Developing the Contraforte for Twenty-first-century Ensemble Playing

Doctoral Thesis

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Abstract

The contraforte, introduced in 2001, is a development of the contrabassoon. While there is a limited amount of information about the contrabassoon, the contraforte remains largely unexplored. In my doctoral project, I research this uncharted territory by examining the definitions of specific contemporary effects, how these effects are used on bassoon, contrabassoon and contraforte and the notations employed. I then construct categories that can serve as a foundation for a topography of contraforte sounds. The research includes new solo works for the contraforte that grew from collaborative efforts with an eclectic array of established composers: Leah Muir, Georges Aperghis, Georg Friedrich Haas, Alberto Posadas, and Liza Lim. Also included is my own composition which illustrates how I approach playing the contraforte in a solo context. All these pieces draw on the results of my artistic research. The main challenge was to take this instrument beyond the sustained notes of its forebear, the contrabassoon, and to launch it into future explorations of a diverse and variegated world of sounds. The aim of my research is to share these findings with players and composers, encouraging composers to incorporate the contraforte into their ensemble compositions and inspiring performers to become more familiar with the instrument.

Zusammenfassung

Das Kontraforte, das 2001 eingeführt wurde, ist eine Weiterentwicklung des Kontrafagotts. Während zum Kontrafagott begrenzt Informationen verfügbar sind, bleibt das Kontraforte noch weitgehend unerforscht. In meiner Doktorarbeit möchte ich dieses Neuland ergründen, indem ich spezifische, in der zeitgenössischen Musik verwendete Effekte untersuche sowie die Verwendung dieser Effekte auf Fagott, Kontrafagott und Kontraforte und die dafür verwendeten Notationsweisen. Daraus entwickle ich dann Kategorien, die als Grundlage für eine Topographie von Kontraforte-Klängen dienen können. Meine Forschung umfasst neue Solowerke für Kontraforte, die in Zusammenarbeit mit einem breiten Spektrum etablierter Komponisten und Komponistinnen entstanden sind: Leah Muir, Georges Aperghis, Georg Friedrich Haas, Alberto Posadas und Liza Lim. Sie schließt auch meine eigene Komposition ein, die illustriert, welchen spieltechnischen Ansatz ich beim Kontraforte im Solokontext verfolge. Alle behandelten Werke greifen auf die Ergebnisse meiner künstlerischen Forschung zurück. Die größte Herausforderung bestand darin, das Instrument über die gehaltenen Töne seines Vorgängers, des Kontrafagotts, hinauszuführen und damit die Weichen für künftige Erkundungen einer vielfältigen und vielfarbigen Klangwelt zu stellen. Ziel meiner Forschungsarbeit ist es, diese Erkenntnisse mit Spieler:innen und Komponist:innen zu teilen, Komponist:innen dazu zu ermutigen, das Kontraforte in ihre Ensemblekompositionen einzubeziehen, und Spieler:innen dazu anzuregen, sich näher mit dem Instrument auseinanderzusetzen.

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Preface

The contraforte was first introduced into Austria when I invited Guntram Wolf, one of the developers of this instrument, to hold an exhibition of his instruments at the rehearsal room of Klangforum Wien in Vienna in 2005. Owing to its 'unusually wide dynamic range (from the softest pianissimo to the dominant fortissimo), and range of 4½ octaves with excellent tuning [and] a clear, round sound that blends', the contraforte is the 'new' instrument that is best suited to replace the role of contrabassoon in contemporary new music groups.[1] In an orchestra, it plays the same role as a contrabassoon. As a result of the Wolf exhibition, the Klangforum Wien, Wiener Symphoniker and Kunstuniversität Graz (KUG) all purchased and began using contrafortes (Fig. 1.1).

Figure 1.1: Guntram Wolf and the author, 2005, at the Wolf exhibition in Vienna.

[1] "Es weist einen ungewöhnlich großen Dynamikbereich auf (vom leisesten Pianissimo bis zum dominierenden Fortissimo), einen Tonumfang von 4½ Oktaven bei ausgezeichneter Stimmung, einen klaren, runden Klang, der sich ideal mit Fagotten und anderen Instrumenten mischt (Klangvergleiche der TU Dresden) [It has an unusually wide dynamic range (from the softest pianissimo to the dominant fortissimo), a range of 4½ octaves with excellent tuning, a clear, round sound that blends ideally with bassoons and other instruments (sound comparisons of the TU Dresden)]". Guntram Wolf, "Kontraforte," accessed August 3, 2024. https://www.guntramwolf.de/de/instrumente/modern/bassoons/kontrafagott/kontraforte-english. English translation by the author.

In 2008, while preparing a lecture on the history, virtues, and abilities of the bassoon, contrabassoon and contraforte for Alberto Posadas's and Aureliano Cattaneo's composition class at the private music institute Centro Superior Katarina Gurska, Madrid, I was discouraged by the paucity of information about, and resources available for contrabassoon and contraforte. Although both instruments are regularly used in ensembles,[2] hardly any references to them can be found. Searching the internet for resources for these instruments yielded very little. American-born Richard Bobo, freelance bassoonist and contrabassoonist, provided a fingering chart and some recordings for the contrabassoon.[3] Kristopher King's website on the contraforte mentioned he had just acquired one and was starting to perform with it.[4] The existing literature offered only a paragraph or two about the role of the contrabassoon in the orchestra.[5] This was baffling because, in the traditional world of classical music, the position of a contrabassoon—or a contraforte playing the same role—in an orchestra is a highly sought-after full-time position. Self-taught players apply for this coveted position, attracted by its monetary rewards, prestige and relatively little stress.[6] Where the contrabassoon

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[2] In the major new music groups in Europe (Proton, Ensemble intercontemporain, Musikfabrik, Ensemble Modern, Klangforum Wien) the bassoonist must play either contrabassoon or contraforte. Out of the five listed groups, four use a contraforte.

[3] Richard Bobo, "Contrabassoon Fingering Chart, 32–36," accessed August 3, 2024, http://me.subcontrabassoon.com/Bobo_Contranomicon_2.pdf.

[4] Kristopher King, "Contraforte," Kristopher King, accessed August 3, 2024, https://kingkristopher.com/tag/contraforte/page/2.

[5] For example: Norman Del Mar, *Anatomy of the Orchestra*, (Berkeley: University of California Press, 1988), 154; Walter Piston, *Orchestration* (New York: W. W. Norton & Company, 1955), 201–205; Werner Seltmann and Günter Angerhöfer, *Fagott-Schule 6, Das Kontrafagott* (Leipzig: Schott, 1984), 7–17; Walter Giesler, Luca Lombardi and Rolf-Dieter Weyer, *Instrumentation in der Musik des 20. Jahrhunderts* (Celle: Moeck, 1985), 179.

[6] In my professional experience the contrabassoon position in an orchestra is paid the same as the first bassoonist but has less hours and less difficult solos and according to myself and colleagues, less stress attached to the position.

sometimes performs like a cumbersome dinosaur, its successor, the contraforte, presents itself as a 'monster', or virtuosic leviathan.[7] In preparing for the Madrid presentation I realised I wanted to present this new instrument to future composers and players as an autonomous voice, instead of merely as a loud, sustained note in a thickly orchestrated chord. I decided to embark on this quest in the hope that my research would spark a contraforte enlightenment and enrich the contemporary music scene with the variegated sounds that the instrument can produce.

[7] Pierluigi Billone, e-mail message to the author, November 14, 2018. The composer Pierluigi Billone, referred to the contraforte as a 'monster' instrument when I approached him to compose a piece for it.

Chapter 1: Introduction and Overview

The musical world is full of unusual wind instruments. Some are old and obscure like the ophicleide, sarrusophone, bass D trumpet, bass oboe, heckelphone and clarinet d'amore. Large wind instruments, like the contrabass flute and contrabass clarinet, are gradually coming to the forefront.[8] There are also some newly developed woodwind instruments: tubax (1999), contraforte (2001), lupophone (2008), and the clex (2016). The one factor that puts the contraforte above all the others is that it can occupy a full-time position in either an orchestra or an ensemble.

The contraforte covers the same territory as the contrabassoon. Both were built to play in orchestras, not specifically intended as instruments to produce new music. The contraforte has the potential to offer far more sonic colour in contemporary music than the contrabassoon because it 'has new acoustical findings and is equipped with a precise, functional and quiet mechanism.'[9] Within it lies a myriad of undiscovered heterogeneous and homogeneous sounds for exploration and cultivation. This is why the primary foci of my artistic research are on the philosophies and approach to extended techniques for the contraforte and the methodology for categorising these. The secondary focus is on the concepts and philosophy that composers employ when creating pieces for this new instrument.

1.1 Motivation, Inspiration and Background

The initial motivation for my artistic research came from the Bärenreiter series, 'Contemporary Instrumental and Vocal Techniques,'[10] specifically the woodwind and brass

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[8] Pieces written specifically for these instruments started with Luigi Nono's *Dell'azzurro silenzio, inquietum* (1985) for contrabass flute, contrabass clarinet and live electronics. Orchestral and ensemble pieces with contrabass clarinet include Olivier Messiaen, *Saint François d'Assise* (1983), Peter Eötvös, *Shadows* (1985), or George Benjamin, *Into the little Hill* (1995). Further contrabass flute examples include Liza Lim, *Tree of Codes* (2016) and Beat Furrer *Fama* VI (2005) for voice and contrabass flute.

[9] "Kontraforte," Guntram Wolf Holzblasinstrumente GmbH, accessed August 3, 2024, https://www.guntramwolf.de/de/instrumente/modern/bassoons/kontrafagott/kontraforte-english.

[10] Bärenreiter, "Contemporary Instrumental and Vocal Technique," The Musicians' Choice, accessed August 3, 2024, https://www.baerenreiter.com/en/catalogue/books/musical-practice.

compendia. These books 'are,' their publishers claim, 'equally valuable to performers, conductors, and composers*'* and designed to help understand an instrument through extended techniques, timbres and variegated instrumental idiosyncrasies.[11] This series is a good way to disseminate tangible extended techniques to the world and project information into the future, but they also have a downside.

The books are expensive limiting accessibility. The fact that the books are published by an established, eminent publishing company guarantee worldwide distribution and a mixture of co-authors and endorsements from well-known composers and musicians aid the distribution and implies the information is absolutely definitive.[12] As my colleague, contemporary conductor and composer Clement Power notes, the 'Bärenreiter imprint, and the printed/high price model, contribute to a perhaps unearned sense of authority. After all, there's no "big boss" at Bärenreiter (or anywhere in the world, indeed) who is qualified to judge what's good or not.'[13] The lack of a real 'boss' for the series is probably why the books are sometimes in need of editing. The musical examples for an extended technique are left to the discretion of the authors and are not always current or the best choice. The often-nebulous area of who pays the cost of producing a book in this series is information privy to musicians who approach Bärenreiter.

For the first book in the series, *The Techniques of Oboe Playing*,[14] co-author and oboist Peter Veale communicated that he 'found sponsors then' to pay Bärenreiter to publish his book.[15] For the most recent book in the series *The Techniques of Tuba Playing*,[16]

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[11] Ibid.

[12] Composers and performers such as Mark Andre, Pierre Boulez, Beat Furrer, Heinz Holliger, and Vinko Globokar.

[13] Clement Power, e-mail message to the author, February 15, 2023.

[14] Peter Veale and Claus-Steffen Mahnkopf, *The Techniques of Oboe Playing* (Kassel: Bärenreiter, 1994).

[15] Peter Veale, Messenger correspondence with the author, February 13, 2023.

[16] Jack Adler-McKean, *The Techniques of Tuba Playing* (Kassel: Bärenreiter, 2020).

author and tubist Jack Adler-Mckean 'had to pay them…for publishing it.' Unfortunately, there appears to be a lack of publishers as mainstream as Bärenreiter that are capable of worldwide marketing. As Peter Veale enlightened me, 'I had to approach lots of publishers until finally, the second time round, Bärenreiter agreed and I had to find sponsorship money to pay for the initial publication!'[17]

Apart from the publishing side, problems also arise from the content of these textbooks. One is the extensive cataloguing of extended techniques that are set out as 'shopping lists.' Kevin Toksöz Fairbairn, a trombonist and recording participant in the Bärenreiter *Techniques of Trombone Playing* (co-authored by Mike Svobada and Michel Roth),[18] comments:

> Mike's [book] is a bit of a "shopping list." It's so easy to do that. However, a "shopping list" of effects structured around actual excerpts from compositions,19 [where] everything is a bit less theoretical and a bit more "here it is…this is how it will be employed," I found that […] a bit more palatable.20

Another problem is the use of spectral analysis of multiphonics. Publishing the breakdown of a multiphonic as a chord with, say, six notes as heard by a machine,[21] 'doesn't mean you can hear them and why notate six, because a machine says so?',[22] as blogger and contemporary flautist, Helen Bledsoe remarks. A multiphonic can sound complex and dense, 'but the listener might only be able to discern three pitches sounding at the same time.'[23] If this is the case, perhaps notating more than three pitches is unnecessary.

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[17] Peter Veale, Messenger correspondence with the author, February 13, 2023.

[18] Mike Svobada and Michel Roth, *Techniques of Trombone Playing* (Kassel: Bärenreiter, 2017).

[19] See Benny Sluchin, *Contemporary Trombone Excerpts* (Tamworth: Warwick Music, 2014).

[20] Kevin Toksöz Fairbairn, Messenger correspondence with the author, February 12, 2023.

[21] Pascal Gallois, *The Techniques of Bassoon Playing* (Kassel, Bärenreiter, 2012), 101.

[22] Helen Bledsoe, telephone conversation with the author, February 2, 2023.

[23] Aleah Fitzwater, "Multiphonics in Music" Notestem, accessed August 3, 2024, https://www.notestem.com/blog/multiphonics.

This way of presenting extended playing techniques does not allow for the innumerable variants that arise from the different players, instruments, physiology and materials used for playing the instrument. The aforementioned 'shopping lists' of examples of sounds take up most of the Bärenreiter books' content. In *The Techniques of Bassoon Playing*, bassoonist Pascal Gallois derives the majority of extended techniques from one specific piece only, his commissioned work from Luciano Berio, the *Sequenza XII* (1995).[24] The bassoon Sequenza is a virtuosic solo piece because of the use of the technique of 'a continuous and uninterrupted glissando covering the bassoon's entire range' whilst circular breathing.[25] In my experience of playing this piece, a separate glissando fingering chart is required for a smooth continuous glissando, as well as knowledge of the resistance of notes on the bassoon to know where best to apply circular breathing.[26] Sadly, this concept is not mentioned in Gallois's book. Additionally, the publicity for his book, on Bärenreiter's website, claims that it contains 'tips for all instruments in the bassoon family,'[27] which is simply not true. There is no chapter on the contrabassoon or the contraforte. Gallois does not even mention what these instruments are capable of, stating, 'initially one must wait to see their development in the solo repertoire [and] research and playing experience in concert situations.'[28] My project is therefore necessary to address the contraforte's possibilities, a subject that is missing in Gallois's book. Reviewing the Bärenreiter series, I have concluded that publishing a reference book on the contraforte would not be useful. What would be useful is to set up a website with research that can be kept up-to-date and accessible.

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[24] Gallois, *The Techniques of Bassoon Playing*. See Janet K Halfyard (ed), *Berio's Sequenzas: Essays on Performance, Composition and Analysis* (New York: Routledge, 2016).

[25] Gallois, *The Techniques of Bassoon Playing*, 101.

[26] Method used by the author to premier *Sequenza XII* in Spain, Russia, Hong Kong and Singapore. The glissando fingering chart I used as a basis I found in Heinz Riedelbauch's *Systematik moderner Fagott- und Bassontechnik.* Heinz Riedelbauch, *Systematik Moderner Fagott- und Bassontechnik* (Celle: Moeck, 1988), 35–36.

[27] Bärenreiter, "The Musicians' Choice," accessed August 3, 2024, https://www.baerenreiter.com/en/shop/product/details/BVK1860.

[28] Gallois, *The Techniques of Bassoon Playing*, 113.

Emerging techniques and technologies cannot be readily updated in a textbook. A second edition will merely render the first edition partially outdated. Although Bärenreiter books were my motivation, performer blogs and websites were my inspiration because they are, in the words of Power, 'a good reflection of the ongoing nature of what musicians actually do.'[29] A blog or website can be easily updated and, unlike a reference textbook, is globally accessible. Particularly inspirational blogs and websites include those by the following performers: Christopher Redgate (oboe), Helen Bledsoe (flute, alto flute, bass flute, piccolo), Richard Haynes (bass and contrabass clarinet, clarinet, clarinet d'amore), Ned McGowan (contrabass flute), Heather Roche (clarinet, bass and contrabass clarinet), Joshua Hyde (saxophone family except tubax) and Nathan Plant (trumpet).

Unlike the Bärenreiter series, these websites are not co-authored nor have a written endorsement from a prominent composer; they come across as purely personal experience. They are, however, up-to-date, and, most importantly, they put methodology at the forefront. As flautist Helen Bledsoe states in her website, 'I also have a detailed presentation where I approach learning multiphonics through the study of flute harmonics and spectral hearing.'[30] The players are using their own research from their own experiences: chamber and ensemble playing, their approaches and methodologies from their participation in teaching and collaborations, and, in the case of performers such as Nathan Plante and Helen Bledsoe, their own compositions. They deliver content in a dynamic and current way: Heather Roche is on X, Nathan Plant, Joshua Hyde, and Helen Bledsoe use YouTube videos. Extensive cataloguing, as in the Bärenreiter series, is avoided. The approach to, and methodology for, an extended technique is discussed at length. These blogs are all accessible to the community because they are free, although they accept voluntary donations.

