; Hoch, 2018; Sadolin, 2020). Its uses for improving resonance in singers is noted in literature (Titze, 2001; Rayapati, 2008). Twang is also mentioned as an important element in certain belting sub-styles, which are quite relevant to CCM singing styles (Sundberg, Thalén and Popeil, 2012; Guzman *et al.*, 2014). It may especially help in raising the larynx and increasing the volume and projection of the voice for belting styles (Kayes, 2013; Rooney, 2016). Similarly, a narrow pharyngeal space is used as a tool for accessing different belt qualities (Burdick, 2005; McGlashan, Thuesen and Sadolin, 2017; Estill, McDonald Klimek and Steinhauer, 2018b). An analysis of literature suggests twang has numerous uses and benefits, from easier and more efficient voice production to

increased volume, brightness and resonance, which are among the main goals in a singing teacher's studio. Due to its prevalence in both classical and CCM singing pedagogical approaches, having a clear definition of what twang is and how it is achieved is imperative.

I have noticed that twang is commonly described in contemporary voice models as a bright, piercing quality that results from an increase in higher frequency content, caused by the narrowing of the aryepiglottic sphincter (AES) (Steinhauer, McDonald Klimek and Estill, 2017; Sadolin, 2019, 2020; Perta, Bae and Obert, 2020; Feng and Howard, 2021). However, as a clinical speech pathologist, Obert suggests is not possible to move the epiglottis in isolation and in order for epiglottis to move, the tongue root must move as well, closing the small depression known as the epiglottic vallecula between the tongue's posterior and the epiglottis (Standring, 2009; Knight, 2012; Ballentine and Obert, 2019; Obert, 2019; Faiss and Sharma, 2020; Feng and Howard, 2021). In light of her experience and research, Obert proposed the following names: APN (anterior to posterior narrowing) for tongue root engagement and LPN (lateral pharyngeal narrowing) for the twang sound (Obert, 2019). It is also possible to have a combination of these gestures in the vocal tract (Perta, Bae and Obert, 2020). This theory appears to go against the common school of thought of current CCM models regarding pharyngeal and AES narrowing differentiation for twang. Hence, it might provide a missing piece in the vocal puzzle that other theories and models do not provide answers to. However, the fact that both of these gestures are referred to as 'twang' in the literature, vocal technique circles and teaching studios, appears to cause confusion and misunderstandings among singers and voice teachers.

As a result of my preliminary research, it is evident that the existing primary source literature on twang is scarce and limited in scope. Yet singing teachers all over the world have been teaching this concept for more than a century (Garcia, M. as cited in Steinhauer et al., 2017; Helmholtz, H. as cited in Ballentine & Obert, 2019). Therefore, gaining a deeper

understanding of what is currently being taught as twang by other teachers was necessary. Due to COVID-19 restrictions, an analysis of video and audio examples available online was more feasible over focus groups or interviews with practitioners, with YouTube being the most accessible platform with numerous examples. Hence, the idea of obtaining audio samples from videos of practitioners on twang and conducting a documentary analysis on their teachings was generated.

It is possible to distinguish between a twangy sound dominated by a narrower pharyngeal wall versus tongue root engagement aurally and through the use of a spectrogram (Obert, 2019). Pharyngeal narrowing alone should result in added brightness to the voice through “a concentration of acoustic energy around 3 kHz” (Yanagisawa *et al.*, 1989), an increase in energy between 2 kHz – 4 kHz (Titze and Story, 1997; Bozeman, 2014a; Ballentine and Obert, 2019; Obert, 2019; Perta, Bae and Obert, 2020) or an increase in energy in the 4 kHz – 7 kHz range (Perna, 2020). Brighter harmonics after 2 kHz that appear like a broadband increase in energy, up to the top of the spectrum, should indicate pharyngeal narrowing. In contrast, tongue root engagement and therefore narrowing of the AES would be present as anti-resonance in the 4 kHz – 6 kHz range (Obert, 2019). Therefore, in the spectrogram, brighter harmonics should be visible at 2 kHz – 4 kHz, without an increase in energy at or after 6 kHz. These findings from literature have aided the spectrographic analysis of audio examples.

2.2. Source Material Selection Process

It is not entirely possible to know the total number of voice practitioners who upload technique tips and lessons to YouTube given the limitations of the platform. A quick search can produce a result with thousands of videos, often in multiple languages. Hence, this study is limited to videos with the highest view counts and those that are in English.

The main method of finding and accessing practitioner videos is through the search engine of YouTube. With the search engine, it is possible to sort videos by view counts. Therefore, the sampling strategy will be convenience-based (Lincoln and Guba, 1989; Hoepfl, 1997). It is important to acknowledge that the algorithm of this search engine tailors videos to each viewer's interests, which means that the same keywords may produce different search results for different users according to their search history and previous viewings (Youtube Creator Academy, 2020). To avoid personalised results, a new user was created on the computer and the website was accessed from a private browser window without pre-existing cookies.

The following videos were presented in the search results with the keywords 'singing', 'vocal' and 'twang', sorted by the highest view count on January 15th, 2021:

1. [Ep. 77 "What is Vocal Twang"](#) (Stoney, 2015) (298,883 views)
2. [How to Sing: HIGH and LOUD!](#) (Hollens, 2015) (298,336 views)
3. [Twang Vocal Technique - Sarah Brickel Singers Advice](#) (Brickel, 2012) (82,629 views)
4. [Do you have enough TWANG in your Voice? | Sing with Twang | #DrDan](#) (Robinson, 2014) (80,781 views)
5. [How to Sing With Twang](#) (with Dianne Divadi) (Divadi, 2016) (49,248 views)
6. [Vocal Twang: Definition and How to Exercises](#) (Petersen, 2018) (42,991 views)
7. [Singing with Vocal Twang | including exercises | #DrDan](#) (Robinson, 2017) (40,948 views)
8. [How To Sing Loud And High Using Twang WITHOUT Nyah, Wah & Hee \(Closed Soft Palate\) #SingingSensei](#) (Shimizu, 2016) (30,814 views)

All practitioners in these videos have YouTube channels dedicated to singing technique and lessons with a high number of subscribers. From their own descriptions in their channels, they all appear to offer singing courses and private lessons. The minimum years of experience mentioned in a channel is 6 years and the most recently started channel is from April 2014 (Petersen, 2021).

The original list contained 10 videos from search results. This number was chosen as the videos further down in the list either did not have the audio quality necessary for acoustic analysis, had lower view counts or were overly commercial for the purposes of this study. Having practitioners from different countries was a major consideration in the inclusion of these videos. After carefully viewing all 10 videos, one video that was relevant to nasality but did not mention twang in the title or the content was removed, even though it was included in search results (Robinson, 2016). Another video was removed due to the constant background noise of the outdoor environment interfering with acoustic analysis (Stoney, 2019). On this list, one practitioner appears to have 2 videos (Robinson, 2014, 2017). As these videos were uploaded three years apart, both were included in this study for their high view counts and also for the different information the practitioner provided in these videos, with the former involving a relatively brief description of twang with no exercises and the latter quoting a highly esteemed practitioner, Gillyanne Kayes, and presenting two exemplar vocal exercises.