These platforms can overcome misinterpretations or misunderstandings of the written word in contemporary reference books by offering live discussions, opportunities to

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[29] Clement Power, e-mail message to the author, February 15, 2023.

[30] Helen Bledsoe, "Multiphonics: Tips to Study," Helen Bledsoe, accessed August 3, 2024, https://helenbledsoe.com/multiphonics-tips-for-study.

send in comments or feedback, and video tutorials. The oboist Christopher Redgate offers online discussions about microtonality, where 'you can also expect a number of tips and "rules of thumb" to help avoid the problems that can be encountered. And [you can] get to know ways in which microtones can be used in a context that includes non-microtonal instruments.' [31] Trumpet player Nathan Plant 'gives YouTube Series with tutorial videos related to blog posts' about executing new sounds on the trumpet.[32] Helen Bledsoe, flautist, keeps her website up-to-date by asking her readership 'if you know of any other learning materials, please share them in the comments.'[33] These web-savvy musicians gave me ideas about how to decode the contraforte as a conveyor of contemporary sounds.

Another form of inspiration for this project came from my daily activity in a contemporary music ensemble. Much of my empirical knowledge needed for this research was derived from my work with Klangforum Wien, and the undocumented practice-based-research conducted within the group. In the working environment of Klangforum I was inspired by ever-changing situations. Sitting in a small wind section, I was exposed to new and varied ranges of instrumental colours. My colleagues often relied on physiology to help produce these colours. One example of using physiology is learning how to change intonation through the widening and narrowing of the pharynx. By thinking 'ooh' whilst playing, the pharynx cavity enlarges, dropping the pitch of a note: by thinking 'mee', the throat muscles contract, thereby raising the pitch. This demonstrates that pitch in microtonality and monophonic sounds can be controlled by the player.

Constant exposure to an eclectic range of compositional styles and new instrumental techniques from other instruments also greatly influenced me. I kept a journal of the

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[31] See the publicity promotion in Sounds, "About Chris," Christopher Redgate and the 21st Century Oboe, accessed February 3, 2024, https://sound-scotland.co.uk/event/opensound-writing-for-microtonal-oboe-with-christopher-redgate.

[32] Nathan Plant, "The Modern Trumpet by Nathan Plant," Nathan Plant, accessed August 3, 2023, http://themoderntrumpet.com.

[33] See the end of the first paragraph in Helen Bledsoe, "Multiphonics: Tips to study," Helen Bledsoe, accessed August 3, 2024, https://helenbledsoe.com/multiphonics-tips-for-study.

sounds that I liked and I attempted to replicate them on the contraforte during my research. Frequent interactions and discussions with composers in my work environment had both upsides and downsides. On the downside was the assumption by several composers that a technique on one instrument could be directly transferred to another instrument.[34] On the upside was the discovery of something completely new and unexpected—a 'controlled accident'—or suggesting an alternative solution for a technique and led the composer to change their score.[35]

The contraforte is a large, cumbersome and expensive instrument. Most of these instruments are owned by institutions, such as universities, ensembles and orchestras. In a hard case the instrument weighs 18 kg, making it difficult to transport. A 1 kg custom-made carbon travel case, costing around € 3,000, has proven to be essential. For a private owner, this adds yet another expense, but for a travelling music ensemble the expense is part of owning the instrument. I am very thankful to Klangforum as I have had the best equipment and in addition did not have to pay for the maintenance of the instrument. This contributed enormously to my research.

Distinctive ensembles like Klangforum are at risk of disappearing. As the group's previous guest conductor expressed, 'we are moving towards a different work environment because players that are twenty-five years old want to cross over. We therefore should be aiming for this market: a player that performs classical and contemporary music.'[36] If this is so, players will be flirting between classical and contemporary music instead of specialising in one or the other. Instrumentalists who are not in an environment of a contemporary music 'niche' group miss the opportunity to experiment and

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[34] One example is the execution of extremely quiet playing of flutter tonguing in the high register on the clarinet. From my experience this is difficult to execute on a double reed instrument with the same ease.

[35] This expression describes the discovery of a new sound whilst on a specific tangent for something else. See Christopher Redgate and David Gorton, "Austerity Measures and Rich Rewards" in *Artistic Practices*, *Experimental encounters in music and beyond*, ed. Kathleen Coessens (Leuven: University Press, 2017), 64.

[36] Bas Wiegers, personal conversation with the author, May 28, 2022.

develop empirical knowledge.[37] They are not exposed to new sonic fields. They lose the chance to learn creating a sound that does not suit the instrument. And, most importantly, they forgo funding of unique instruments such as the contraforte. Had I not become a member of a 'niche' contemporary music ensemble, I would never have had the musical inspiration and exposure needed for this research.

1.2 Artistic Result and Project Goal

One of the goals of my research is to show how the contraforte potentially has the expressive and technical range equal to any solo instrument, highlighting its versatility beyond tradition roles. By developing contemporary techniques specifically for the contraforte and commissioning new works, my research expands the available repertoire and technical possibilities for the instrument. This contributes to the broader field by providing a template for how other lesser-known or new instruments can be developed and integrated into contemporary music practices. By documenting the techniques and musical possibilities of the contraforte, my research provides a resource for other performers and composers. This documentation makes it accessible for future research and educational purposes, contributing to the ongoing development of artistic practices. By focusing on the contraforte, I would hope that this would encourage other research on the exploration of modern instruments such as the clex and lupophone.

1.3 Structure of the Doctoral Thesis

The concept and construction of the contraforte, the categorisation of discovered sounds, composers' concepts and philosophies, and reflections are the foci of the four chapters in this dissertation. Chapter one presents background information on the contraforte and examines the distribution and characteristics of this instrument, addressing its acoustic problems. The distribution information highlights the growing profile of the

[37] Contemporary classical 'niche' groups include Proton, Ensemble intercontemporain, Musikfabrik, Ensemble Modern and Klangforum Wien.

instrument and players worldwide. Chapter one also makes the case that the contraforte is not merely a replacement for the contrabassoon but a new and different instrument whose construction problems can be solved.

Chapter two discusses the use of empirical knowledge and experimentation to develop a range of non-classical timbres and to construct a topography of contraforte sounds. Through a clearly defined methodology, I develop a catalogue of extended playing techniques. New performance practices are used to create some of the techniques. The approach for this chapter comes from observing contrabassoon solo and ensemble excerpts as well as autoethnographic references. The chapter is divided into categories that are built around my monophonic, quarter-tone and eighth-tone tablatures which can be accessed through links in Appendix B. The outcomes, derived from my approach to playing, may be regarded as suggestions to be elaborated upon and refined. My research results are available from audio bites in the texts and on links to my website.[38] As the contraforte has sixty-seven million fingering combinations,[39] the website will necessarily be a work in progress. The extended playing techniques introduced on the website and in this thesis are by no means complete. Instead of a 'Bärenreiter-style' book, the website covers sound topics that are important to contrafortists, contrabassoonists and composers.

Chapter three contains a critical analysis of the concepts, working process, and philosophical questions of composing for a new instrument as reviewed through the following six new pieces created for this research: Leah Muir, *Pigeonholed* (2019–22), Georges Aperghis, *Tag ohne Nacht* (2020), Georg Friedrich Haas, *Was mir Beethoven erzählt* (2020), Alberto Posadas, *Ga* (2021), Liza Lim, *Nautilus* (2022) and Lorelei Dowling, *Travelling Suite* (2023).

The pieces are part of this doctorate as they synthesise extended techniques within a musical framework. The works are documented as recordings with timestamps for the contemporary techniques and accessible via scanning the QR codes at the beginning

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[38] Lorelei Dowling, "Contemporary Contraforte," Lorelei Dowling, accessed August 3, 2024, https://contemporary-contraforte.com.

[39] Bernard Bonin, e-mail message to the author, February 22, 2022.

of each section. All the composers have granted permission to use excerpts from their pieces and have their scores included in this research. Links to the scores are included in each section.

In the last chapter the epistemic process of acquiring contemporary techniques on the contraforte is reflected upon. Questions and self-analysis help me view the changes in my playing. Reflecting on the collaboration process and the pieces, prepares the way for the next approach to research into the contraforte. New performance practices for the next generation have emerged and are discussed. The chapter concludes with a discussion of how the contraforte has developed in ensemble composition since the beginning of the project, which was the aim of this thesis.

1.4 Development and Presence of the Contraforte

'Rather than putting a Bandaid on the problem
we decided to cure the disease.'[40]

These words, from Guntram Wolf, were the initial concept for the contraforte. It is important to understand that the contraforte is a not just a 'bandaid' to the problems of a contrabassoon. The instrument, developed by Wolf and Bendickt Eppelsheim in 2001, is brand new. For the duo, the contraforte was conceived as 'a more modern alternative to the traditional concept of the contrabassoon, which dates back to the 19th century, [which] seemed very interesting and possible to us.'[41] The construction of the contra-

[40] Lewis Lipnick recounts this comment from Wolf. See Lewis Lipnick, "Contraforte," YouTube, January 13, 2017, video, 8:47 (timestamp 1:56), https://youtu.be/onr1oqQK0Rg.

[41] Benedickt Eppelsheim, e-mail message to the author, June 13, 2022. ('Eine modernere Alternative zur traditionellen Konzeption des Kontrafagotts, welche ins 19. Jahrhundert zurückreicht, schien uns sehr interessant und möglich zu sein.' English translation by the author.) I sent a questionnaire on the contraforte to Benedickt Eppelsheim which he e-mailed back on June 13, 2022. An English translation is attached in Appendix A. Please note that the spelling and wording used by the interviewee has not been modified.

forte is not based on the acoustical properties of the contrabassophone or contrabassoon, [42] but 'on formulas from Cornelis J. Nederveen's *Acoustical Aspects of Woodwind Instruments*.'[43] The name 'contraforte' reflects the instrument's 'wider dynamic range […] like the pianoforte, and [the fact] that it's in the bass register.'[44] 'The contraforte plays in all musical genres.'[45]

A small pool of prominent players who are valued colleagues, should be acknowledged for their contraforte work in their respective ensembles as well as their freelance work. These players are Kris King (freelancer, California, USA), Elise Jacoberger (Ensemble Proton, Bern, Switzerland), Robert Gillinger (Vienna Symphony Orchestra, Austria), Johannes Schwarz (Ensemble Modern, Frankfurt, Germany), Lucas Rössner (Ensemble Phoenix, Basel, Switzerland), Brock Imison (Melbourne Symphony Orchestra, Australia), Noriko Schimada (Sydney Symphony Orchestra, Australia), Edurne Santos (freelancer, Vienna, Austria), Olivia Palmer-Baker (freelancer, Berlin, Germany), Lewis Lipnick (Washington National Symphony Orchestra, USA), and Henry Skolnick (St. Louis freelancer, USA). To date there have been eighty instruments produced,[46] which is relatively few, but these have been distributed throughout the world into thirty-eight different institutions, ensembles and orchestras.[47] A comparison between contraforte and contrabassoon will help to understand why the profile of the contraforte is increasing.

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[42] Woodwind instrument invented in 1847 to replace the contrabassoon.

[43] Eppelsheim, e-mail message to the author, June 13, 2022 ('Es basiert auf Formeln aus Cornelis J. Nederveen's *Acoustical Aspects of Woodwind Instruments.*'). See Appendix A.

[44] Ibid. ('…den größeren Dynamikbereich als zuvor, wie beim Pianoforte, und das eben in der Kontrabaß-Lage.')

[45] Ibid. ('Also soll es jeder spielen, der möchte, vom Genre ganz unabhängig.')

[46] Firm Wolf, e-mail message to the author, June 14, 2024.

[47] Ibid. Due to data protection laws, a list of the orchestras, ensembles, and institutions that own a contraforte cannot be published.

1.5 Contraforte and Contrabassoon

Part of exploring a new instrument is to compare it to its precursor as a means of approval and acceptance. Table 1.1 below lists the quantitative and qualitative differences between the contraforte and the contrabassoon.

Description	**Contraforte**	**Contrabassoon**[48]
developed	2001	1714
manufacturer	Wolf	numerous[49]
acoustic length	580 cm	550 cm
reed	contraforte/contrabassoon	contrabassoon
keys (approximately)	32	21
height	150 cm	136 cm
weight	9.6 kg	4 kg
bore	conical and wide	conical and narrow
bell	facing upward	facing down
hand position	closer together, comfortable	wider apart, larger stretch

Table 1.1: Quantitative comparisons between the two instruments.

The table is self-explanatory, but there are two unusual features that are not mentioned. The first is that the contraforte has two flageolet (octave) keys on the bocal that are operated by bicycle brake cables. This allows notes to sound with ease and a simpler fingering system in the register C5–C6 can be used. The second feature omitted from table 1.1 is the use of C clamps in the construction of the contraforte, which allows for the replacement of sections if needed. Unlike the contrabassoon, which is still improving and developing, the contraforte 'has been engineered, because it would have been impossible to develop it only by trial and error.'[50] Apart from the mechanical

[48] The information on the contrabassoon is from "Contrabassoon," Vienna Symphonic Library, accessed August 3, 2024, https://www.vsl.info/en/academy/woodwinds/contrabassoon#sound-combinations.

[49] There are numerous makers of the contrabassoon including the firm Wolf. Other Firms include Heckel, Fox, Yamaha, Püchner, Mollenhauer, Bell, and Moosmann, just to list a few.

[50] Bernard Bonin, e-mail message to the author, February 22, 2022. Bernard Bonin or BB is a nuclear physicist and acoustic specialist whom I consulted to understand the acoustic properties of the contraforte.

differences, the two instruments have a different range and produce a different sound (see Table 1.2).[51]

Qualities	Contraforte	Contrabassoon
range	A1–C6	B♭1–D5
intonation	stable	unstable
dynamics	extensive	limited
sound	focused	buzzy/harsh
playing technique	uncomplicated	challenging

Table 1.2: Qualitative comparisons between the two instruments.

The range of the instrument is clear, but the other qualities require some explanation. The contraforte has stable intonation because it has a precisely constructed bore taper. Therefore, when the instrument plays extreme dynamics, the intonation is maintained, which is not the case with the contrabassoon. According to New Zealand Symphony Orchestra principal contrabassoonist David Angus,[52] the focused sound produced by the contraforte can be criticised for sounding 'like a tuba'[53] and therefore lacking its own voice. Lewis Lipnick, former National Symphony Orchestra contrabassoonist, enjoys the extreme register because the 'top register [sounds] between a saxophone and cello.'[54] Contraforte colleagues in the Sydney and Melbourne Symphony Orchestra commented on the clear sound compared to the buzzy sound of a contrabassoon.[55] They also noted how the mechanical construction of the contraforte not only facilitates

[51] In this doctorate, the international pitch notation (IPN) system of numbers and notes is used. Higher numbers designate higher octaves, where C4 refers to middle C on the piano. The contraforte and the contrabassoon sound an octave lower than notated.

[52] The word 'contrabassoonist' is used by orchestra's when referring to a contraforte player.

[53] RNZ, "The NZSO has a new bassoon...or does it?," YouTube, November 20, 2018, video, 4:48 (timestamp 1:25), https://www.youtube.com/watch?v=Mi6go69RUng&ab_channel=RNZ.

[54] Lewis Lipnick, "Contraforte," YouTube, January 13, 2017, video, 8:47 (timestamp 6:55), https://youtu.be/onr1oqQK0Rg.

[55] Noriko Schimada and Brock Imison, "Discussion: Contra Bassoon and Contra Forte" Live streaming, The Australian Double Reed Society Conference, online, September 19, 2020.

the slurring of wide intervals to sound with ease, but allows for creating easier fingering combinations in the high register.[56]

1.6 Acoustic Problems

> Wind playing imposes high demands in terms of learning and handling respiratory techniques, arm/hand/finger movement, tongue articulation, body posture, and embouchure control. Physiological aspects are therefore extremely important. However, it is also important for players to understand something of the acoustical behaviour of the instrument they play, in terms of the function of the mechanisms and practical factors that produce the sound.[57]

Since I changed from using a contrabassoon to a contraforte, I have found three tuning problems that needed investigating. The first problem was the bottom register, specifically A1–G2, which not only felt flat to me, but was also identified as flat on a tuner. Tuning notes in this register with the double bass, cello, trombone and piano in the ensemble also proved this register to be below the standard pitch. The second problem was that the highest octave (C5–C6) was also flat. I needed an immediate solution for this as I was preparing Haas's double concerto for violin, contraforte and orchestra at the time, and Haas had composed large, exposed sections in this extreme register. A third problem also occurred in this register: when playing an F5, G5 or A5, a flattened third higher or lower would sound instead.

To understand these three problem areas, I had to devote time to explore the construction and acoustical aspects of the instrument. Measuring the acoustic properties of the contraforte afforded me not only insight into the problems I encountered but answered questions on how to improve and develop standard and non-standard fingering systems. The contraforte presents some idiosyncratic problems stemming from the basic monophonic fingering chart supplied by Wolf, the manufacturer of the contraforte. I sought to explore and understand this side of the contraforte elsewhere rather than

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[56] Ibid.

[57] Leonardo Fuks and Heinz Fadle, *The Science & Psychology of Music Performance* (Oxford: Oxford University Press, 2002), 330.

with the two makers (Wolf, who died in 2013, and Epplesheim, who is not a bassoonist).[58]

In February 2022, I stayed with Bernard Bonin, a French nuclear physicist and acoustic specialist, in Gif-sur-Yvette, France. He designed the computer program *Tutt*, which acoustically analyses musical instruments. Over three full days we explored the acoustical side of the contraforte, with the aim of getting some guidance for my research in four areas:

- To understand why the lowest notes implicitly felt flat to me;
- To understand why the fingerings from the supplied chart in the range C5–C6 sounded flat and to test my alternative fingerings for these notes;
- To understand why the notes F5, G5, and A5 sometimes sound a third higher or lower, which tacitly felt like playing on the 'harmonics' as horn players do;
- To check the acoustic measurements of my quarter-tone fingering chart.

Knowing which 'cents' the intonation is and knowing how the instrument was constructed meant that I could adjust my quarter-tone fingering accordingly.[59] I then would feel confident in venturing further to construct an eighth-tone fingering chart. The first step with Bonin was to measure the instrument and put these measurements of the bore into an input file (Fig. 1.2).

Figure 1.2: Bonin measuring the contraforte.

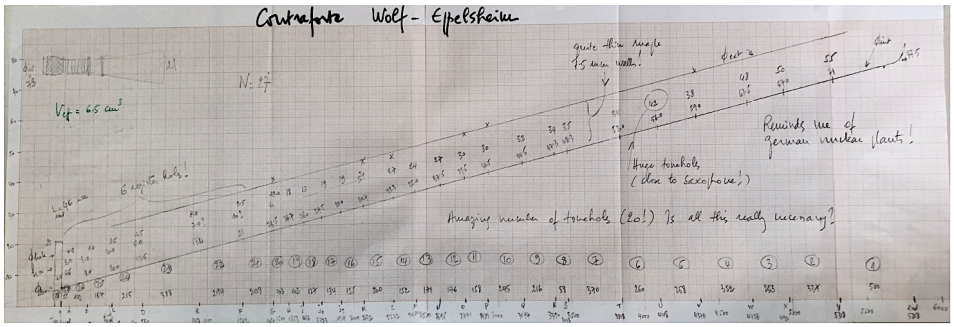
[58] Eppelsheim sadly died before the completion of this artistic research in 2023.

[59] A measurement in music when talking about pitch frequencies. One hundred cents = a semitone.

It was quite challenging to make the measurement owing to the instrument's size, the number of tone-holes, and its mechanical complexity. We did this by attaching a string along the body of the instrument and placing a mark on the string where the middle of each tone-hole occurred. We then removed the blue-tacked string from the contraforte.

This method is not a hundred percent accurate, but it vitiates the need to dismantle the instrument. Only the firm Wolf can do this, as it requires specialised tools.[60] Bonin initially created a manual construction of the bore plan, which he later digitised into a computer file (Fig. 1.3).[61]

1.



2.

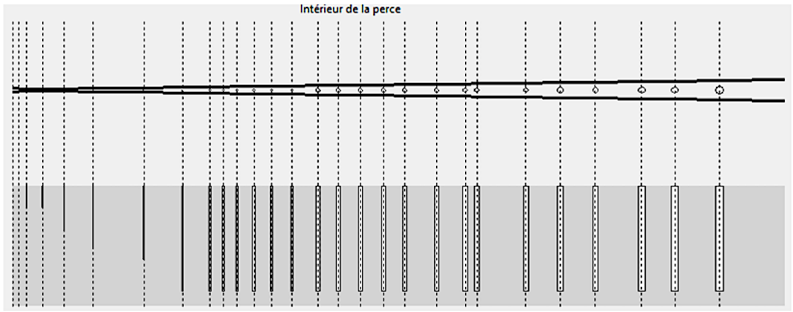


Figure 1.3: Bonin's hand drawn construction of the bore of the contraforte (1.) and the digitised computer version (2.).

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[60] Eppelsheim, e-mail message to the author, June 13, 2022 ('Wenn das Instrument auseinandergenommen werden kann, wird so eine komplexe Mechanik dabei immer verbogen und dereguliert. Selbst zerlegen sollte man sinnvollerweise nur Instrumente mit wesentlich einfacherer Mechanik. [If the instrument can be taken apart, such a complex mechanism will always be bent and deregulated in the process. It only makes sense to disassemble instruments with much simpler mechanics]'). See Appendix A.

[61] All woodwind instruments are constructed of a bore, either cylindrical, straight (clarinet, wooden flute) or conical (bassoon, saxophone).

The second step involved inputting the file into the Tutt software to calculate the impedance curves (how the sound moves) and the acoustic pressure fields (how the sound behaves) within the contraforte. Bonin analysed the lowest note of the instrument A1 (sounding A0) which should vibrate at 27.6 Hz.[62] The reading came out as 27 Hz, and, according to Bonin, 'this may be intended by the maker to take into account the non-linearities of the ear at very low pitch.'[63] This could explain why the instrument felt flat to me in this register: it was constructed to produce a flatter pitch starting from the lowest pitch, a sounding A0.

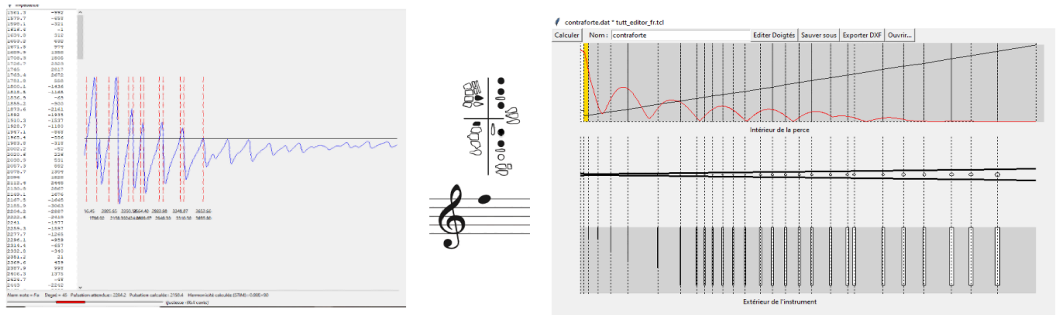
The third step was to repeat the same acoustic calculations with a selected high note fingering that was both flat and played either a third higher or lower than the note intended. We considered two fingerings for F5: F5S and one labelled F5L.[64] This is the result (Fig. 1.4).

[62] Each note of music has a frequency measurement. (Hz) frequency refers to the number of cycles per second of the sound wave. The Hz measurement for bottom A of the piano (A0) is 27.6Hz. This should be the same Hz measurement for the bottom note of the contraforte, but through the Tutt program, I discovered it is not.

[63] Bonin, February 22, 2022.

[64] F5S refers to the standard fingering (S) for the note F5 which is taken from the supplied fingering chart supplied by Wolf. The bassoonist Stefan Pantzier developed the contraforte fingering chart. F5L refers to the author's (L = Lorelei) fingering for F5.

1.



2.

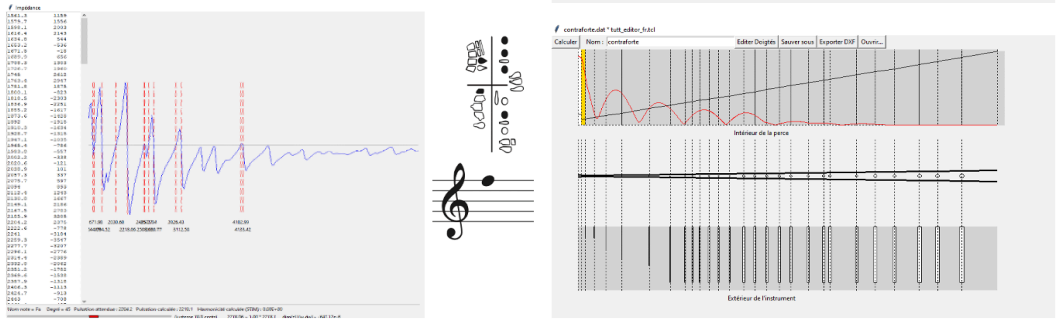


Figure 1.4: The differences in the impedance curve and acoustic pressure wave of the fingering F5S (1.) and my fingering, F5L (2.).

The impedance curve diagram on the left (1.) has a regular pattern with a sharp peak. The red line in the adjacent diagram represents the acoustic pressure wave. For the standard fingering of F5S Tutt analysed the tuning of -36 cents. My fingering's (2.) impedance curve is wider and more consistent. The acoustic pressure wave (shown by the red line in the diagram on the right) is also more regular compared to the one in (1.). Tutt analysed the tuning of this fingering as a F5 + 11 cents. I was very happy with this result.

We also found that both F5S and F5L have two flageolet keys opened at once. This is why it is possible to pitch the note either a third lower or higher, depending on the placement of the embouchure. Realising this and using the right embouchure helped in pitching the note as an actual sounding F5. I interpreted this information to mean that the provided fingering tablature needed improvement. Bonin and I spent the rest of our time analysing my fingering chart for quarter-tones. The success of my quarter-tone fingering chart was judged according to three acoustic-point criteria:

a) The pitch accuracy as expressed in cents;

b) The harmonic contents of the note, i.e., the timbre. As Bonin noted, 'the higher the value of the harmonicity, the richer the timbre';[65]

c) The tuning as 'portrayed from the shape of the impedance curve [moving of sound]. If the impedance curve displays marked peaks which are well-separated from each other, the emission [tuning] is expected to be good and without fluctuations in sound or multiphonics.'[66] A quarter-tone chart (G1–A2), prepared for later digitisation into an input file for Tutt is shown below (Table 1.3):

	N		G↑ 1	G#↑ 1	A↑ 1	A#↑ 1	B↑ 1	C↑ 2	C#↑ 2	D↑ 2	D#↑ 2	E↑ 2	F↑ 2	F#↑ 2	G↑ 2	G#↑ 2	A↑ 2
3	●	A	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2	●	B	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
1	●	C	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
8	●	D	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
8	●	E	●	●	●	●	●	●	●	●	●	●	○	●	○	○	○
8 2	●	F	●	○	○	●	●	●	●	○	○	●	●	○	○	○	●
2 1	○	G	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●
2 1	○	H	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●
E♭	●	I	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●
3	○	J1	●	●	●	●	●	●	○	○	○	●	●	●	●	●	●
C#	●	J2	●	●	●	●	●	○	●	○	●	●	○	●	●	●	●
4	○	K	●	●	●	●	○	●	●	●	○	●		●	●	●	●
5	○	L	●	●	●	●	●	●	○	○	○	○	●	●	●	●	●
B♭	●	M	●	●	○	○	●	○	●	●	●	●	○	●	●	●	○
6	○	N	●	○	●	○	○	○	●	○	○	●	○	●	●	○	●
A♭	●	O	○	●	●	○	●	●	●	●	●	●	●	●	○	●	●
F F#	○	P	○	●	○	○	○	○	○	○	○	○	○	●	●	●	○
F# F#	●	Q	○	○	●	●	●	●	●	●	●	●	●	○	○	○	●
E	○	R	○	●	○	○	○	○	○	○	○	○	○	●	○	●	○

[65] Bonin, February 22, 2022.

[66] Ibid.

D	○	**S**	○	○	●	○	○	○	○	○	○	○	○	●	○	○	○
e♭	●	**T**	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
C	○	**U**	○	○	●	○	○	○	○	○	○	○	○	●	○	○	○
c#	●	**V**	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
B	○	**W**	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
B♭	○	**X**	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
A	○	**Y**	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Table 1.3: Contraforte quarter-tone table prepared for digitalisation as an input file for Tutt.

Across the top of the table are the quarter-tones G1–A2. The tone holes are written down the left side of the table in alphabetical order—designating where the measurements were on the string in the middle of the tone holes—and numerals and letters that represent the keys. The black and white dots in the columns show which keys on the instrument are open and which closed when the quarter-tone is played. The black and white dotes in column N (normal) indicate the position of the keys when the instrument is note being played.

I was surprised to discover the huge number of possible combinations of opening and closing tone holes on the contraforte. With twenty-six tone-holes, 'the number of possible combinations would be (67 million) if all holes could be closed or opened independently.'[67] Of course, the key work correlates with the keys, which limits the possibilities, but 'the number of possible combinations is still huge and defies a systematic investigation by a musician without a computer.'[68]

This investigation into the acoustic measurement of the contraforte was crucial to my research because it scientifically validated my equal-tempered quarter-tones and standard notes fingering charts. Other players can benefit from this information. Playing quarter-tones on the contraforte without a quarter-tone fingering method is a frustrating exercise in guesswork. The results also provided me with scientific evidence that notes in the top octave are flat. This gave me the impetus to experiment by slightly adjusting the height of the opening of the flageolet keys on the bocal. Slightly raising

[67] Ibid.

[68] Ibid.

them has allowed the notes between C5–C6 to speak more freely and has raised the pitch. The fact that there are approximately sixty-seven million fingering possibilities in which I can find various sounds means there is a lifetime of work ahead.

Chapter 2 Topography of the Contraforte

Discovering that the contraforte has innumerable fingering combinations to produce sounds resulted in specific research in areas of extended techniques. Consequently, my research has resulted in a mapping of the topography of the contraforte with a focus on effects that are widely used in the contemporary music field. Before embarking on this exploration, however, specific practicalities needed to be addressed, the first being to develop a basic understanding of and strategies for improving the reed.

The music archaeologist and curator of musical instrument instruments Kathleen Schlesinger (1862–1953) wrote in 1917 that 'the mouthpiece is by far the most important part of the instrument – it is the soul of the pipe, but the player must be the master of both.'[69] The soul of a double-reed instrument is the reed. Variations in sound will always be produced owing to the material (plastic, fibreglass and cane) and the shape used to construct the reed. The original contraforte reed, which was developed empirically (although similar to a sarrusophone reed[70]) required further exploration and development before it could be really suited to my way of playing. I began experimenting with four hand-finished contraforte reeds of different lengths and widths. I tested both shorter and longer reeds, using both wide and narrow blades (Fig. 2.1).

Figure 2.1: First four contraforte reeds used for experimentation.

I endeavoured to build all of these reeds with exactly the same measurements along the spine, so as to maintain consistency. Using cane from Germany, France, and the

[69] This quote is taken from a thesis Kathleen Schlesinger, "The Origin of the Major and Minor Modes," *The Musical Times* 58, no. 893 (1917): 297–301.

[70] The sarrusophone is a metal double reed instrument patented in 1856.

USA helped define how I wanted to sound, as the different densities of the cane projected different responses and sounds. On the basis of this experimental stage, I found that the reeds that worked most successfully for my way of playing were short in length and either wide or narrow in breadth. I found that wide-tipped reeds were easy to play, but that the sound was not centred or warm. With narrow reeds, I was able to achieve a focused and centred sound, while it was also easier to play in the highest registers of the instrument, and the intonation held when playing at extreme dynamics. The shape of these reeds also helped raise the instrument's pitch, which, as I discussed in the introduction, was a problem for me. Throughout my artistic research, I also used four different embouchure positions on the reed: at the tip, in the middle, at the back and almost the entire reed in my mouth. This chapter discusses the results this produced.

It is also essential to be aware of the physical differences between players of the contraforte. These often elicit different sonic results; therefore, with the desire that my research will be useful to others, I have sometimes needed to find simple alternative solutions for producing sounds. When discussing pronunciation in a foreign language, Caleb Gattegno noted that muscle movements 'are under our voluntary control' and 'we simply need to make different shapes with our lips, jaw, and tongue and what we do with our breathing.'[71] While this quote pertains to speaking a language, mastering and manipulating our embouchure is essential for performers aiming to explore and execute extended techniques on their instrument, including in classical performance practices. The focus in this chapter, however, will be on non-traditional techniques, because the contraforte is a new instrument in a new century, and such techniques are essential to maintaining the 'musical requirements of each successive epoch.'[72] In

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[71] Caleb Gattegno, "The Unreliable Ear," *The Silent Way*, accessed August 3, 2024, https://silent-way.online/2020/12/28/the-unreliable-ear.

[72] 'The objective has therefore been not one of exploiting the characteristic possibilities of each instrument but of satisfying the musical requirements of each successive epoch.' (Bruno Bartolozzi, *New Sounds for Woodwind*, trans. and ed. Reginald Smith Brindle, London: Oxford University Press, 1967, 3.)

addition to exploring contemporary sounds, understanding the instrument's limitations has also proven beneficial.

Although the contraforte belongs to the bassoon family, it functions differently to a bassoon. Unlike the bassoon, all tone holes are covered, and the larger pads result in slower mechanical key response. Owing to this mechanical encumbrance and the fact that all of the tone holes are covered, there are fewer options for producing multiphonics than on the bassoon. The ability to execute a finger glissando or to allow individual harmonics to sound when overblowing a lower note is dubious. Composers have already used these timbres when writing for the contrabassoon, which has influenced my approach to finding different ways of achieving these techniques. These were the factors I had to be aware of and, in the case of the reed, find a solution to before developing an approach and methodology for exploring the instrument's wealth of non-traditional sounds.