Even though they are not publishing in a peer-reviewed medium, these practitioners have gained a worldwide audience and have reached significantly high view counts. Thus, their teachings greatly influence singers and teaching of other practitioners. My personal experience with my clients suggests that singers looking for vocal improvement often visit YouTube for singing technique lessons and ideas. Hence, it is important to analyse the grey sources available on this topic in a documentary analysis.

2.3. Analysis of Source Material

From my previous literature review, the relationship between different twang mechanisms and acoustic output is evident. Therefore, the method of analysis involves spectrographic evaluation and a comparison of practitioners' definitions of twang with their demonstrations.

The first step of this analysis was to download the audio files from YouTube videos. Each video was carefully viewed to understand the practitioner's approach to twang as well as to determine and obtain the most representative audio sample from their demonstrations. This was noted in time stamps for each video. At the third step, the audio snippet of twang without any instruments or noise in the background was analysed using the spectrogram in VoceVista Video Pro (Sygyt Software, 2021) to examine the acoustic output. This data was compared to findings from literature regarding acoustic effects of both strategies to note the indicated type of twang.

Afterwards, a table was created to present findings of this analysis (see Table 1 below).

	Name of Video	Practitioner, Country and Channel Name	Description of Twang	Analysed Audio Time Stamps	Acoustic Analysis	Indicated Type of Twang
1	Ep. 77 “What is Vocal Twang”	Justin Stoney (NY, USA) – New York Vocal Coaching	“bright qualities that result from the narrowing of the Aryepiglottic Sphincter ” ... “twang is different than nasal resonance ” (Stoney, 2015)	3:41 – 3:42	Brighter harmonics at 2 kHz – 4 kHz, clear reduction in energy at/after 6 kHz	AES narrowing
2	How to Sing: HIGH and LOUD!	Evyne Hollens (OR, USA) – Evyenne Hollens	“brightening, nasal sounding resonance” ... “ not nasality ” ... “ a nasal placement ” ... “putting [the voice] in to the front of your face” ... “your tongue will lift ” (Hollens, 2015)	2:17 – 2:18	Brighter harmonics at 2 kHz – 4 kHz, no reduction in energy up to the top of the frequency spectrum	Pharyngeal narrowing
3	Twang Vocal Technique - Sarah Brickel Singers Advice	Sarah Brickel (England, UK) – Singers Advice	“ tongue high in the back, retracted [false vocal folds]” ... “the feeling of [the voice] being very much in your head ” ... “thin fold mass” (Brickel, 2012)	2:36 – 2:39 (on A#3) 6:42 – 6:48 (on C5)	Brighter harmonics at 2 kHz – 4 kHz, clear reduction in energy at/after 6 kHz	AES narrowing
4	Do you have enough TWANG in your Voice? Sing with Twang #DrDan	Dr. Daniel K. Robinson (QLD, Australia) – Dr Dan’s Voice Essentials	“that’s what most people think twang is, nasality. But it isn’t” ... “any sound that travels through the nasal cavity is by definition nasalised. But twang is different ” ... “Twang is produced in a much lower section of the vocal tract, directly above the vocal folds, in a space called the laryngopharynx” ... “the laryngopharynx is shaped by the epiglottis” ... “often referred to as the twanger, the aryepiglottic sphincter narrows the laryngopharynx” ... “easily associated, albeit incorrectly, with nasality ” (Robinson, 2014)	1:18 – 1:20	Brighter harmonics at 2 kHz – 4 kHz, clear reduction in energy at/after 6 kHz	AES narrowing
5	How to Sing With Twang	Dianne Divadi (VIC, Australia) – The Songbird Tree by Kerri Ho	“twang is a technique” ... “an extreme form of resonance ” ... “in your face” (Divadi, 2016)	3:53 – 3:54	Brighter harmonics at 2 kHz – 6 kHz, no reduction in energy up to the top of the frequency spectrum	Pharyngeal narrowing

6	Vocal Twang: Definition and How to Exercises	Ronja Petersen (Denmark) – Singgeek	“ two different kinds of twang ” ... “twang that makes your voice louder , and then there is twang that is sort of nasal-y, Southern accent ” ... “the twang that we are talking about today is the twang that amplifies your voice” ... “what happens when you twang is that the epiglottis lowers itself down” (Petersen, 2018)	4:33 – 4:35	Brighter harmonics at 2 kHz – 6 kHz, slight reduction in energy up to the top of the frequency spectrum	Appears to be a combination of both AES narrowing and pharyngeal narrowing
7	Singing with Vocal Twang including exercises #DrDan	Dr. Daniel K. Robinson (QLD, Australia) – Dr Dan’s Voice Essentials	“Gillyanne Kayes, a singing voice specialist based in the UK, further qualifies twang as being characterised by a tightened aryepiglottic sphincter with high larynx and tongue” ... “immediately above the vocal folds” ... “twang is not nasality . It is added to the sound before the choice is made as to whether the sound will be directed through your nasal cavity or through the mouth” ... “one of the common denominators in both of today’s twang exercises is the use of an NG sound” ... “when we use the NG sound, it activates the aryepiglottic sphincter ” (Robinson, 2017)	7:42 – 7:43	Brighter harmonics at 2 kHz – 4.5 kHz, clear reduction in energy at/after 5 kHz	AES narrowing
8	How To Sing Loud And High Using Twang WITHOUT Nyah, Wah & Hee (Closed Soft Palate) #SingingSensei	Craig Shimizu (Japan / HI, USA) – Singing Sensei	“you can hear when [the nasal passage] closes because the voice gets very nasal” ... “and you are on your way to twang with your soft palate in its closed position, essential for twanging” ... “twang is produced in the laryngo-pharynx as the aryepiglottic fold closes” (Shimizu, 2016)	8:23 – 8:24 (on E3) 8:29 – 8:30 (on F#4)	Brighter harmonics at 2 kHz – 4 kHz, clear reduction in energy at/after 6 kHz	AES narrowing

Table 1. Descriptive and acoustic analysis of videos on twang.

2.4. Discussion

In addition to being a highly confusing term in the white literature, twang is also said to be a “hotly debated and often misunderstood topic” in practitioners’ practice (Robinson, 2014). Practitioners acknowledge the conflicting information about twang and its relationship to nasality in several videos (Robinson, 2014, 2017; Hollens, 2015; Stoney, 2015; Shimizu, 2016; Petersen, 2018). One practitioner in particular mentions the two different descriptions, or types, of twang with one being louder and the other being more nasal (Petersen, 2018).

Some practitioners have a scientific approach to their teaching with precise anatomical knowledge, citing highly esteemed voice practitioners, i.e. Gillyanne Kayes (Robinson, 2017), or contemporary voice models, such as Estill Voice Training (Brickel, 2012; Robinson, 2017). 4 practitioners specifically mention the laryngopharynx and the aryepiglottic sphincter’s movement for producing twang. Some include illustrations of the AES and explain the effect of its narrowing with resonant chambers (Robinson, 2014; Shimizu, 2016; Petersen, 2018) or liken it to a thumb at the tip of a garden hose, narrowing the opening and increasing the water pressure (Robinson, 2014; Petersen, 2018). Most practitioners appear to have a solid understanding of the voice production mechanism and a consensus on acoustic effects of twang. In fact, 3 videos include information about the acoustic effects of twang, such as increasing the perceived loudness by 600%, but the original source of this information was not presented in any videos (Robinson, 2014, 2017; Hollens, 2015; Divadi, 2016). Additionally; increasing efficiency by reducing vocal effort and breathiness, adding brightness without sacrificing depth, increasing projection, better vocal fold closure are given as reasons to include twang in one’s singing practice (Brickel, 2012; Robinson, 2014, 2017; Hollens, 2015; Stoney, 2015; Divadi, 2016; Petersen, 2018). It is also recommended for singing notes that would be too high for belting (Brickel, 2012; Hollens,

2015). Twang's relevance to both classical and contemporary styles is also mentioned by some practitioners (Robinson, 2014; Stoney, 2015).