My approach to discovering contemporary techniques for the contraforte consisted of five stages. The first stage was to look at the definition of individual extended techniques. The second stage involved searching for resources dealing with specific extended bassoon, contrabassoon, or contraforte techniques. As an experienced contemporary bassoonist, I aimed to apply techniques that I know work on the bassoon, using my practical knowledge and adapting it to this new instrument. The third stage entailed analysing musical examples of effects since 1960 that composers have incorporated into ensemble or solo pieces for the contrabassoon, contraforte, or bassoon. These examples of contemporary techniques show that these instruments can play modern music, not just traditional music. Finding particular musical colours unique to the bassoon raised the question of whether this new instrument, the contraforte, would be able to produce similar effects. The fourth stage involved referring to autoethnographic notes on sounds I had heard from other instruments. I kept diaries of timbres that were either unusual or inspirational, or even just simply beautiful: air and key effects, unusual colours extracted from the contrabass flute, contrabass clarinet and heckelphone; the sound produced by bowing on a double bass tailpiece, the different colours mutes can make; the ways in which foil and different mouthpieces can distort and filter sound; the effects of singing whilst playing; the art of '*sotto voce*,' or ghosting, which is almost inaudible, to name just a few. These inspired my experimentation on

the contraforte. For the fifth stage, I considered the notation of these extended techniques. The notation of effects differs among composers, sometimes resulting in many different notations for the same effect, particularly for overblowing, multiphonics, and microtonality.

My methodology was based on systematic experimentation to eliminate ephemeral effects. I aimed to prioritise fluency, substance, and tangibility within the framework of the chosen extended techniques. To assess the effects' consistency, I used two contrafortes and collaborated with another player, Edurne Santos, to achieve conclusive results. I kept manuscript books of experiments, recorded these, and replayed them the next day to see if the same technique functioned. The concepts, approaches, and methods for each sound are contained in the following sections of this chapter: monophonic sounds in the new upper register, quarter and eighth tones, multiphonics, overblowing, underblowing, roll tones and dyads, glissandi, tremoli, and a section on experimentation.

2.1 Monophonic Sounds in the New Upper Register

Part of exploring an instrument's topography is understanding its behaviours when playing in the highest register. First, I obtained an overview of how composers utilise these highest notes in their compositions by investigating the bassoon's upper limits. György Ligeti's Concerto for Piano and Orchestra (1984–88) and Concerto for Violin and Orchestra (1989–93) showcase the extremities of pitch in the bassoon literature. Interestingly, while these extremities take a great deal of effort to execute, they are treated in two ways: in one case as foreground and in the other as background. The high E5 in the second movement of the Piano Concerto is foregrounded through orchestrational mindfulness: a piccolo and double bass are the only two other instruments playing, allowing the bassoon to be clearly heard. The bassoon is effectively sharing the piccolo line. In contrast, the series of G5s played by the bassoon in the fifth movement of the Violin Concerto is part of a tutti melodic figure for three instruments (the oboe, bassoon and double bass) set against a densely orchestrated background. Ligeti effectively covers up the high G5s by placing them within a thick musical texture, and this same phenomenon can occur when employing extremities of pitch with the contrabassoon (Fig. 2.2).

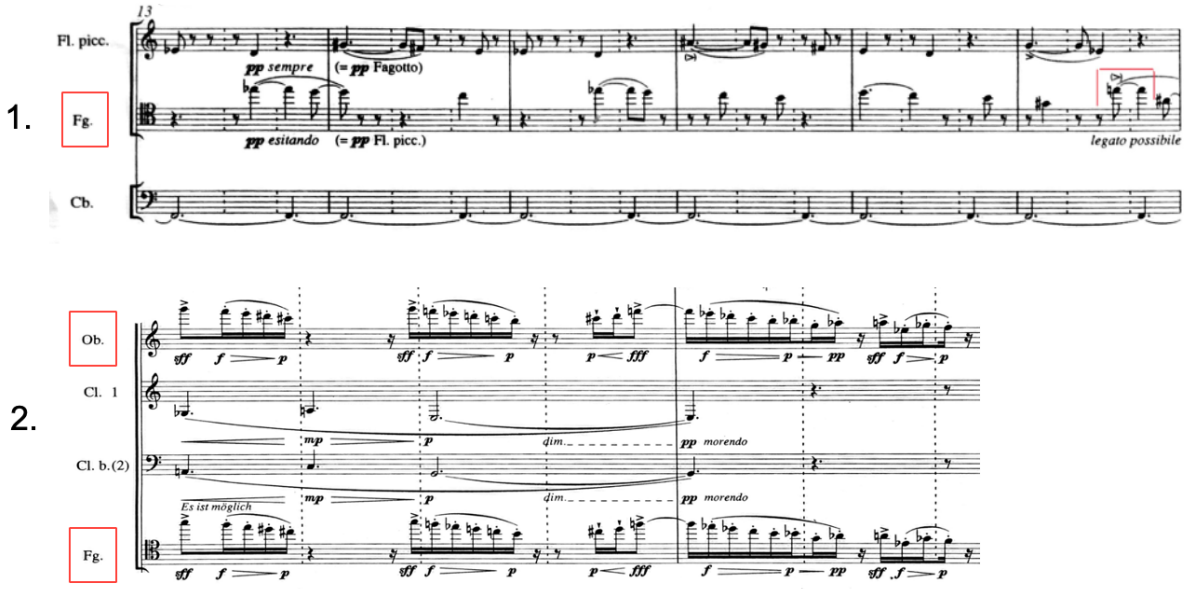

Figure 2.2: Ligeti, Piano Concerto, ii, bb. 13–18 (1.) and Ligeti, Violin Concerto, v, bb. 75–77 (2.): examples of the bassoon's high register.

In Iannis Xenakis's *Jalons* (1986), the contrabassoon plays a C5 and a repeated D5, doubling a double bass line. In John Adams's agile and energetic contrabassoon part in Chamber Symphony (1992), the first movement, Mongrel Airs, ends with a D5 (Fig. 2.3).

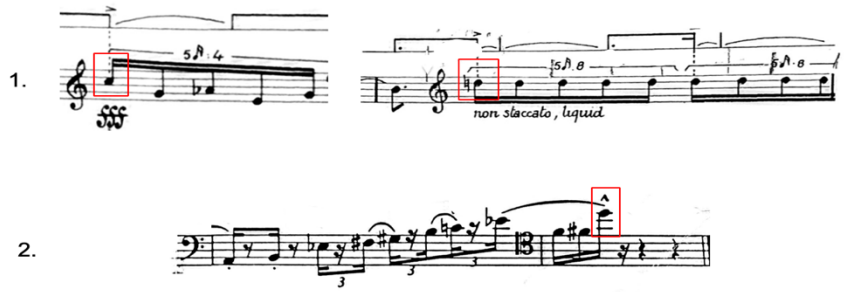

Figure 2.3: Xenakis, *Jalons*, b. 37 and b. 66 (1.) and Adams, Chamber Symphony, i, bb.247–248 (2.): examples of the contrabassoon's high register.

It is interesting to note that Adams's piece is modelled on Arnold Schoenberg's *Kammersymphonie* (1906), an ensemble piece that also contains an agile and at times high contrabassoon part, albeit one that is embedded within a thick orchestration. Notably, the combined idea of agility *and* high register presented new performance practices for the contraforte, particularly since this instrument has an additional octave: C5–C6.

As mentioned in the introduction, it was necessary to address the problem of intonation in the register between C5 and C6, which meant I had to invent a new fingering system. I first developed this through experimentation, before taking a systematic approach in which I sharpened the pitches obtained using the existing fingering chart by adding an auxiliary key while still maintaining the standard European tuning perimeter of 442–443 Hz. By employing a principle of retaining very close finger patterns between notes in terms of the choice of auxiliary keys, I was also able to avoid the complicated cross fingerings for which the top octave of the bassoon is notorious.[73] The prioritisation of agility in the top register of the contraforte required the development of an additional tablature of simple fingering combinations, because the fingerings that play best in tune are not necessarily fingerings that allow agility. [74] I also experimented with embouchure changes to enhance the facility of playing in the top octave. The outcome was to deploy an embouchure technique of *smiling* whilst playing at the back of the reed. This exerts equal pressure on the reed and allows notes in this register to begin cleanly and quietly. In other words, a note could be started almost from *niente*. The contraforte 'extremities' that I developed in this way, which go beyond the range, are used in Georges Aperghis's *Situations* (2013) and are referred to as 'screeching' (Fig. 2.4). After finding a new solution for this register, I commenced research for quarter-tones.

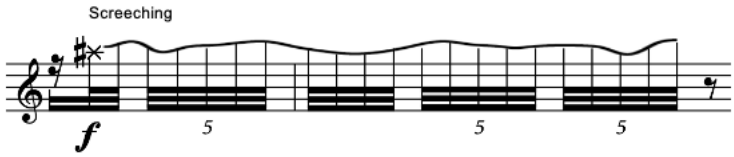

Figure 2.4: Aperghis, *Situations*, bb. 856–858: example of the contraforte's top register.

[73] 'The pipe resonances of the bassoon […] are important to the performing bassoonist as the root cause of the seemingly arbitrary fingerings in the upper register.' James Kopp, "The Not-Quite-Harmonic Overblowing of the Bassoon," Kopp Reeds, accessed August 3, 2024, https://koppreeds.com/harmonic.html.

[74] See Appendix B for the link to the 'Contraforte Fingering Chart C5–C6.'

2.1.1 Quarter-Tones

'The 24-tone system may be one of the most practical microtonal systems because it works well on conventional musical instruments.'[75]

Wind players are already acquainted with microtonal practices owing to the intonation adjustments required for standard pitch, so venturing into microtonality is not new territory per se; however, an extensive investigation of the microtonal possibilities available on the contraforte and contrabassoon has not been performed before. Specifically, the microtonality explored here is quarter- and eighth-tones.[76] Playing quarter-tones on the bassoon in a musical context influenced my appreciation for them. The first quarter-tone piece I encountered that convinced me of the intricate sonic world the can be conjured using quarter-tones was Alain Bancquart's woodwind quintet *Ma manière de nuages* (2001).[77] The fifth movement, for oboe and bassoon playing a virtuosic duelling quarter-tone line in the high register is musically enhanced by a series of silences. The pauses allow the ear to absorb the tension and enjoy the notes of the twenty-four-tone scale.

In ensemble playing, the use of quarter-tones on the bassoon has been employed in both fast (e.g., Georges Aperghis, *Situations*, 2013) and slow (Enno Poppe, *Speicher 1*, 2008) melodic passages. Other impressive literature for bassoon employing quarter-tones that served as inspiration for my research into quarter-tones on the contraforte include Poppe's *Holz solo* for bassoon (2005), and the bassoon duo from Louis Andriessen's *Lacrimosa* (1991). In ensemble playing, the tuning of quarter-tone chords is treated with the same respect and precision as the tuning of chords employing the notes of the standard twelve-note scale. My wind colleagues complain if a quarter-tone is not homogenous in sound, implying that an alternative fingering should be used. This respect for fine detail in quarter-tone tuning is another reason I pursued their discovery on the contraforte. Composers had already started composing for the

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[75] Sandor Germanus, e-mail message to the author, July 27, 2021. Sandor Germanus is the head of the Huygens-Fokker foundation, a centre for microtonal music.

[76] The other microtonalities I have played on the contraforte are third and sixth-tones.

[77] Recording Klangforum Wien, 2001, https://youtu.be/a1D8pTs07YA?si=5yISE6fbrMTC-hnl&t=1230.

contrabassoon using quarter-tones/microtonality, even though there are still no fingering resources available, with examples including Xenakis's *Kraanerg* (1968–69), Giacinto Scelsi's *Maknongan* (1976), Donald Erb's *Five Red Hot Duets* (1992), Enno Poppe's *Sherben* (2000–08), Aperghis's *Situations* (2013), Haas's *das kleine ICH Bin ICH* (2016), and Bernhard Lang's *ParZeFool* (2017) (Fig. 2.5).

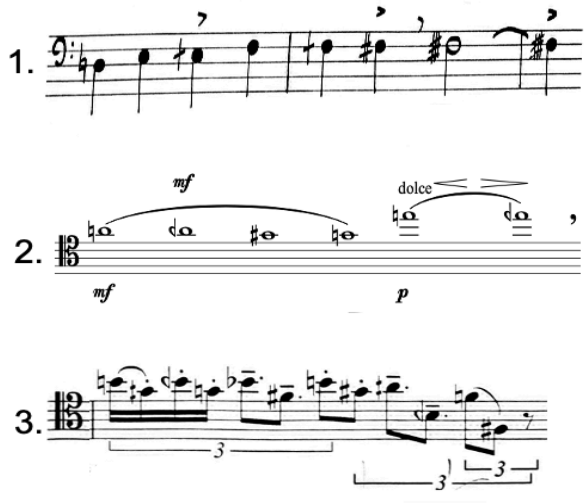

Figure 2.5: Xenakis, *Kraanerg*, 34:12 (1.), Haas, *das kleine ICH Bin ICH*, bb. 468–469 (2.) and Poppe, *Sherben*, bb. 21–22 (3.): examples of quarter-tones for the contrabassoon.

Examples such as these motivated me to explore quarter-tones on the contraforte and to find rapidly playable solutions. Bassoonists, on the other hand, already have the advantage of a simple quarter-tone fingering chart that was published in 1986.[78]

2.1.2.1 Method

Trombones have easy access to quarter-tones using their slides, and quarter-tone trumpets and horns have now been developed. Quarter-tones on the contraforte are created either by embouchure manipulation or the use of non-standard fingerings. Interestingly, the contraforte's reed size allows for quasi-quarter-tones that do not require a complex fingering system. By exerting embouchure pressure on the back of the reed where the cane is denser, it is possible to raise the pitch by almost a quarter-tone. I originally observed this technique being employed by my contrabass clarinet colleague

[78] Dieter Hähnchen, *Zeitgenössische Musik für Fagott solo* (Leipzig: Verlag für Musik,1986), 114.

whilst playing Xenakis's *Kraanerg*. In contrast, I discovered that playing at the very tip of the reed and 'voicing' flattened the pitch. This worked when playing slowly but executing this method quickly with precision tuning does not. Using the embouchure to play quarter-tones in this manner thus tends to be impractical, making the use of a fingering chart a more reliable approach.

To start developing a quarter-tone fingering system, I referred to baroque and classical bassoon fingering charts, as well as for the French *contrabasson* as they have some unusual fingering combinations to experiment with.[79] I developed a quarter-tone fingering chart that was as closely related to the standard contraforte fingering tablature as possible. I found many quarter-tone fingerings, some extremely complex, noting minor physical amendments that resulted in the creation of different timbres—for example, that one should 'smile more when playing,' or that a 'circular breathing embouchure' should be used. In the end, I chose simple fingerings for quarter-tone pitches. I also had to 'blow' the idea of microtonality into the wood of the instrument. I was conscious that playing quarter-tones requires the same amount of intonation awareness as standard notes. Later, when working on Liza Lim's *Nautilus* (2022), I would discover that contraforte harmonic fingerings used for overblowing can also be used to produce quarter-tones. The range in which quarter-tones are available on the contraforte, with the low frequencies being hard to hear, ideally begins at G2 and goes up to C6. Below G2, quarter-tones are more of a fantasy than a reality. Like the bassoon, the contraforte does not have enough auxiliary keys to produce pure quarter-tones below an E2.

Even having developed a fingering chart, learning to play quarter-tones on a new instrument presented another challenge altogether. I approached this task with the aim of learning to play them as fluently as possible. These are not easy pitches to hear in a bass wind instrument, so using a sophisticated tuner helped me become accustomed to this set of tonal resources. I also found it easier to hear quarter-tones when singing them than when playing them. I came to this realisation while performing Klaus Lang's *Der dünne Wal* (2012), where I had to simultaneously sing a quarter-tone higher than

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[79] Paul J. White, "Early bassoon fingering charts," *The Galpin Society Journal*, Vol. 43 (1990): 76–81. https://www.jstor.org/stable/842479.

the note I was playing. Using a simple digital quarter-tone piano and hearing the homogenous blending of standard semitone pitches with quarter-tones facilitated my ability to accurately hear quarter-tone pitches. I then memorised the resonances and physiology of performing quarter-tones on the contraforte, all of which came with continuous practice. As noted by the clarinet player and teacher John St. George in *Wind Artistry*, '...practice is a familiarisation process, familiarisation with accuracy.'[80] 'Voicing' helped me to correct the pitch of a quarter-tone, and repetition helped me to retain this information, proving Richard Vella's assertion that 'repetition is one of the most fundamental of musical processes and can be used to develop material in new areas.'[81] Finally, I was able to determine whether the quarter-tone fingerings I had developed were homogenous enough in tone by using them when playing in an ensemble situation.[82]

For each quarter-tone composed, we will likely need to master a new notation for quarter-tones, an obstacle that makes it difficult to compare quarter-tone practices among different composers.[83] Often, performers rely on composers to decide on the notation of extended techniques, with quarter-tones being one of the particularly problematic areas of musical notation. In most quarter-tone notation systems, a series of new accidental signs are added alongside the conventional sharps, flats, and naturals (Fig. 2.6).