In contrast to the scientific approach, 3 practitioners appear to have a more kinaesthetic approach to their descriptions of twang, mentioning subjective kinaesthetic words such as 'tongue high in the back' (Brickel, 2012), 'bright' (Hollens, 2015; Stoney, 2015), or 'in front of your face' (Hollens, 2015; Divadi, 2016). 'Scrunching the face' is also suggested for facilitating finding twang (Brickel, 2012; Hollens, 2015). It should be noted that 'scrunching the face' might be effective for predominantly pharyngeal narrowing as opposed to AES narrowing, which is also seen in Table 1 as the demonstrated twang mechanism of Hollens (2015).

There are numerous exercises demonstrated in these videos to facilitate finding and using twang in singing. One topic often mentioned by a few practitioners is about the relative ease of finding twang in the speaking voice (Stoney, 2015) or through character imitations (Brickel, 2012; Hollens, 2015; Stoney, 2015; Divadi, 2016; Petersen, 2018) first before attempting to apply it to singing and vocal exercises. Imitation exercises such as the duck quack, whiny toddler, crying baby, whining cat, taunting, cackling witch, goat or sheep, bluegrass or country singers are frequently mentioned as ways of accessing twang. In vocal exercises, suggested syllables include NAAN, NYEH, siNG, haIYAH, WHY, NG, and lastly, miner mine (Brickel, 2012; Hollens, 2015; Stoney, 2015; Divadi, 2016; Shimizu, 2016; Robinson, 2017). Working on closing the nasal passage by lifting the soft palate is also recommended to find twang without 'irritating' sounds for students with sensitive ears (Shimizu, 2016). It is important to note that even though Shimizu mentions the 'aryepiglottic fold' closing as the mechanism for twang, his focus on raising the soft palate and mentioning to the laryngopharynx suggests he might also be referring to the kinaesthetic sensation of pharyngeal narrowing without the addition of nasal resonance.

The analysis of videos has revealed that the two distinct approaches to twang are also present in practitioners' teachings. In the spectrogram view, it became evident that 4 practitioners demonstrate vocal examples of twang with a narrowing of the AES. 3 of those practitioners mention narrowing of the AES as the mechanism for twang in their descriptions and explanations. Hence, it is reasonable to suggest that their descriptions and demonstrations are mostly consistent. In their videos, these practitioners refer to contemporary voice models such as Estill Voice Training (Brickel, 2012; Robinson, 2017) or cite other voice practitioners (Robinson, 2017).

On the other hand, 2 practitioners on the list demonstrate twang with pharyngeal narrowing. These practitioners do not mention narrowing of the AES in their descriptions of twang, instead refer to kinaesthetic sensations or imagery such as nasal resonance or placement in the face (Hollens, 2015; Divadi, 2016). The exclusion of AES narrowing from both their presented descriptions on twang and their demonstrations might be correlated.

Even though these practitioners' background information is not given in its entirety in most cases, these findings might point to a relationship between the practitioners' familiarity with contemporary voice models and their teachings regarding twang. This is further supported by the fact that Robinson names Jo Estill as the first practitioner to use the term and elaborates on the twang quality in EVT (Robinson, 2017). As CVT (Sadolin, 2020) and EVT (Steinhauer, McDonald Klimek and Estill, 2017) which both describe twang as a narrowing of the AES are increasing in popularity; more and more practitioners gain familiarity with these methods and incorporate certain elements from them to their own teaching. The uniformity of the information available online on twang being caused by AES narrowing implies that these models are being highly influential on practitioners without official training qualifications from aforementioned institutions. The similarity of suggested exercises, almost to the point of repetition, further supports this suggestion.

Interestingly, the demonstration of the practitioner who specifically acknowledges that there are two types of twang, appears to have both components present (Petersen, 2018). This might be related to her awareness of both mechanisms leading to her training of these mechanisms separately and then incorporating them both into her singing. This is consistent with Obert's proposal that AES narrowing and pharyngeal narrowing strategies are not mutually exclusive and thus can be trained separately and employed simultaneously (Obert, 2019).

In one of his videos, Robinson recommends the use of NG sound to practice twang, stating that it activates the AES (Robinson, 2017). Similar exercises with nasal sounds, such as NAAN, NYEH and siNG, are presented by other practitioners as well (Brickel, 2012; Hollens, 2015; Stoney, 2015). Even though some of these practitioners specifically distinguish between twang and nasality in their descriptions, the nasal nature of these exercises might have a contribution to the misperceptions among singers and practitioners.

As a component of twang, the back of the tongue is rarely mentioned in these videos. Aside from one practitioner (Brickel, 2012), the tongue's role in twang is not acknowledged. Brickel does not include the narrowing of the AES in her explanation of twang, yet refers to a high back tongue position to exercise twang. Her demonstration also indicates that AES narrowing is her dominant twang strategy. Even though her description does not include AES narrowing, her teaching might be based on the kinaesthetic sensation of the tongue root's engagement as a determinant of twang. From my previous literature review, the relationship between the AES and tongue root engagement is evident since the aryepiglottic muscle is small and does not insert directly into the epiglottis and thus the AES cannot be moved in isolation from the tongue (Vandaele, Perlman and Cassell, 1995; Pearson *et al.*, 2016; Obert, 2019). It is possible to engage the tongue root to narrow the AES separately from the dorsum and tip of the tongue. However, the engagement of the back tongue would result in a

backwards and downwards movement to close the vallecula and narrow the AES. It is possible that the ‘high back tongue’ explained to in this video is caused by false kinaesthesia. However, it is important to note that a high tongue dorsum position also contributes to an increase of energy in higher frequencies. Because a high tongue position and twang both add brightness to the voice through an increase in energy in the 4 – 7 kHz range, there are acoustic similarities between them (Perna, 2020). In the spectrogram analysis of these videos, a similar pattern of energy increase between 4 – 7 kHz is seen in Hollens’ and Divadi’s demonstrations (Hollens, 2015; Divadi, 2016). Pharyngeal narrowing alone can result in removal of the anti-resonance effect of open piriform sinuses in the 4 kHz – 6 kHz range (Bozeman, 2014b; Ballentine and Obert, 2019; Obert, 2019). In which case, the 6 kHz – 7 kHz range could be determinant for differentiating between pharyngeal narrowing and a high tongue position. In both practitioners’ demonstrations, there is a significant increase in acoustic energy between 6 kHz and 7 kHz, which suggests that pharyngeal narrowing might be coupled with a high tongue dorsum position in both examples. Unfortunately, there are no currently available studies on this topic that specifically analyse the difference between high tongue dorsum position and pharyngeal narrowing or those that research the causes of a specific increase in acoustic energy between 6 kHz – 7 kHz. Further research is necessary to support or disprove these findings.

In the literature AES narrowing is said to be a difficult strategy in the higher register as it may depress the larynx and prevent it from rising while the lower larynx required for the lower range would be difficult with a narrowed pharynx (Kayes, 2013; Rooney, 2016; Obert, 2019). In two videos by Brickel and Shimizu, twang is demonstrated in two separate registers (Brickel, 2012; Shimizu, 2016). Brickel demonstrates twang first in the lower register for a treble voice, on A#3 (Figure 3 in Appendix A). Later in the video, twang is demonstrated in the higher register on C5 (Figure 4 in Appendix A). Even though the relationship between

formants and harmonics results in different views in the spectrogram for these pitches, the reduction in acoustic energy after 5.5 kHz is clearly visible. Brickel appears to demonstrate AES narrowing comfortably in both registers and does not include pharyngeal narrowing as a strategy in the higher range. Similarly, Shimizu demonstrates twang first on E3, a mid-low register pitch for male voices (Figure 9 in Appendix A) and then on F#4 in the high register (Figure 10 in Appendix A) (Shimizu, 2016). Even with the clipping artefacts present in the audio in the second sample, it is evident that there is a clear reduction in acoustic energy after 5 kHz. This spectrogram view suggests Shimizu is also demonstrating AES narrowing in both registers with ease without resorting to pharyngeal narrowing in the higher register. As a result, Obert's proposal of two strategies of twang often being used together to varying degrees in different registers is not backed by these practitioners' demonstrations. Unfortunately, demonstrations on different pitches were not present in practitioners' videos with predominantly pharyngeal narrowing. Accordingly, it is not possible to compare their strategies in different registers to other practitioners'.

It is important to note that the practitioners and videos in this list were selected by convenience sampling method at the beginning and then narrowed down using purposive sampling. Hence, the findings may not be representative of the entire population of online practitioners or reflect the teachings of practitioners who do not have an online presence (Winter, no date; Berg, 2001; Teddlie and Yu, 2007).

Evidently, the inconsistency on twang is present both in practitioners' practice and in voice research. The 8 videos by 7 practitioners analysed in this study only provide a brief insight into the teachings of other practitioners. It is clear that the practice of some practitioners in different countries is influenced by contemporary voice models and recent studies on AES while the other practitioners prefer different strategies for twang, albeit with similar but not identical acoustic results. With all the conflicting information on twang, it is

not surprising that singers and practitioners alike are having difficulties with understanding and applying it to their practice. Further studies should be conducted to identify clear descriptions and reach some consensus among practitioners and researchers regarding twang terminology, similar to the 2016 study on symbolic notation and definitions of voice acoustics involving 22 voice professionals from different backgrounds (Titze, 2016).

Obert's proposal of having two different names for twang might be a reasonable solution to this issue: APN (anterior to posterior narrowing) for tongue root engagement resulting in AES narrowing and LPN (lateral pharyngeal narrowing) for the twang sound with pharyngeal narrowing (Obert, 2019). However, until a consensus is reached among researchers and practitioners, the terminological gap would only increase in the future with later studies.

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4. Appendix A: Spectrogram Views

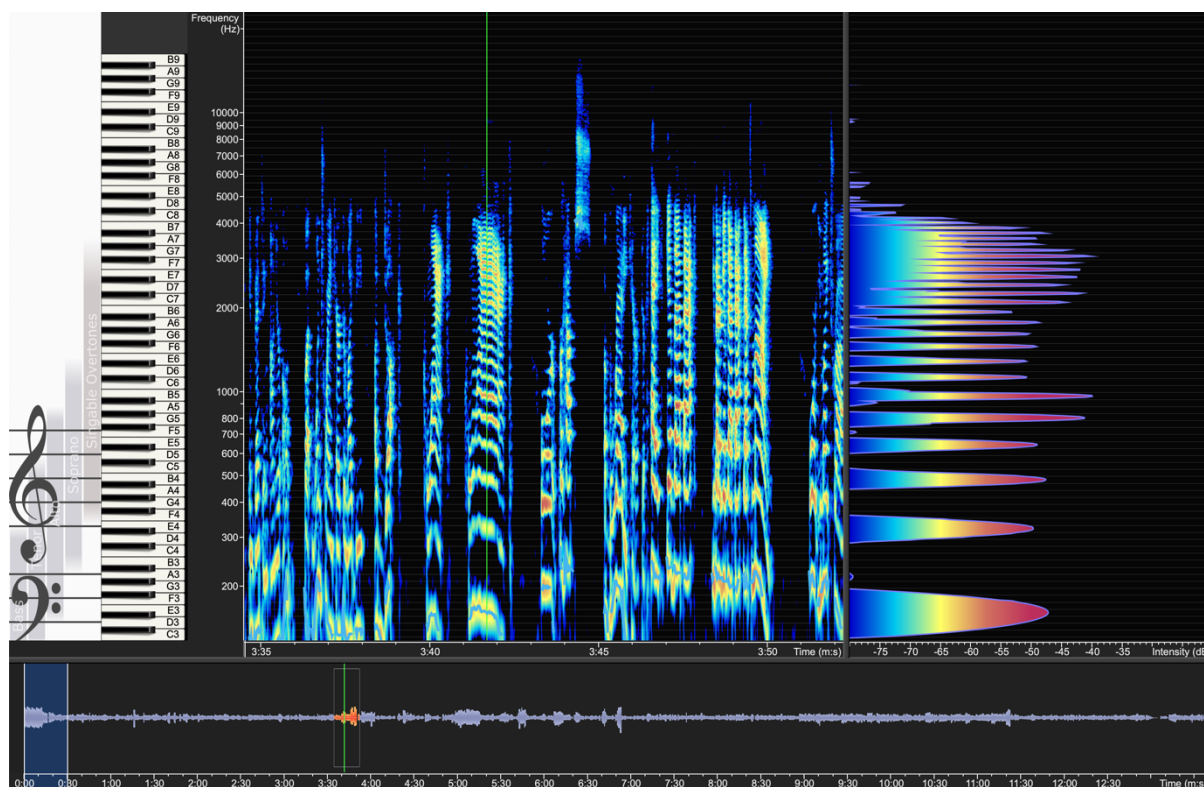


Figure 1. Spectrogram view of analysed video no:1 from VoceVista Video Pro, between 3:41 - 3:42 (Stoney, 2015).