Figure 2.6: Standard notation for indicating quarter-tones.

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[80] John St. George, *Wind Artistry* (Sydney: Rienzi, 1984), 43.

[81] Richard Vella, *Musical Environments: a Manual for Listening, Improvising and Composing* (Australia: Currency Press, 2000), 224.

[82] See Appendix B for the link to the chart titled 'Contraforte Quarter-Tone Fingering Chart.'

[83] Myles Skinner, "Toward a Quarter-Tone Syntax: Selected Analyses of Works by Blackwood, Hába, Ives, and Wyschnegradsky" (doctoral thesis, University of Buffalo, 2006). 3. https://www.tierceron.com/diss/intro/intro.pdf.

Other composers write ‘fifty cents’ over the note to imply the playing of quarter-tones. However, some composers need clarification with quarter-tone notation.

Composers Michael Pelzel and Sarah Nemtsov use ↑ signs to indicate playing a quarter-tone higher and the same sign to indicate adjustments to the tuning of a note in the overtone series. Other composers simply put a + next to a standard note. More thought about the instrument playing the quarter-tones and how they are developed would be an ideal solution for quarter-tone notation. As a performer, I find it logical to use the note from which the quarter-tone is derived, so I constructed my quarter-tone fingering chart accordingly. I prefer to read notation for quarter-tones based on the note name a semitone lower non-enharmonically. I do not want to read a C three-quarter-sharp notated as a flattened Db, because my quarter-tone fingering for this is derived from C#.

2.1.2 Eighth-Tones

While working on quarter-tones, I explored further possibilities for microtonality on the contraforte, resulting in a fingering chart for playing eighth-tones. Playing Isang Yun’s *Monolog* for bassoon (1984) and hearing Georg Friedrich Haas’s *for Johnny Reinhard* (2014) convinced me that eighth-tones offer an appealing musical timbre that is worthy of further exploration on the contraforte. I had envisioned that playing a fast run of quarter- and eighth-tones on the contraforte could create a quasi-glissando effect.[84] However, after experimenting with this idea, I found it did not sound as convincing as using a combination of embouchure and a specifically designed fingering system.[85]

2.2 Multiphonics

‘Can the contraforte play multiphonics?’[86] This is often the first question a composer asks when they are introduced to the contraforte. It is very much an assumption of composers to think that a contraforte would not be capable of playing multiphonics.

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[84] This is discussed in section 2.6 Glissandi.

[85] See Appendix B for the link to the chart titled ‘Contraforte Eighth-Tone Fingering Chart.’

[86] This question was posed by a Master of Composition student from Donostia-San Sebastian, Spain, January 18, 2023, when the class of composers came to Vienna to work with Klangforum.

What makes multiphonics so unique that they are not perceived to be part of the contemporary contraforte vocabulary? The acoustic expert Arthur H. Benade describes a multiphonic—although, somewhat confusingly, his description would also apply to standard pitches—as an oscillation 'made up of a collection of components whose frequencies are connected to one another by an elaborate set of heterodyne relationships.'[87] Bruno Bartolozzi, a pioneer in developing multiphonics or 'multiple sonorities' for wind instruments, notes that they can 'be produced by woodwind instruments.'[88] When his revolutionary book, *New Sounds for Woodwind*, was published in 1967, however, his research on multiphonics was restricted to primary rather than secondary wind instruments, and thus did not include new sounds for piccolo, bass clarinet, cor anglais, or contrabassoon. Fortunately, these secondary wind instruments now have a higher profile than they did when the book first appeared, and there are now resources on multiphonics available to players of these instruments, including the contrabassoon and the contraforte. Indeed, two resources on multiphonics for these instruments have appeared online since the commencement of this project: Richard Bobo's *Multiphonic Fingering Chart (Preliminary)*,[89] and Johannes Schwarz's *Sound Library* for bassoon and contraforte.[90]

From a bassoon player's perspective, whose instrument entered the contemporary music arena later than flute, clarinet, and oboe, the term 'multiphonic' should not be used to describe the sounding results obtained when using the 'overblowing' technique on the bassoon, contrabassoon or contraforte. I believe terminology should refer to the physical technique employed, rather than describing the sounding result. Just as the term 'roll tone' is used even when the technique results in a multiphonic being produced, so overblowing should be referred to as overblowing. Bassoonist Schwarz

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[87] Arthur Benade, *Fundamentals of Musical Acoustics* (New York: Oxford University Press, 1976), 565.

[88] Bartolozzi, *New Sounds for Woodwind*, 2.

[89] Richard Bobo, "Contrabassoon Fingering Chart, 32–36," accessed August 3, 2024, http://me.subcontrabassoon.com/Bobo_Contranomicon_2.pdf.

[90] Sound Library Online, "Fagott Klangarchiv," Johannes Schwarz, accessed August 3, 2024, https://www.soundlibrary.online.

agrees with this,[91] although other wind players disagree. Overblowing has also been referred to as a 'harmonic-series-based multiphonic' by saxophonist Keith Moore.[92] Flute and clarinet players refer to the harmonic layering achieved using this technique as a multiphonic. Adding to the confusion are the numerous terms that can be used to describe other types of multiphonic. Adding another layer to a multiphonic—the voice—can be referred to as a 'multi-drive multiphonic.'[93] Christopher Redgate refers to multiphonics that transpire from a monophonic sound as 'emergence multiphonics,'[94] whereas oboist Libby Van Cleve describes the same effect as a 'metamorphosis multiphonic'.[95] Could this not also be called underblowing? Then, there are references to the fingering systems that produce multiphonics.

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[91] „Mehrklänge sind nicht zu verwechseln mit überblasenen Klängen, die besonders im tiefen Register hervorgerufen werden können. Ein Überblasen eines tiefen Tones hat zur Folge, das das natürliche Obertonspektrum dominant im Gesamtklang her MEHRKLÄNGE, die mit speziellen Griffen abseits der klassischen Griffweise entstehen, haben zumeist ein sehr farbiges Spektrum an Tönen, die oftmals nicht einem auf einen Grundton bezogenen Klangschema entsprechen." (Multiphonics are not to be confused with overblowing, which can be produced especially in the low register. Overblowing a low note result in the natural overtone spectrum becoming dominant in the overall sound. Multiphonics, which are created with special fingerings apart from the classical fingering, usually have a very colourful spectrum of tones, which often do not correspond to a tonal scheme based on a fundamental.) Ibid., accessed August 3, 2024, (click on the multiphonic number on the website page to activate the quote) https://sound-library.online/app?sound=19.

[92] Keith Moore, "A Multiphonic Reappraisal and the Alto Saxophone Concerto *Radial*" (doctoral thesis, Columbia University, 2014), 15.

[93] Ibid., 26.

[94] Paul Archbold and Christopher Redgate, "Multiphonics and the Oboe, 4–5," SAS-Space, accessed August 3, 2024, https://sas-space.sas.ac.uk/6944/4/Multiphonics_and_the_Oboe_v14photo.pdf.

[95] Libby Van Cleve, *Oboe Unbound*: *Contemporary Techniques* (Toronto: The Scarecrow Press, 2004), 33.

Bartolozzi and Jamie Leigh Sampson, in her book *Contemporary Techniques for the Bassoon: Multiphonics* (2014),[96] use the terms 'monovalent' and 'polyvalent' to describe the different types of fingering system that can be used to execute multiphonics.[97] 'Collateral' multiphonics, a term used by Moore, describe the mixing of fingerings. All of this is somewhat confusing and unnecessary.[98] More important than understanding the different terminologies is grasping the ways in which composers conceptualise multiphonics when writing for wind instruments. From my autoethnographic notes, I concluded that there were three broad categories of wind multiphonic use:

- statically as a tonal or percussive element;
- in melodic sequences;
- as tonal reinforcement in *fortissimo* passages.

One of the more striking examples of multiphonics that I have heard occurs in Agata Zubel's *Bildbeschreibung* (2015), played by the tubax, an instrument developed by Eppelsheim that is similar to the contrabass saxophone (Fig. 2.7).

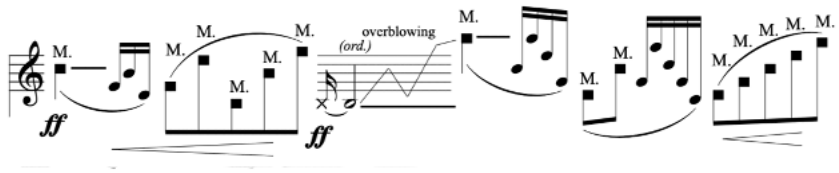

Figure 2.7: Zubel, *Bildbeschreibung*, i,: graphic notation for tubax multiphonics.

The graphic notation allows the performer to choose the multiphonics, thereby giving each performance a different flavour. Over the course of multiple performances of this piece, different aspects of the musical gestures were highlighted as a result of the choice of multiphonics on the tubax. In one performance, the choice of loud, dense

[96] Jamie Leigh Sampson, *Contemporary Techniques for the Bassoon: Multiphonics* (New York: Adj-Ective New Music, 2014), 7.

[97] Bartolozzi, *New Sounds for Woodwind*, 37.

[98] Keith Moore, "A Multiphonic Reappraisal and the Alto Saxophone Concerto *Radial*" (doctoral thesis, Columbia University, 2014), 14.

low-pitched multiphonics came across as a forceful passage. In another, high-pitched multiphonics with pronounced beatings portrayed a more melodic line.

As a wind player, what is surprising when researching wind multiphonics is to discover the ways in which other instrumentalists—particularly brass players—achieve this effect. Trombone multiphonics can be produced using four different techniques: singing while simultaneously playing a monophonic sound (referred to as 'sung' multiphonics), split tones ('lip' multiphonics),[99] mutes, and 'noisemakers.'[100] Unlike brass players, bassoon and contraforte players do sing through their instruments but this does not produce multiphonics.

My initial approach to finding multiphonics on the contraforte was to try using bassoon multiphonic fingerings that had been used in musical contexts. I started from pieces I had played in which multiphonics were used in melodic lines, rather than as a singular effect. Examples of such pieces include Pierluigi Billone's *Blaues Fragment* (2010) and 'Metrio' from the series *Legno Edre* (2004) for solo bassoon, as well as Sofia Gubaidulina's *Duo Sonata* (1977) for two bassoons and Concerto for Bassoon and Low Strings (1975). Both of the Billone pieces contain a wealth of multiphonic information initially developed by the composer, even though he is not a formally trained bassoonist. Most of his multiphonics worked on my bassoon, but because of the way he played and the instrument he used, some did not. As such, experimenting with his prescribed fingerings resulted in a similar multiphonic —with a frequency difference of 15 cents—that suited my way of playing and my bassoon. This encouraged me to try bassoon multiphonics on the contraforte. I approached this by experimenting with the addition and subtraction of keys and by employing 'the conscious manipulation of the internal oral cavity.'[101] This included changing the opening of the throat aperture

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[99] "Multiphonics on Trombone: a guided tour," a hand-out from trombonist Kevin Toksöz Fairbairn.

[100] Such as bassoon reeds, saxophone and clarinet mouthpieces, or bird or duck calls. Anything that makes a noise and can be put into the trombone mouthpiece or onto the slide.

[101] Brett Van Gansbeke,"Voicings," Orchestral Bassoon, accessed August 3, 2024,

https://www.orchestralbassoon.com/voicings.

through ‘vowel’ usage.[102] The Gubaidulina pieces, on the other hand, all used multiphonics from the didactic textbook *Metodo per Fagotto* (1972).[103] However, when performing her pieces, I again had to adjust the prescribed fingerings to achieve the desired result.

Metodo per Fagotto also provides a number of interesting fingering combinations but does not offer any real insights into the art of multiphonics, especially none that can be translated onto the contraforte. Other bassoon multiphonic resources provide some interesting ideas for a methodology for cataloguing multiphonics. Dieter Hähnchen claims that there are ‘nine basic fingerings’ that can be used as a basis for bassoon multiphonics, of which ‘a large number of quite different sounding multiphonics can be produced which can be altered through dynamics, lip pressure and auxiliary keys,’[104] while American experimental bassoonist and period bassoon maker Leslie Ross has an interesting approach to cataloguing and notating multiphonics.[105] Nevertheless, all of this information was related to bassoon multiphonics. A more appropriate path would be to investigate the execution of multiphonics on instruments sharing a common thread with the contraforte. In pursuit of this, I decided to limit my search using the following criteria: bass wind instruments,[106] newly developed instruments, and instruments that play using a double reed. Wind instruments belonging to the first category include the tubax, the contrabass clarinet, the baritone saxophone and the contrabass flute. Two new low-resonating single-reed instruments, the Clex and the tubax, fall into

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[102] Ibid.

[103] Sergio Penazzi, *Metodo per Fagotto* (Milano: Edizioni Suvini Zerboni,1972).

[104] Hähnchen, *Zeitgenössische Musik für Fagott solo*, 123.

[105] Leslie Ross notates the dominant frequency of a multiphonic with an opaque oval and red note heads for the lowest frequency in her prescribed fingerings. Leslie Ross, “Multiphonics,” Leslie Ross, accessed August 3, 2024, http://www.leslieross.net/multiphonics.html.

[106] Bass wind instruments include the contrabass clarinet, the baritone saxophone and the contrabass flute.

the first two categories.[107] The lupophon fits all of the categories, while the heckelphone fits two. I was curious about approaches and methodologies for finding multiphonics on these two instruments because I had discovered a new performance technique on the contraforte for playing multiphonics. I wondered if players of these instruments used the same idea. Sadly, the amount of publicly available material that has been generated is limited, so no new insights were obtained into approaches, methodologies, or other ideas for multiphonics.[108]

2.2.1 Method

The way multiphonics are performed on the contraforte is the same as on the bassoon, occurring 'when the generator—in this case, the frequency of the reed which is under is the variable control of the lip-pressure, and the resonator—here the resonating cavity in the instrument which is under the variable control of the fingering—are not in accord with one another.'[109]

I had already performed ensemble pieces that required multiphonics on the contraforte, including Aperghis's *Situations* (2013), Haas's *Hyena* (2016), Posadas's *Poética del Espacio* (2018–19) and I had already started a catalogue. To expand my existing few, I further searched for multiphonics from the fingerings of the research for the contraforte I had been working on:

a) A new fingering tablature for the range C5–C6
b) Fingering tablatures for microtones
c) Overblowing
d) Harmonics

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[107] A group led by Swiss clarinettist Ernesto Molinari developed the Clex (Contrabass Clarinet Extended), which is similar to a contrabass clarinet but features sensors that connect the keys to a computer. Fresh Wind, "CLEX – Contrabass clarinet Extended," YouTube, Sept 27, 2019, video, 9:48, https://www.youtube.com/watch?v=_6Z9G4-O6o8.

[108] There are several lupophon multiphonics from Peter Veale which are printed in the music of Helen Bledsoe's *Qisa* (2021) for Lupophon and electronics.

[109] Hähnchen, *Zeitgenössische Musik für Fagott solo*, 123.

e) Glissando possibilities using new fingering combinations.

Like Redgate, I started with fingerings that I had discovered that produced multiphonics, and then systematically added the unused keys, first one at a time and then in combination.[110] I would then re-play the multiphonics newly found in this way the next day to see if I could obtain the same result and try them once again a month later to gauge whether the result had been a one-off or could be repeated on demand. I needed to be able to 'insist' that a multiphonic was present in the instrument's wood. Playing multiphonics is essentially 'confusing your instrument into playing more than one note at a time.'[111]

The choice of five individual octave keys and the C# key as keys that can be opened to disturb the air column provides numerous possibilities for multiphonics. I discovered that the more I played multiphonics on the instrument, the more responsive the multiphonics became. I believe that this is due to the wood changing, swelling slightly from condensation and adjusting to the different atmospheric conditions. Using the same fingering for multiphonics on a brand new contraforte does not work, as I have experienced firsthand. On the basis of my own experience, I conclude that the less airtight the instrument becomes, the easier it is to play multiphonics. This fascinating natural phenomenon is difficult to describe. I began experimenting with the idea of a leaking instrument and developed an unusual method—I have yet to find woodwind resources that discuss this—for achieving multiphonics on the contraforte.

Starting from the full spectrum of an overblown fundamental, I slightly released the pressure on the third finger of my left hand, prompting a multiphonic to emerge. Unfortunately, this technique cannot be executed quickly due to the slow release of finger pressure on the key. Inspired by Bartolozzi, I tried another method of experimenting with multiphonics using four different embouchure positions: on the tip of the reed, in

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[110] Christopher Redgate and David Gorton, "Austerity Measures and Rich Rewards" in *Artistic Practices*, *Experimental encounters in music and beyond*, ed. Kathleen Coessens (Leuven: University Press, 2017), 67.

[111] Aleah Fitzwater, "Multiphonics in Music," Notestem, accessed August 3, 2024, https://www.notestem.com/blog/multiphonics.

the middle of the reed, at the back of the reed, and almost swallowing the reed.[112] This triggered different multiphonics with the same non-standard fingering. This experiment illustrates the fact that different players with different embouchures can achieve different multiphonic results from the same fingering. It is also why sometimes the embouchure position is indicated along with the fingering of the multiphonic.