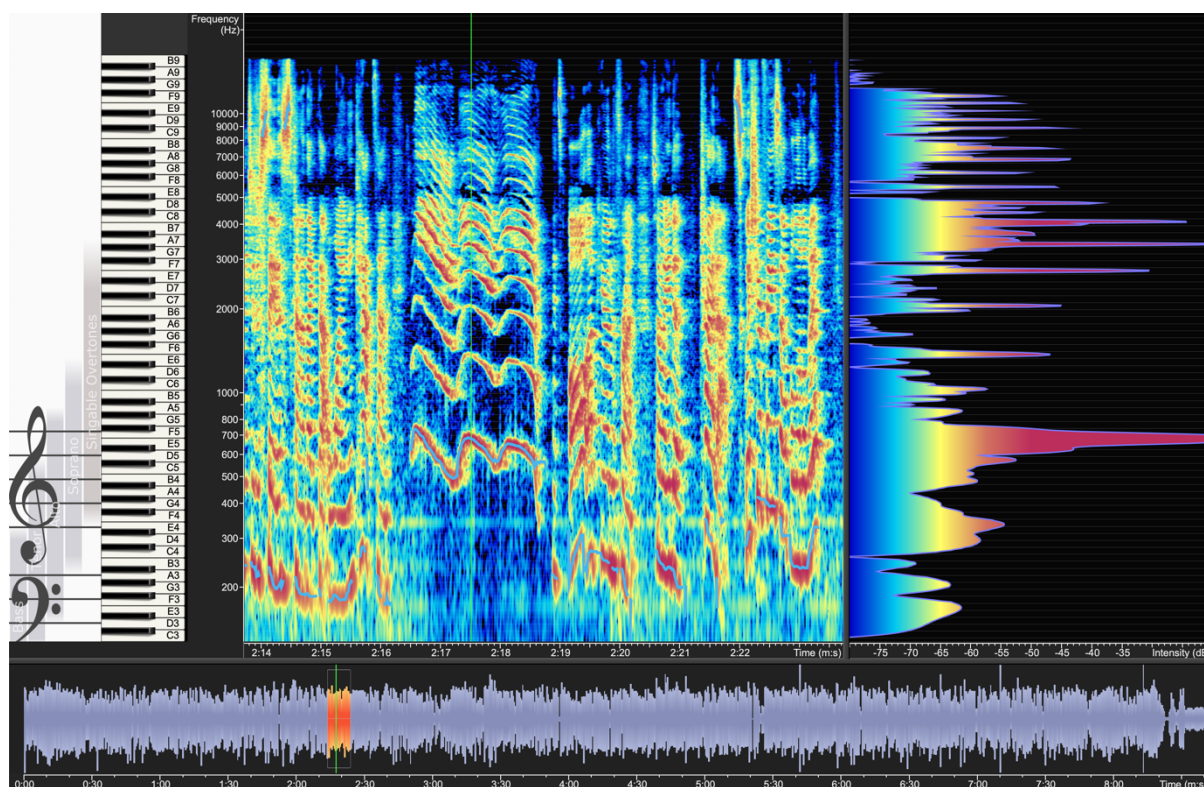


Figure 2. Spectrogram view of analysed video no:2 from VoceVista Video Pro, between 2:17 - 2:18 (Hollens, 2015).

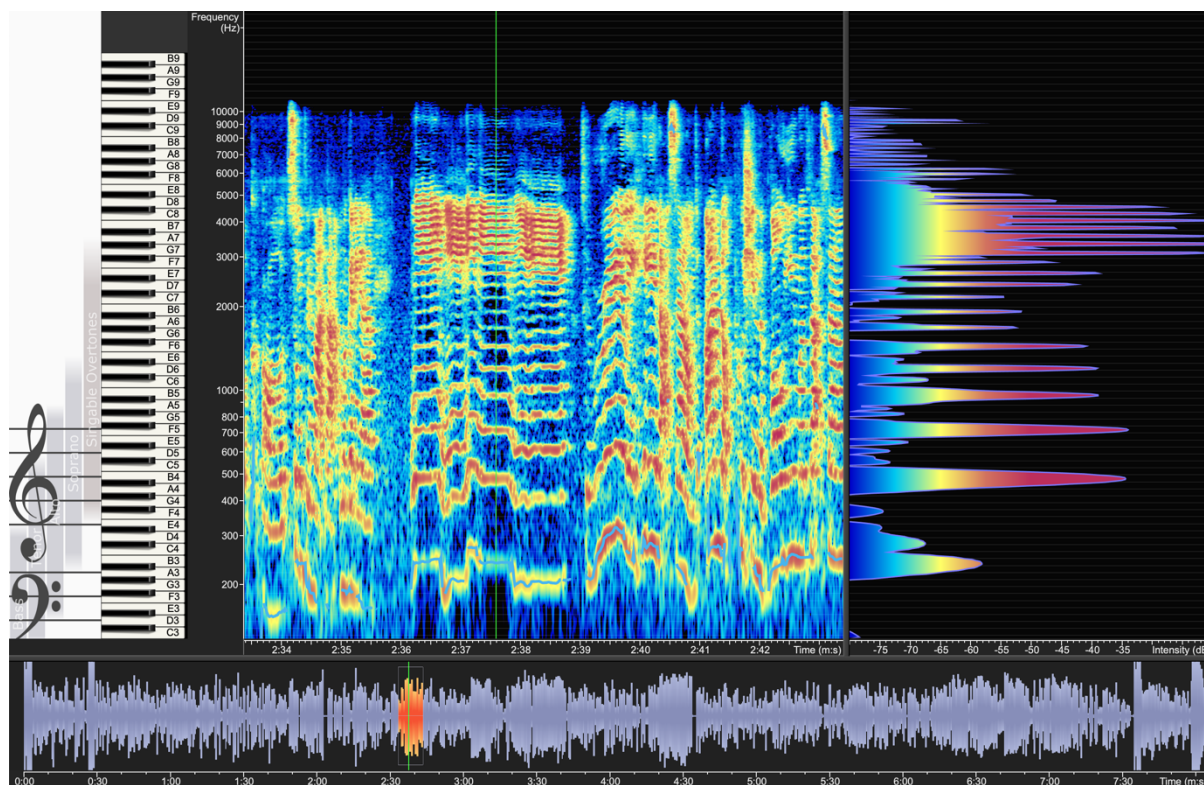


Figure 3. Spectrogram view of analysed video no:3 from VoceVista Video Pro, between 2:36 - 2:39, on pitch A#3 (Brickel, 2012).