In some of my contraforte multiphonics, there is a strong oscillation between two notes that predominates; therefore, I divided the multiphonics into two groups: beating multiphonics and multiphonics. I had initially begun to categorise my multiphonics using a system describing them as high-, middle- or low-sounding multiphonics, noting weak and robust responses. However, I subsequently changed my cataloguing method, loosely identifying the multiphonics on the basis of the position of their dominant frequency within the standard equal-temperament chromatic scale. I use the word 'loosely' because multiphonics have slight microtonal variations in pitch compared to tempered pitches. In most cases, though, I found that these pitches could be manipulated with the embouchure to bring their intonation into line with tempered pitch.

2.2.2 Documentation and Analysis of Multiphonics

The documentation of my research on multiphonics included recording each multiphonic, and subsequently performing a spectral analysis. Interestingly, Bartolozzi notes that the best method for carrying out the spectral analysis of multiphonics is for a 'composer to work with the performer, using a second [string] instrument to identify the sounds. Two people can work quickly: one emits the sound continuously, the other tests the pitch of the various components and writes them together with the details of the various fingerings, embouchure, etc.'[113] This, to me, is a very hands-on but old-fashioned approach. I sought advice from other colleagues on their approaches to spectral analysis of multiphonics.

One method described to me by the clarinettist Richard Haynes was useful. He recorded contrabass clarinet multiphonics using a simple setup: recording using a Shure

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[112] Bartolozzi, *New Sounds for Woodwind*, 41.

[113] Ibid., 60.

MV88 microphone into GarageBand, then using its built-in equaliser to document the frequencies. This was an ideal solution for me, since I wanted to analyse multiphonics using a method that could be easily taught to bassoon students, enabling them to document their multiphonics without the expense of hiring a sound engineer. Additionally, I had extensive Zoom discussions with the composers Alberto Posadas and Pedro Berardinelli discussing the methods they used for spectral analysis. Berardinelli, who composed a bassoon solo using various multiphonics he analysed himself, taught me how to use SDIF in the notation software SPEAR. He used a Zoom H6 with an X/Y microphone capsule to record the multiphonics. Posadas suggested consulting frequency charts alongside his method of spectral analysis when working with Audacity, also utilising a Zoom H6 to record.

2.2.3 Process

I made multiple recordings of each of my multiphonics to ensure consistency. This is important, since these sounds are not typically produced on instruments designed for playing classical music. The real-time challenge lies in playing the sounding multiphonic as a cohesive sound block. While a recording can convey the quality and the sonority, it may vary due to factors like the room, microphone, and the player.

Recording the contraforte presents challenges because the sound heard acoustically while playing projects into the room inversely.[114] Additionally, as a new instrument, the contraforte requires new recording approaches, especially considering its low frequencies. I reviewed—and some I tested—different microphones as part of my recording setup (see Table 2.1). For the analysis of the spectral data, I utilised a variety of different software packages (see Table 2.2).

[114] This issue emerged during the recording Lim's *Nautilus* for contraforte. While using a quarter-tone fingering, I heard the note (F#↑5) blending into the melodic line as I played. However, the F#↑5 disturbed the sound engineer who remarked that it sounded like a ghost note within the context. He suggested using another fingering.

Microphone	Cost	Observations
Shure MV88	Economical	Used in conjunction with an iPhone. There is no variance in sound when connected to an iPad or MacBook Pro.
Zoom H6 with an X/Y microphone capsule	Expensive	Minimal difference compared to a recording with an iPad Pro.
2 x DPA[115] 4066-OC-A-F00	High Budget	These are ideal for bassoons, but the contraforte sound is too overwhelming for these microphones.
Sennheiser MKH8040 and MKH8020	High budget	Very expensive. Focus on the low partials of the instrument.

Table 2.1: Microphones reviewed.

Software	Cost	Observations
SPEAR[116]	Free	Used with SDIF
AudioSculpt	Expensive	IRCAM program
Audacity	Free	Not suitable for contraforte
iZotope RX	Expensive	Top-end equipment
SDIF[117]	Expensive	IRCAM program used with Spear

Table 2.2: Spectral analysis software tested.

In investigating the spectral analysis software, I made many discoveries. Audacity struggled to detect the low partials of the contraforte, iZotope was too expensive, and AudioSculpt presented challenges in terms of user comprehension. Moreover, when combining SPEAR and SDIF for spectral analysis, I obtained conflicting results for the same multiphonic, leading to hours of frustration trying to find out why. Resorting to

[115] The acronym DPA stands for Danish professional Audio. I use two DPA microphones for amplifying the bassoon in electronic pieces. They are attached to braces I built, connected to the bell and boot joint near the right-hand forefinger. One microphone, placed 12 cm off-centre from the bell, sits at the top the instrument. The other is situated 12 cm from the first tone hole of the boot joint, positioned two thirds down the length of the bassoon. This setup led me to experiment with DPA microphones on the contraforte.

[116] The acronym SPEAR stands for Sinusoidal Partial Editing Analysis and Resynthesis.

[117] The acronym SDIF stands for Sound Description Interchange Format.

Haynes's spectral analysis method, I recorded a multiphonic with a Shure MV88 microphone and analysed the frequencies using GarageBand's equaliser. To check the analysis, I consulted two frequency charts: one at 440 Hz and another at 442 Hz. Initially, I compared the recording against the two charts for accuracy, but eventually settled on using only the 440 Hz chart.

However, I found that the GarageBand method did not offer the precision I desired. After consulting a sound engineer, I switched to using Steinberg's SpectraLayers Pro10 for the analysis but still used the Shure MV88 to record the multiphonics. I notated my multiphonics using a clear rectangle to represent the dominant frequency, while the next three major frequencies were notated using black note heads. If there were additional oscillations in the multiphonic that required their frequencies to be notated, I would add up to two more notes to the chord, with these being notated using a smaller, light grey note head. I was fixed on the idea of notating only the minimum number of frequencies necessary. This stemmed from unpleasant experiences with composers who expected me to pitch notes individually from the chord description, even when some partials were merely suggestive and out of the bassoon's range (Fig. 2.8).[118]

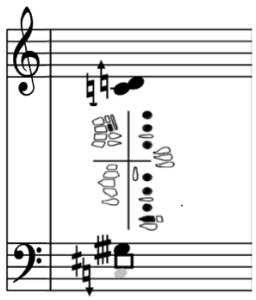

Figure 2.8: Dowling: example of multiphonic notation.

Composers often spectrally analyse multiphonics from different instruments, so why shouldn't performers all do this? By analysing my multiphonics myself, I was able to

[118] See Appendix B for the link to the chart titled 'Contraforte Multiphonics (140) with Fingering Chart and Audio.'

determine how many additional frequencies to include alongside the dominant ones. Knowing how to do this has enabled me to teach bassoon students how to document their multiphonics without needing a sound engineer.

Existing notation for multiphonics can be either ‘descriptive’ or ‘prescriptive’ notation. Descriptive notation indicates the desired sound, while prescriptive notation shows the actions needed to produce a multiphonic, such as the fingering. Sometimes embouchure position is indicated, as this can affect which frequencies will be heard in the multiphonic. Other notations include an ‘M’ written over a fundamental note, block chords and ‘x’ on a note or fingerings. Some examples of multiphonic notation are shown below (Fig. 2.9).

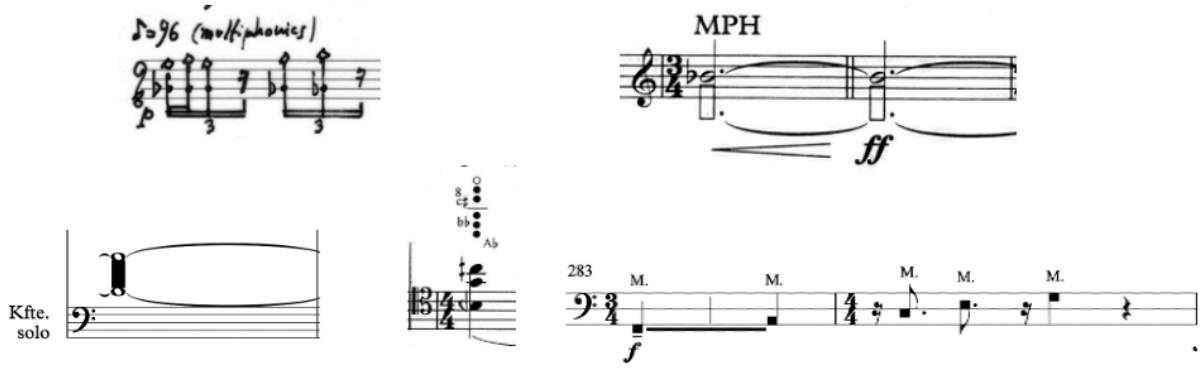

Figure 2.9: Aperghis, *Tag ohne Nacht*, bb. 29–30, Kalitzke *Werckmeister Harmonies* bb. 441–443, (top) and Haas, *Was mir Beethoven erzählt,* bb. 121–122; Posadas, *Ga*, bb. 36–37 and Zubel, *Bildbeschreibung*, v, bb. 283–285, (bottom): examples of multiphonic notation for the contraforte.

2.3 Overblowing

Overblowing is a technique ubiquitous to woodwind instruments. This technique holds particular significance in contraforte research, as it has been employed in ensemble compositions for the contrabassoon (for example, Iannis Xenakis’s *Jalons* (1986) and George Benjamin’s *At first Light* (1982)). However, there has yet to be a comprehensive investigation aimed at consolidating and advancing the technique. Overblowing is a term used to describe the process of ascending to a ‘higher register’ via the layering

of overtones.[119] Owing to the 'spectrum of overtones,' it is a pure sound compared to the gnarliness of a multiphonic.[120] The result of overblowing has been referred to as 'spectral or overblown multiphonics.'[121] Overblowing on woodwind instruments is executed using the standard fingerings for bass fundamental notes and requires a tighter embouchure to produce the resultant layering of harmonics.

Since woodwind players are able to easily execute this technique, as it is a contextual gesture, in contrast to multiphonics, no fingering tablature references are required. Furthermore, overblowing is not notated descriptively as a multiphonic. For these reasons, I have devoted a separate section to this technique, distinct from the multiphonic section. Overblowing should not be categorised as a multiphonic, but rather as harmonic layering. The visual difference between overblowing and multiphonics further underscores that their outcomes are distinct. The spectrographs below, which show overblowing the fundamental note C2 and playing a multiphonic based on fundamental C2, provide evidence of these distinctions (Fig. 2.10).

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[119] Philip Bate and Murray Campbell, "Overblowing," in *The New Grove Dictionary of Music and Musicians,* Vol 18, second ed., ed. by Stanley Sadie (London: Oxford University Press, 2001), 820.

[120] Stephanie Willow Patterson, An Introduction to Contemporary Music for Bassoon with Sixty-Four Etudes (Florida: Trevco Music, 2014), 80.

[121] Heather Roche uses the term 'Spectral (overblown) multiphonics' in her index. See the section 'On Multiphonics' in Heather Roche, "Index / TOC," Heather Roche, accessed August 3, 2024, https://heatherroche.net.

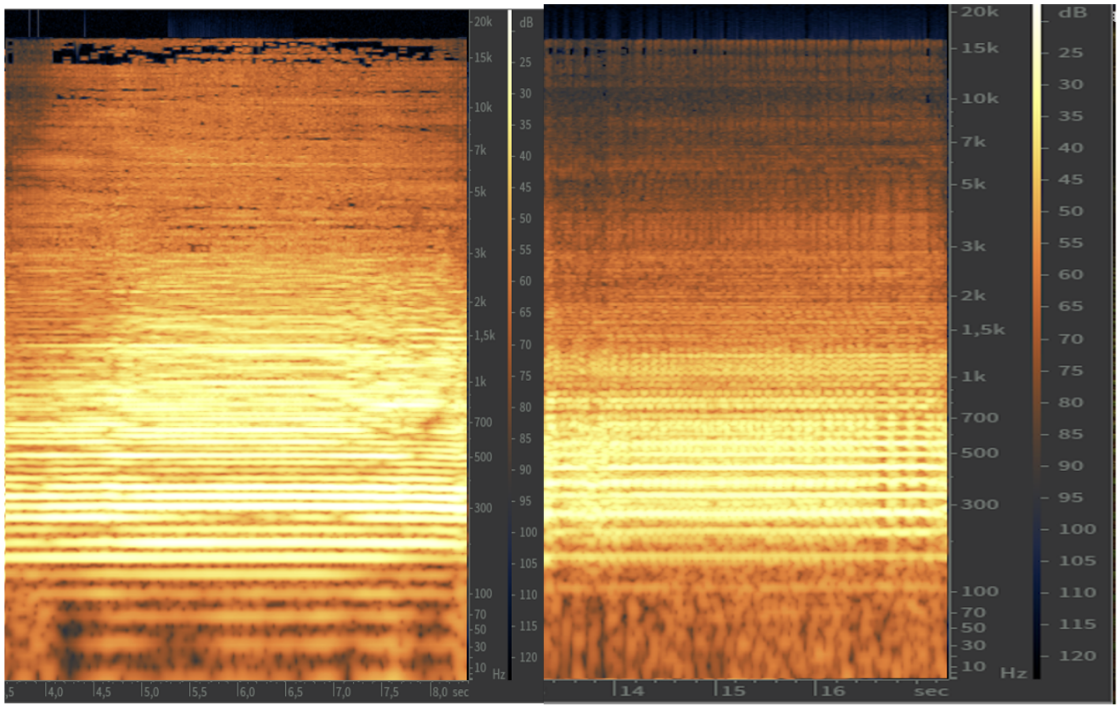

Figure 2.10: Spectrographic analysis of an overblown C2 and a multiphonic using the C2 fingering on the contraforte.

The spectrographic analysis, conducted using the iZotope RX spectral analysis program, reveals distinctive features: above 1,500 Hz, the overblown sound displays a gradual spectral roll-off at higher partials, while the multiphonic sound exhibits the blending of several discrete frequencies. Furthermore, at 300 Hz, the overblown example showcases straight, pure-coloured horizontal lines, contrasting with the variegated, partially wavy lines observed in the multiphonic. This evidence shows that the sound analysis resulting from overblowing does not yield a multiphonic but rather a harmonic layering, supporting the use of this term to describe the outcome of overblowing.

Harmonic layering through overblowing is easy to produce, which is why this technique has already been used for contrabassoon in ensemble compositions. A notable example is in Xenakis's *Jalons* (1986), where overblowing as a repetitive loud block of sound is used in a duet between the contrabassoon and the contrabass clarinet (Fig. 2.11).

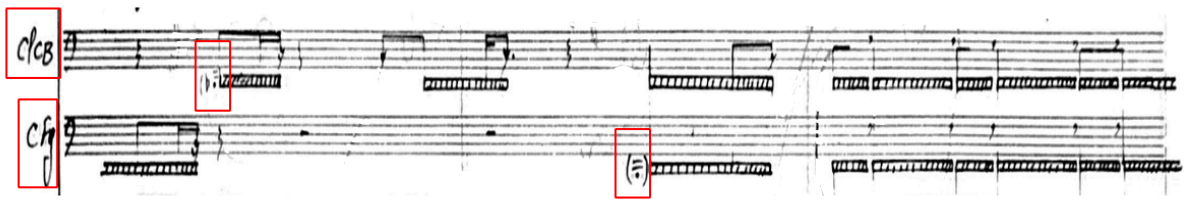

Figure 2.11: Xenakis, *Jalons,* bb. 82–85: contrabass clarinet and contrabassoon overblowing duet.

In contrast to Xenakis's use of static blocks of overblown sounds on bass woodwind instruments, Beat Furrer employs this technique in *Fama VI* (2005), utilising loud, overblown fundamental notes on the contrabass flute to accompany the speaking voice. This static use of overblowing stands in sharp contrast to its application in the bassoon repertoire. In works such as Johannes Maria Staud's *Celluloid* (2011), Lim's solo piece *Axis Mundi* (2012–14), and her ensemble piece *Tree of Codes* (2016), overblowing serves as a melodic gesture.

Overblowing has proven to be an effective device, but it has also been misunderstood. In George Benjamin's *At First Light* (1982), the register employed is unsuitable for the required *fff* effect to be achieved while overblowing (Fig. 2.12). The fundamental range in which a full spectrum occurs at the loudest possible dynamic while overblowing is A1–E♭2 on both contrabassoon and contraforte.

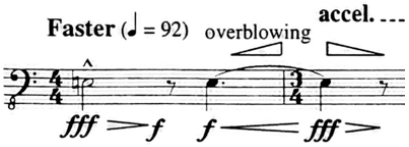

Figure 2.12: Benjamin, *At First Light,* i, bb. 75–76: overblowing on a weak fundamental will not produce a loud dynamic.

A novel approach to overblowing can be found in the heckelphone in Posadas's 'Umbrales evanescentes' from *Poética del Espacio* (2018–19). Here, the gradual building of harmonic layers creates a dynamic range.

2.3.1 Method

I began experimenting with contraforte overblowing to find ways of controlling the growth of the overtone spectrum, achieving dynamic variation, and isolating individual

harmonics. I commenced on C2 with different lip pressures and embouchure positions.[122] Starting at the tip of the reed, I increased my lip pressure whilst simultaneously moving my lips up the gradient of the reed. In my mind, I visualised rolling my lips simultaneously over my teeth while moving up the reed: basically, I was swallowing the reed. This resulted in a gradual building of harmonic layers and increased volume. With this idea of swallowing the reed, I changed my approach and pulled the instrument slowly towards me, allowing the reed to go further into my mouth whilst tightening my embouchure. This also increased the number of harmonic layers. Conversely, moving the instrument away from me whilst relaxing my embouchure decreased the number of harmonic layers. With this performance practice as the basis, I added three physiological actions: flutter tonguing, singing one note in either the low, middle or high register of my vocal range, or resting my teeth lightly on the reed.

I recorded these variations to hear whether something unusual happened, but the outcomes were too subtle. Adding flutter tongue amounted to nothing unusual in an overblown chord. Singing while overblowing slightly highlighted different harmonics, which is not unusual, while using teeth on the reed increased the volume of the harmonic chord but restricted the range of the harmonics. As a further variation, I applied slight pressure with my teeth to the back of the reed while playing an overblown C2, which resulted in a subtle change in sound. Experimenting further, I jammed the third flageolet key open with a piece of cork and then gradually built up a layer of overtones from lip pressure.[123] This, again, produced only a subtle change. However, combining this action of swallowing the reed with the use of any of the four available flageolet keys resulted in an overblown sound that set me on the path to finding alternative non-

[122] As opposed to the three notes lower (B, B♭, A), which implicitly to me are less flexible.

[123] The third flageolet key or octave key, as it can also be referred to, is located on the bocal.

standard fingerings for this effect. I named this sound 'the electric guitar'[124] effect because it reminded me of a distorted sound somewhat reminiscent of electric guitar playing in rock bands. [125]

Various notation styles have been used to indicate overblowing on the contrabassoon and the contraforte. Xenakis used criss-crosses (see Fig. 2.10), which can be mistaken for roll tone notation.[126] Additionally, the symbol Ü, representing the German word '*überblasen*' (overblown in English), has been used in pieces such as Staud's *Celluloid* (2011) for bassoon. Some composers adopt graphic notation that visually depicts the harmonic layering produced by overblowing (Fig. 2.13).

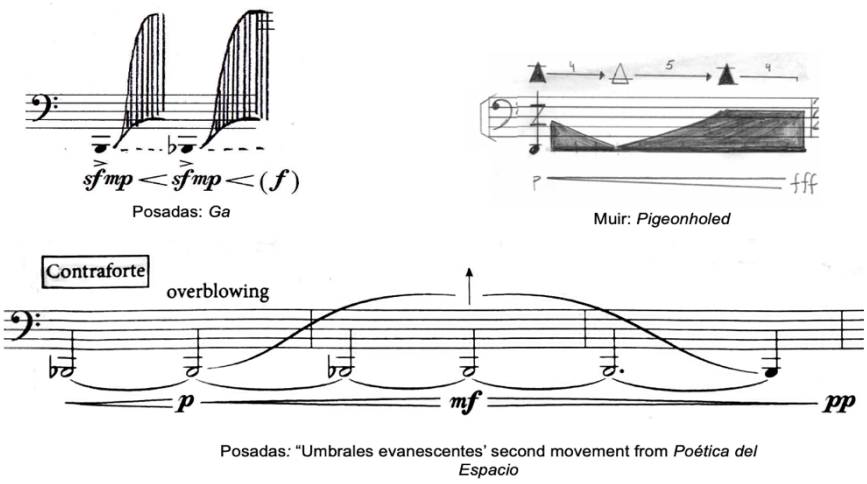

Figure 2.13: Posadas, *Ga*, bb. 90–91 and Muir, *Pigeonholed,* bb. 105–106 (top); Posadas, ii, *Poética del Espacio*, bb. 212–215 (bottom): examples of graphic notation to indicate overblowing.

[124] Lorelei Dowling, "Travelling Suite," Electric Guitar, YouTube, May 7, 2024, video, 11:34, https://youtu.be/KycClXyDsQc?si=-CExPFiJpXPVuSqT&t=270.

[125] See Lorelei Dowling, "Electric Guitar Sound," Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/08/19/electric-guitar-sound.

[126] See section 2.5 on roll tones and dyads.

2.3.2 Isolating Harmonics

Oboist Christopher Redgate cites a practical reason for why performers of double reed instruments should investigate the use of individual harmonic fingerings,[127] suggesting that we should know more about these so that we can use them to even out the sound quality when performing microtones on our double reed instruments.[128] He also contends that the use of harmonic fingerings opens up the possibility of 'making some areas of fingering easier especially work from multiphonics and complex microtonal/high–note fingerings.'[129] Apart from this double reed expert's reasons as to why we should investigate and use harmonic fingerings, I was also interested in the approach used when playing individual harmonics on the flute, another wind instrument, hoping it would provide insight that would potentially inform and enrich the way I execute harmonics on the contraforte. Bledsoe describes on her blog the way in which flutists isolate harmonics through air speed, the angle of the air, and the resonant frequency of oral cavity.[130] However, this method is inadequate for the contraforte, which is characterised by a cylindrical bore and a double reed. On the contraforte and bassoon, unlike on the flute, oral manipulations alone do not suffice to achieve harmonic isolation. This distinction is evident from Sofia Gubaidulina's *Duo Sonata* (1977) for two bassoons, where one of the first appearances of a bassoon harmonic is executed using a fingering variation (Fig. 2.14).

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[127] A harmonic can be referred to as a flageolet or overtone.

[128] 'Quarter tones can be markedly different in sound quality from the standard pitches on the instrument. A combination of quarter-tone fingerings with carefully chosen harmonics or alternative fingerings could possibly even out the discrepancies.' Christopher Redgate, "Re-inventing the Oboe," *Contemporary Music Review* 26, no. 2 (2007), 186.

[129] Christopher Redgate, "Re-inventing the Oboe," *Contemporary Music Review* 26, no. 2 (2007), 186.

[130] See Helen Bledsoe, "Tutorial Harmonics and Harmonic Multiphonics (Tutorial 1)," Helen Bledsoe, accessed August 3, 2024, https://docs.google.com/presentation/d/1xLEs3qzCy7Mepz6N1u6jAvW5TKEOUkDMCHW-erbTn86k/edit?pli=1#slide=id.gc014d65f0e_0_364.

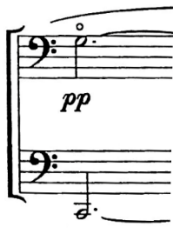

Figure 2.14: Gubaidulina, *Duo Sonata* for two bassoons, bb. 23–24: example of a bassoon harmonic.

In Figure 2.13, the harmonic G3 is produced from the C2 fundamental by slightly opening the first finger of the left hand. Extending this exploration, the conclusion of Jörg Widmann's *Freie Stücke* (2002) features a short solo using bassoon harmonics based on the B♭1 fundamental (Fig. 2.15).

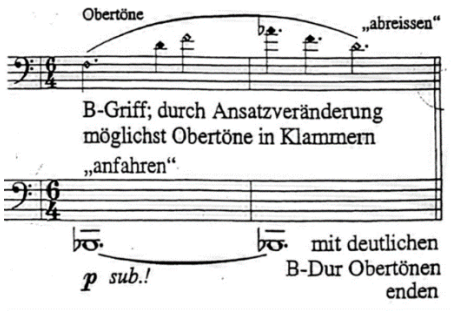

Figure 2.15: Widmann, *Freie Stücke*, vi, bb. 53–54*:* bassoon harmonics while playing a B♭1.

After a brief collaboration, Marc Andre composed *da* (2010)[131] for solo bassoon and ensemble specifically for me, extensively incorporating harmonics. While the emphasis on harmonics was unexpected, it allowed me to delve into my study of bassoon harmonics, a field for which comprehensive information is scarce. Remarkably, this composition concentrates on individual high harmonics derived from fundamental fingerings that deviate from typical bassoon conventions. It's important to note that employs harmonic series tuning rather than the more common bassoon harmonic tuning, which

[131] Recording Lorelei Dowling, Harmonics excerpt da, https://youtu.be/KycClXyDsQc?si=c_nOf-HEbs7UGvlpP&t=96.

poses a challenge owing to the unique acoustic construction of the bassoon.[132] My investigations prompted me to adopt a fingering system that amalgamated the slight opening of the first tone hole on the bassoon (the F tone hole) and the second finger of the right hand (the A tone hole) by an eighth, a third or a quarter with the addition of flageolet keys.[133] Opening the first finger hole on the bassoon results in the production of harmonics, because this 'admits atmospheric pressure to break up the fundamental's midway node and strengthen the second harmonic's midway antinode.'[134]

In order to transfer this concept to the contraforte, I developed a new technique of opening fully covered tone holes, along with the use of the flageolet keys.[135] Using this method, I was able to isolate harmonics from a fundamental contraforte note. Like a bassoon harmonic, playing an individual harmonic on a contraforte can be achieved not only by opening individual keys whilst playing the fundamental note, but also by using a standard fingering and adding auxiliary keys to dampen the sound and adjust the pitch.[136] This produces a note that sounds similar to a harmonic, but which can then be further manipulated with the embouchure to achieve the exact harmonic tuning required.[137] It is important to note that harmonic notes from the base fundamental of both the contraforte and the bassoon are 'close to being members of the harmonic

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[132] 'The bassoon's bore is an imperfect cone in two respects [and] because of these two sorts of imperfections, the pipe resonances of the bassoon bore do not lie in a true harmonic relationship. Instead, the ratio is slightly stretched...' James B. Kopp, "The Not-Quite-Harmonic Overblowing of the Bassoon." Kopp Reeds, accessed August 3, 2024, https://koppreeds.com/harmonic.html.

[133] These are located on the wing joint of the bassoon. There are three such keys, which are referred to as the *a, b/c,* and *d* vent keys.

[134] Anthony Baines, *Woodwind Instruments and their History* (London: Faber and Faber Ltd,1967), 37.

[135] Opening a tone hole on a fundamental note on the bassoon results in another technique called 'roll tones.'

[136] See Appendix B for the link to the chart titled 'Overblowing / Isolating Harmonics on the Contraforte.'

[137] Hähnchen, *Zeitgenössische Musik für Fagott solo*, 122–23.

series [but] never perfectly harmonic,' and they therefore *do not* fit the standard tuning of the harmonic series unless manipulated through lip pressure.[138]

Playing harmonics on the contraforte is a relatively new concept.[139]The examples of notation indicating this technique below are drawn from pieces composed specifically as a part of this research (Fig. 2.16).

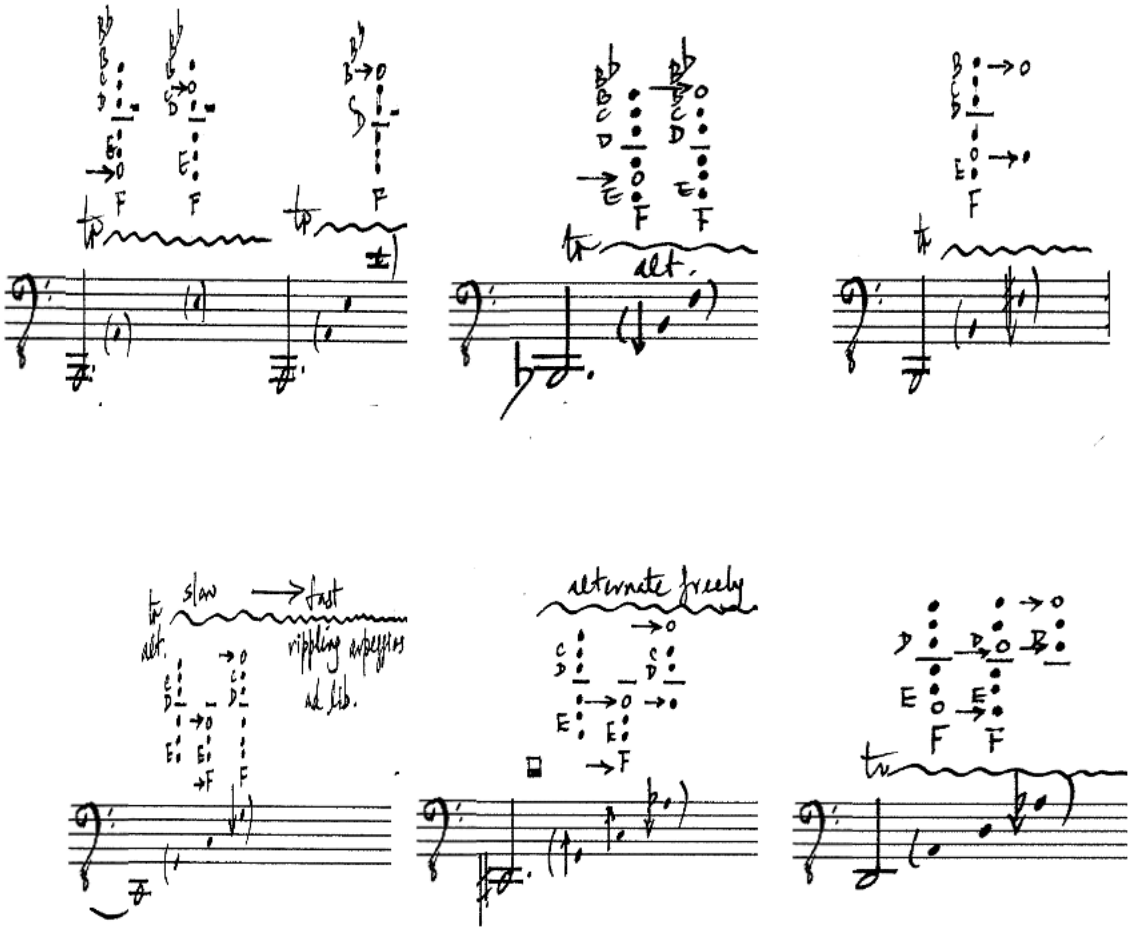

Figure 2.16: Lim, *Nautilus*, bb. 62–63, bb. 49–50 and bb. 2–3(top), bb. 1–2, bb.4– 6 (bottom): prescriptive notation showing the isolation harmonic from a contraforte.

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[138] Guy Oldham and Murray Campbell, "Harmonics," in *The New Grove Dictionary of Music and Musicians,* Vol 10, second ed., ed. by Stanley Sadie, (London: Oxford University Press, 2001), 854.

[139] See Lorelei Dowling, "Overblowing," Lorelei Dowling, accessed August 19, 2024,

https://contemporary-contraforte.com/2024/08/19/overblowing.

2.4 Underblowing

On wind instruments, underblowing is a technique in which a monophonic note is played with a relaxed embouchure, resulting in a multiphonic. On the bassoon, this is executed through pitch bending and is possible in the tenor register of the instrument between F4 and Eb5 using standard fingerings. The resulting multiphonic, according to Dieter Hähnchen, contains 'a single very audible partial sounding a quarter-tone flatter than that expected from the fingering.'[140] This does not occur on the contraforte owing to the larger reed. Having used this technique on the bassoon with both standard and non-standard fingerings inspired me to explore underblowing on the contraforte. The underblown melodic line in Staud's *Celluloid* (2011) for bassoon employs standard fingerings, with the letter M indicating that the player is to underblow the note in question (Fig. 2.17).

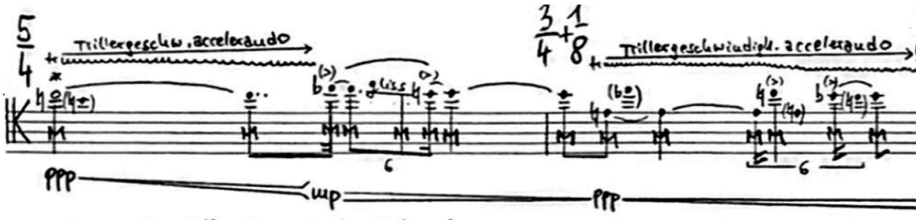

Figure 2.17: Staud, *Celluloid,* bb. 180–182: underblowing on the bassoon indicated by '*M*' using standard fingerings. [141]

In the fifth movement, 'Metrio', of Billone's *Legno. Edre* (2004) for solo bassoon are two exquisite examples of underblowing. These use non-standard fingerings based on the same pitch (Fig. 2.18).

[140] Hähnchen, *Zeitgenössische Musik für Fagott solo*, 124.

[141] Audio example: Johannes Maria Staud, *Celluloid*, Lorelei Dowling, 2016.