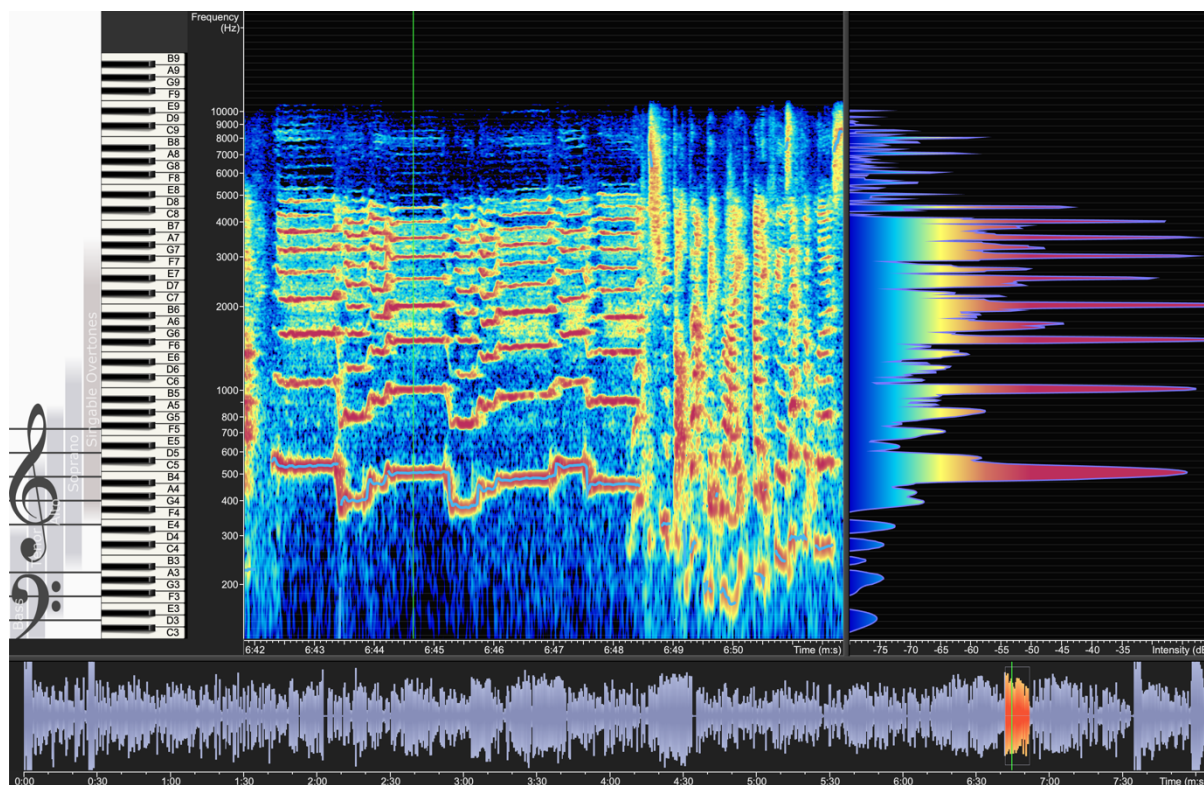


Figure 4. Spectrogram view of analysed video no:3 from VoceVista Video Pro, between 6:42 - 6:48, on pitch C5 (Brickel, 2012).

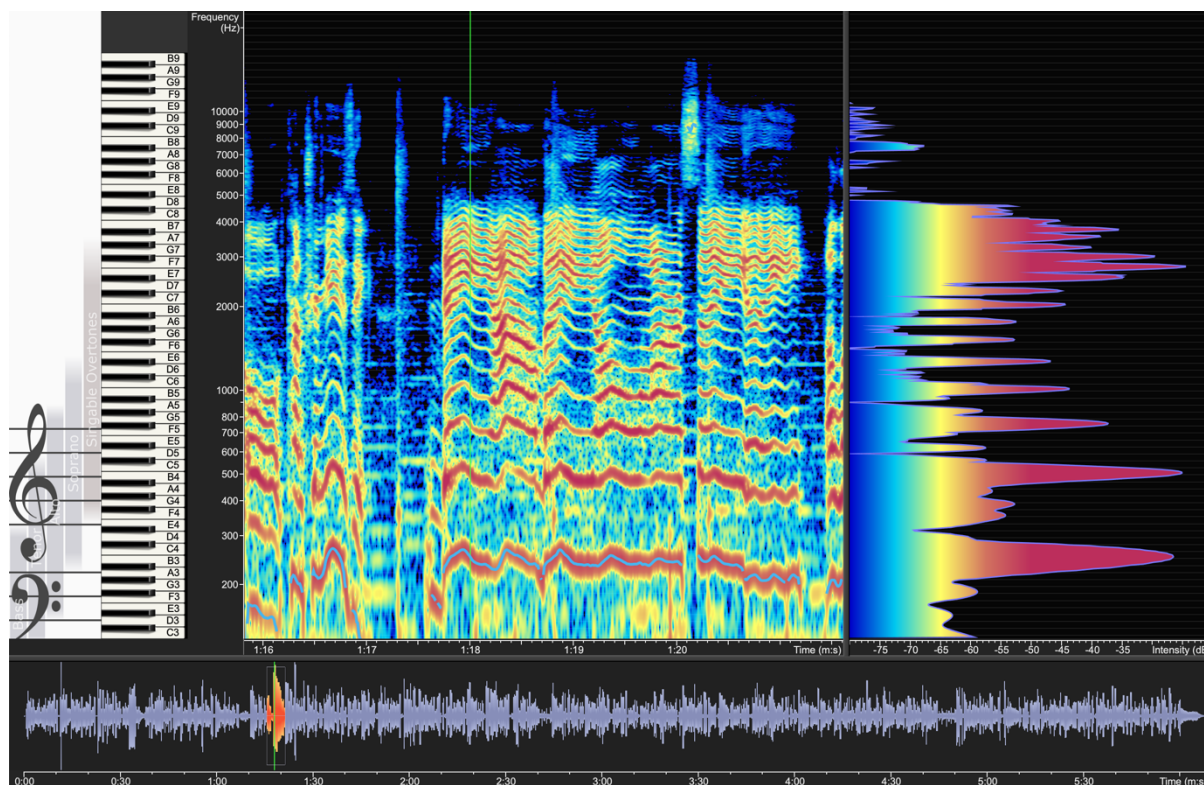


Figure 5. Spectrogram view of analysed video no:4 from VoceVista Video Pro, between 1:18 - 1:20 (Robinson, 2014).

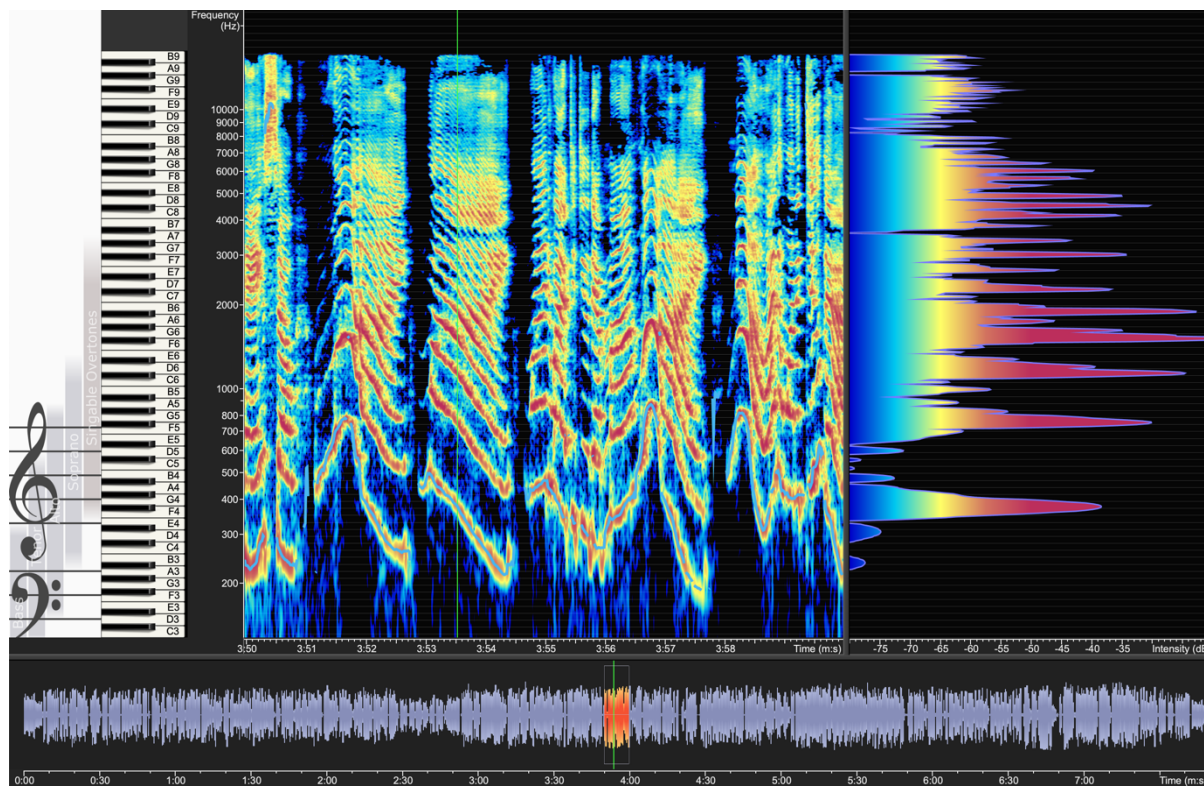


Figure 6. Spectrogram view of analysed video no:5 from VoceVista Video Pro, between 3:53 - 3:54 (Divadi, 2016).

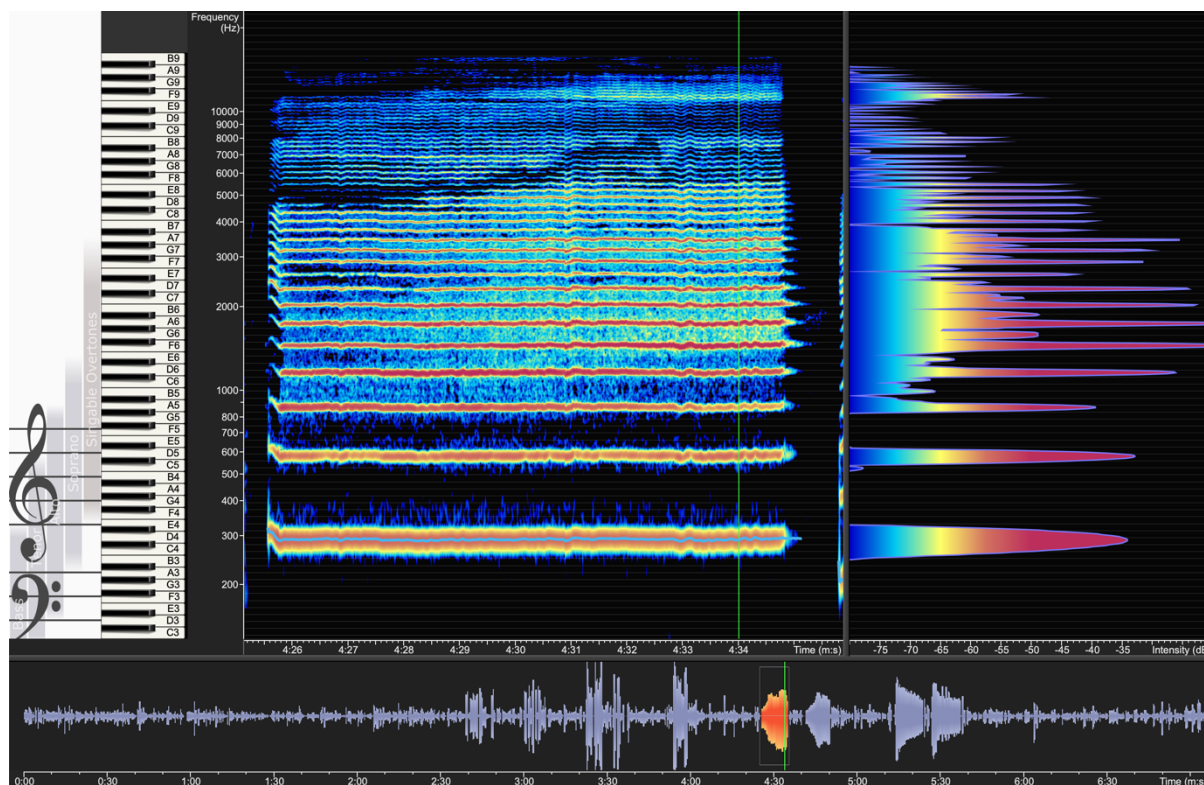


Figure 7. Spectrogram view of analysed video no:6 from VoceVista Video Pro, between 4:33 - 4:34 (Petersen, 2018). Gradually adding twang to a held note, beginning at 4:26.

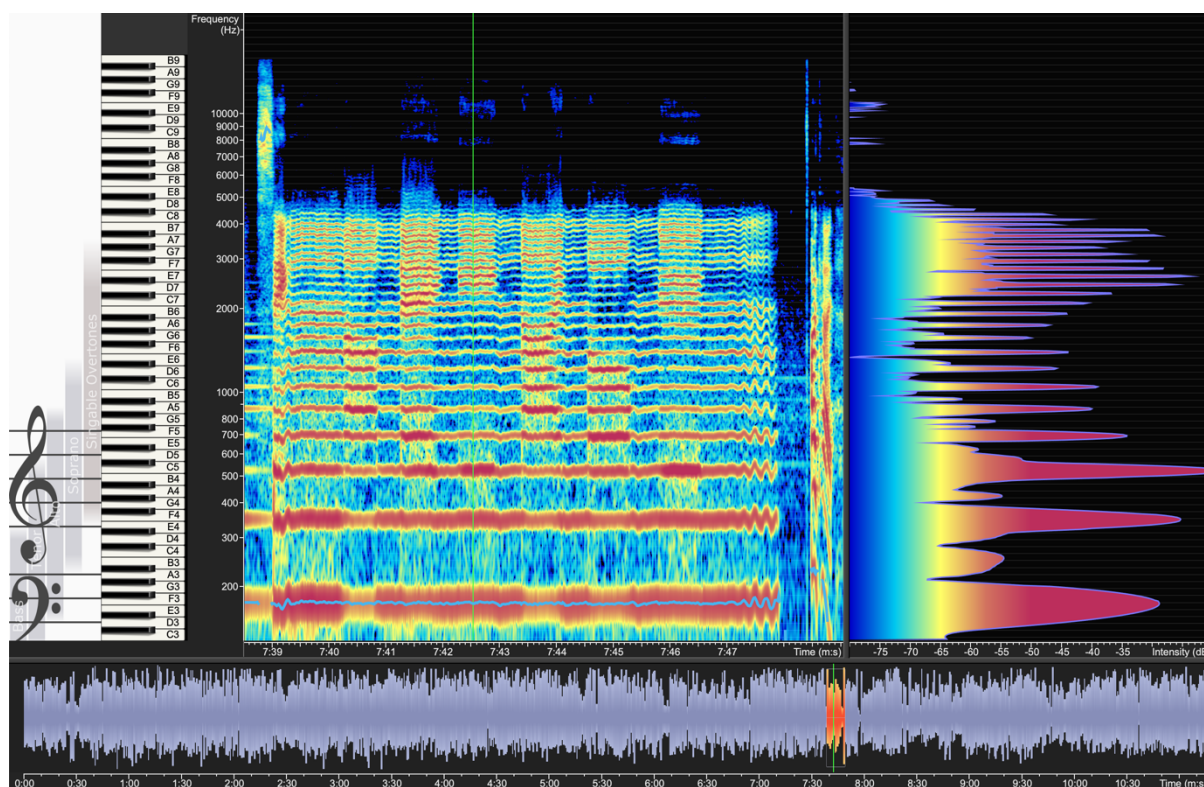


Figure 8. Spectrogram view of analysed video no:7 from VoceVista Video Pro, between 7:42 - 7:43 (Robinson, 2017).

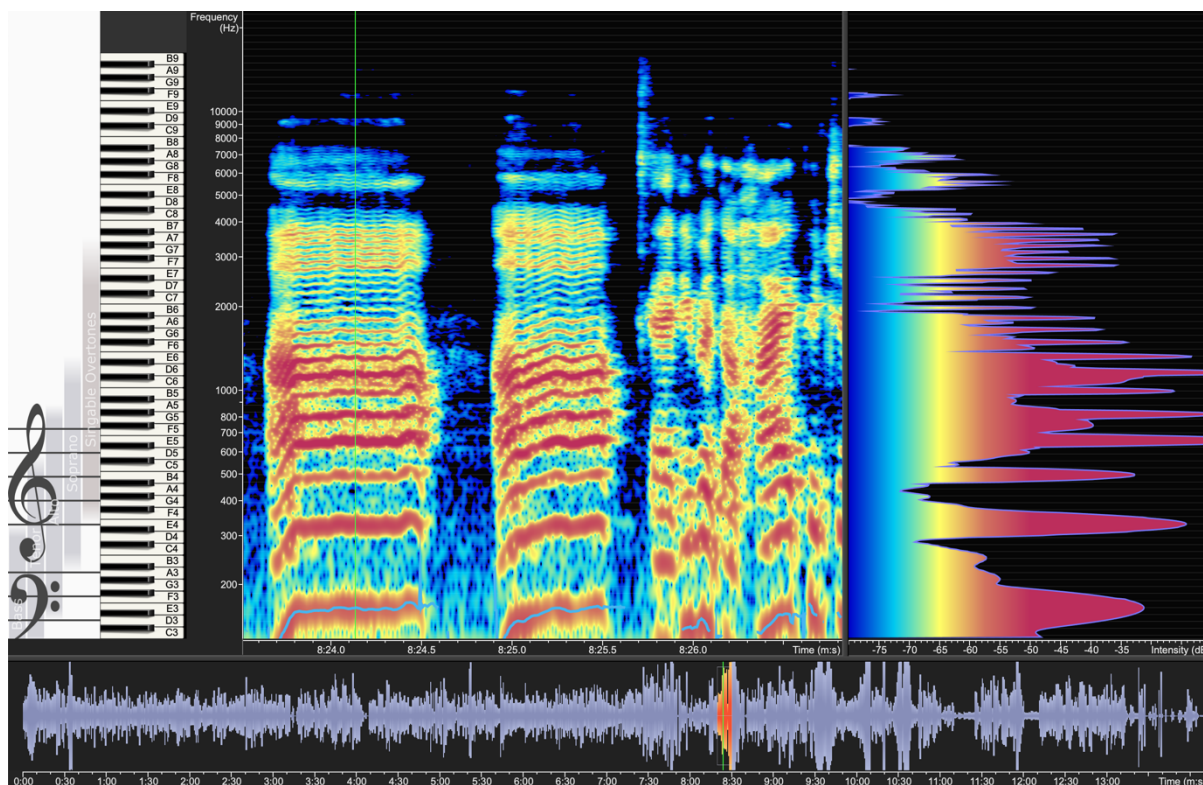


Figure 9. Spectrogram view of analysed video no:8 from VoceVista Video Pro, between 8:23 - 8:24, on pitch E3 (Shimizu, 2016).

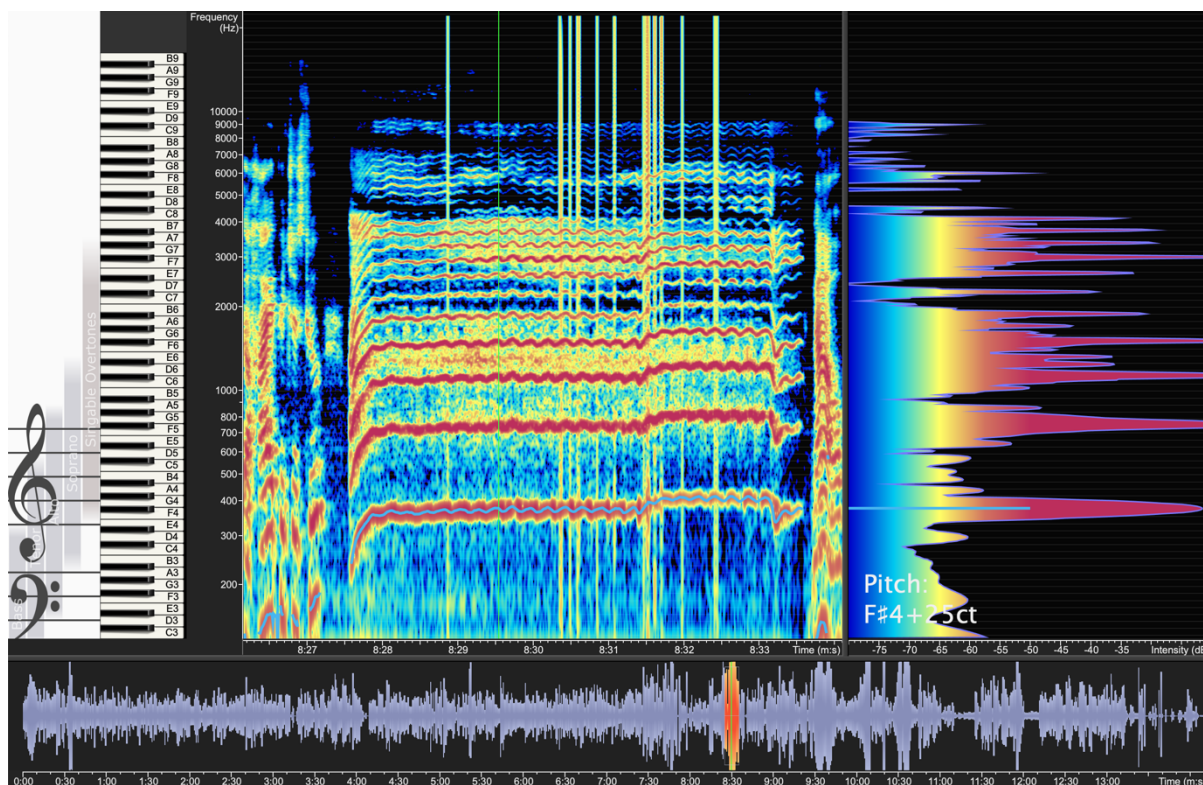


Figure 10. Spectrogram view of analysed video no:8 from VoceVista Video Pro, between 8:29 - 8:30, on pitch F#4 (Shimizu, 2016). As seen above, some artefacts due to clipping are present in this audio file.