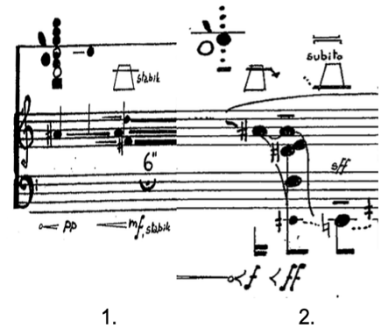

Figure 2.18: Billone, *Legno. Edre*, v, page, line 2 (1.) and page 1, line 1 (2.): underblowing on the bassoon using non-standard fingering. [142]

2.4.1 Method

I started with the standard fingering for producing notes on the contraforte and experimented with lip bending and opening of the pharynx.[143] Owing to the larger dimensions of the contraforte reed, I initially positioned my embouchure towards the back of the reed. Subsequently, I applied a pitch bend to the note, generating a multiphonic. This is the opposite of the more relaxed embouchure used for underblowing on the bassoon. When executing this technique on the contraforte, the range A1–F3 produced only a pitch bend on the note, F3–F4 produced the same pitch an octave lower and F4–C6 produced resultant multiphonics.[144]

For me, this technique on the contraforte requires a crescendo to produce the resultant multiphonic, so the dynamic range cannot be lower than *mp*. By experimenting with different embouchure positions on the contraforte whilst underblowing a note, I was able to identify three distinct auditory outcomes:

- The monophonic note remains and is the loudest and highest note of a non-dissonant sounding chord;

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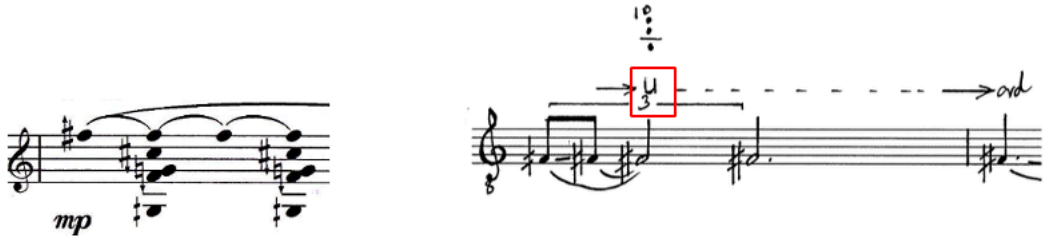
[142] Audio examples: Pierluigi Billone, *Legno. Edre*, Metrio, performer Lorelei Dowling, 2013.

[143] See Lorelei Dowling, “Underblowing,” Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/08/19/underblowing.

[144] See Appendix B for the link to the chart titled ‘Contraforte Original Underblowing Chart.’

- A multiphonic or strong oscillation occurs that does not contain the sound of the note that is being underblown; and
- A single note or an interval a 5th below the note sounds.

Underblowing on the contraforte depends on the placement of the embouchure on the reed, the pressure exerted by the lips, and the use of the pharynx to a greater degree than on the bassoon. Notation for underblowing on the contraforte can be categorised as either descriptive or prescriptive. In addition to the fingering, the letter U can also be used to denote underblowing (Fig. 2.19).



Posadas: *Ga* Lim: *Nautilus*

Figure 2.19: Posadas, *Ga*, bb. 25–26 and Lim, *Nautilus*, bb. 12–13: descriptive and prescriptive notation indicating underblowing on the contraforte.

2.5 Roll Tones and Dyads

2.5.1 Roll Tones

The roll tone, which is unique to double reed instruments, is a technique that produces either two heterodyne frequencies or a multiphonic.[145] The production of roll tones on the bassoon, I have discovered, can be realised using two different methods. The first method employs a standard fingering in the low register of the bassoon with one tone

[145] Musikfabrik flute player Helen Bledsoe per WhatsApp messenger: 'Roll tones don't exist on the flute.' November 22, 2023. Musikfabrik clarinet player Carl Rosman per WhatsApp messenger, 'roll tone is generally not a term used with clarinet.' November 22, 2023.

hole opened, playing with a tighter embouchure.[146] An example of roll tones can be heard in the solo bassoon part in Andre's *da* (2011) (Fig. 2.20).

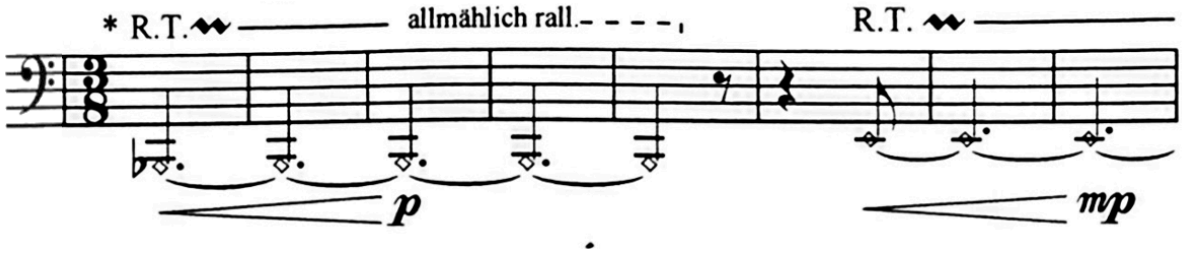


Figure 2.20: Andre, *da*, bb. 214–222: roll tones from standard bassoon fingerings. [147]

The second method uses non-standard fingering. These are easier to execute than the first category and produce a roll tone that contains audible pulsations that can be controlled with the diaphragm and lip manipulation. I learned many of these when premiering Billone's *Blaues Fragment* (2010) for solo bassoon, an example of which is presented below. These are notated using notation that is both prescriptive and descriptive (Fig. 2.21).

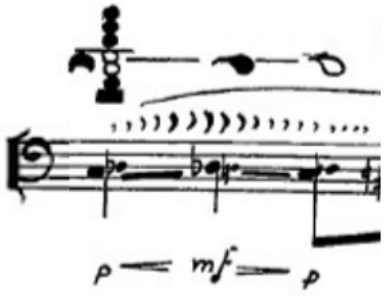


Figure 2.21: Billone, *Blaues Fragment*, page 3, line 1: roll tones from non-standard bassoon fingering. [148]

[146] The bottom notes of the bassoon between B♭1 and E2.

[147] Audio example: Marc Andre, *da*, Lorelei Dowling, 2016.

[148] Audio example: Pierluigi Billone, *Blaues Fragment*, performer Lorelei Dowling, 2016

In contrast to the bassoon, oboists use a different approach to executing a roll tone, which they call a rolling note.[149] Rolling notes are restricted to the three bottom notes on the oboe, and in contrast to the bassoon, standard fingering is used. They are produced when extreme lip pressure is applied to the reed. I will refer to this method of generating a roll tone as a lip roll to differentiate it from the technique used to execute a roll tone on the bassoon.

2.5.1.1 Method

My first experience playing a roll tone on the contraforte was using a non-standard fingering in Muir's *I Frammenti di Desiderio*, Act II (2008) for contraforte and accordion. Initially, I began playing G2 and explored the possibility of creating an oscillation by manipulating the embouchure and the pharynx or adding one or two auxiliary keys. This proved ineffective but focusing on the lower note (F#2) and adding a flageolet key resulted in an oscillation or roll tone (Fig. 2.22).

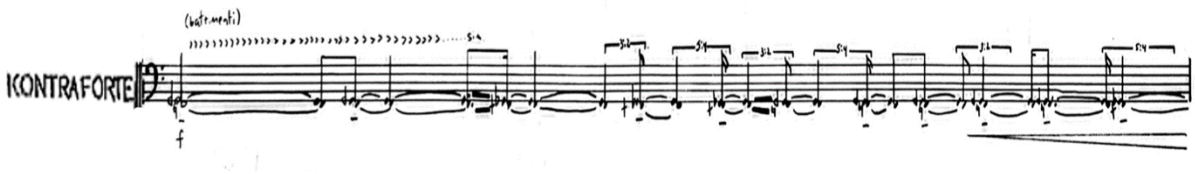


Figure 2.22: Muir, *I Frammenti di Desiderio*, Act II, bb. 1–2: roll tones from non-standard contraforte fingerings. [150]

Following this experience, I explored using Billone's non-standard bassoon fingering roll tones on the contraforte. Transferring these to contraforte required the use of slightly altered fingering combinations and an unconventional embouchure. I was encouraged by the fact that Billone, who can play his bassoon pieces, employs an unconventional embouchure and uses a poor-quality instrument and an inferior reed. He then expects the effects to be transferrable to professional players, who have to find a

[149] Libby Van Cleve, *Oboe Unbound*: *Contemporary Techniques* (Toronto: The Scarecrow Press, 2004), 73.

[150] Audio example: Leah Muir, *I Frammenti di Desiderio*, Act II, performers Lorelei Dowling and Krassimir Sterev, 2008.

way to translate his piece into a fluid construction of musical ideas. This helped in understanding how to take someone else's playing style into consideration in order to achieve the same desired result. However, when using his bassoon roll tone examples on the contraforte, the fingerings were either unresponsive, or the effects were unstable no matter how I physically manipulated them. The solution was to find my own contraforte non-standard roll tone fingerings. I discovered that adding a combination of keys to the basis of a standard fingering resulted in a roll tone.[151] It is an effect that sits comfortably at a dynamic of *mf*. I tried this technique on all of the notes in my quarter-tone, eighth-tone, and alternative high fingering tables. Posadas used one example of my research on contraforte roll tones in the second movement, 'Umbrales evanescentes,' of his ensemble piece *Poética del Espacio* (2018–19) (Fig. 2.23).

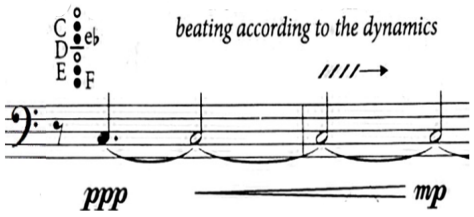


Figure 2.23: Posadas, *Poética del Espacio*, ii, bb. 281–283: a roll tone from a non-standard contraforte fingering.

My technique for executing standard fingering roll tones on the contraforte arose out of my research on harmonics on the contraforte.[152] While playing my concept of a contraforte harmonic, I opened a second tone hole, the first finger on the left hand.[153] This triggered a roll tone, and adding a flageolet key enhanced the oscillations.

[151] The different combinations I used included up to three specific auxiliary keys, and/or the flageolet keys 8 and 1, or the E key.

[152] See Lorelei Dowling, "Roll Tones," Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/08/19/roll-tones.

[153] See the explanation of individual harmonics in section 2.3.1.

2.5.1.2 Lip Rolls

Lip rolls that produce oscillations can also be played from standard contraforte fingerings modified slightly by the addition of an auxiliary key. They occur in the instrument's higher register and require extreme lip pressure to trigger one blade of the reed to vibrate differently, resulting in a fast beating effect. This is the exact physical requirement for the production of oboe roll tones. I also discovered these effects as accidents when searching for and experimenting with contraforte harmonics. Posadas used a lip roll in his piece *Ga* for solo contraforte (Fig. 2.24).

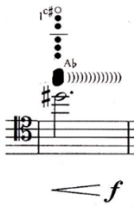


Figure 2.24: Posadas, Ga, bb. 40–41: lip roll played on the contraforte. [154]

I conclude that roll tones on the contraforte can be separated into two categories. Either with an altered standard fingering in the lower register (like the bassoon) or with a non-standard fingering not limited to the lower register and using the pressure of the lips. Composers use symbols such as Rt, XXX—similar to Xenakis's indication for overblowing—to indicate the playing of roll tones. The graphic **)))))** is also employed (Fig. 2.25).

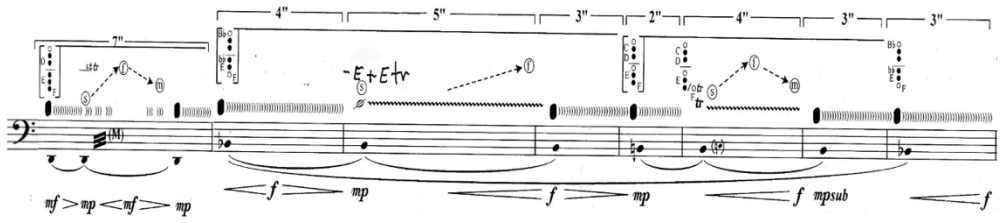


Figure 2.25: Posadas, *Ga*, bb. 4–8: contraforte roll tones with standard fingering. [155]

[154] Audio example: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

[155] Ibid.

2.5.2 Dyads

'Expect the unexpected, they say, but once the unexpected happens, the last thing you expect is that it will happen again.'[156]

I define a dyad as being two notes sounding together simultaneously that produce an interval greater than a major second. Clarinettists have referred to dyads as 'dyad multiphonics,' but this is a redundant term, as one would not refer to a multiphonic that has three notes as a 'triad multiphonic' or four notes as a 'quad multiphonic.'[157]

My autoethnographic notes on this subject note three different pieces in which hearing dyads on the clarinet and bass clarinet was particularly memorable.[158] This served as the prompt for my experimentation on the contraforte to find this magical sound. On reflection, I had already encountered the playing of a dyad on bassoon in Billone's *Blaues Fragment* (2010) (Fig. 2.26).

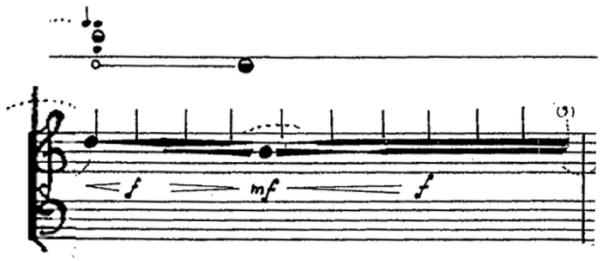


Figure 2.26: Billone, *Blaues Fragment*, page 6, line 1:example of a bassoon dyad. [159]

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[156] Paul Auster, *The Book of Illusions: A Novel* (New York: Picador, 2003), 98.

[157] One example of a clarinettists referring to dyads as multiphonics is Jack Liang on YouTube. Jack Liang, "Clarinet Multiphonics - Close Dyads," YouTube, April 23, 2020, video, 20:09, https://youtu.be/rtG58CHvVGQ?si=f1F1NLFDrtKBc59f. Clarinettist Heather Roche also refers to dyads as dyad multiphonics on her website. Heather Roche, "Dyad Multiphonics," Heather Roche, accessed August 3, 2024,

https://heatherroche.net/2019/09/24/dyad-multiphonics-for-bb-clarinet-part-ii-a-second-look-at-philip-rehfeldts-chart.

[158] Bass clarinet in Salvatore Sciarrino's *Macbeth* (2002) and clarinet in his *Let me die before I wake* (1982) and in Michael Jarrell's *Assonance* (1983).

[159] Audio example: Pierluigi Billone, *Blaues Fragment*, performer Lorelei Dowling, 2016.

My first exposure to dyads on the contraforte occurred in 2007 in collaboration with the composer Eduardo Moguillansky. These were based on standard fingerings in the high register with two flageolet keys open, resulting in a choice between two monophonic sounds. With careful embouchure manipulation, the two monophonic sounds can be simultaneously produced, resulting in a dyad of a third or fourth. The ability to play one note and produce another that can be amalgamated into a very airy dyad is one of the unusual features of the contraforte.[160] These are highlighted in Moguillansky's piece *Cire Perdue* (2008) (Fig. 2.27).

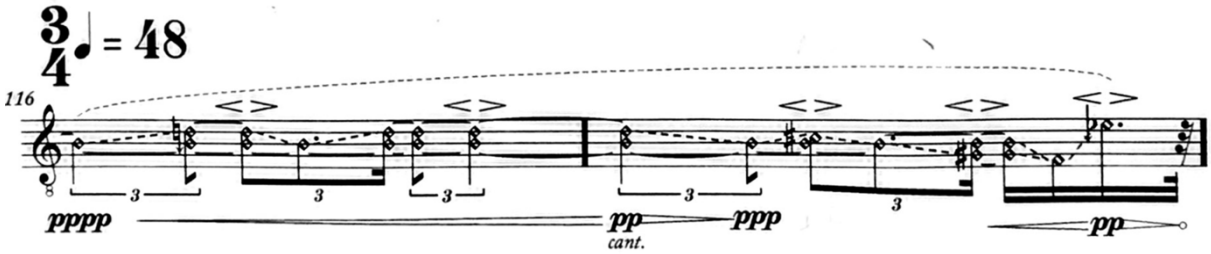

Figure 2.27: Moguillansky, *Cire Perdue*, bb, 116–118: example of contraforte dyads in Moguillansky's *Cire Perdue*.

2.5.2.1 Method

Like the epigraph from Paul Auster at the beginning of this section suggests, I did not anticipate stumbling upon dyads again. Once the unexpected happened, the last thing I expected was that it would happen again. Nevertheless, after making this unanticipated discovery, I doubted my ability to recreate these dyads intentionally, rather than as a result of using a fingering with two open flageolet keys. Further exploration of non-standard fingerings, specifically while experimenting with quarter-tone fingerings and employing a circular breathing embouchure, revealed more about the fragile nature of dyads. Achieving the sound of dyads demands a substantial quantity of air and precise lip pressure, making them difficult to execute.

[160] See Lorelei Dowling, "Dyads," Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/08/19/dyads.

2.6 Glissandi

The *Grove* description of the glissando as specifying a 'rapid, sliding movement' indicates that this technique is traditionally associated with the clarinet, horn, and trombone.[161] However, in the twenty-first century, techniques have been developed for other wind instruments to allow them to execute their own forms of glissandi. Flute, oboe, saxophone and bassoon glissandi result from a mixture of synchronised lip manipulation and the slow opening and closing of keys. The use of ascending and descending glissandi played by the contrabassoon/contraforte is already evident in ensemble and solo literature such as Xenakis' *Kraanerg* (1968–69), Giacinto Scelsi's *Maknongan* (1976), George Lopez's *Blue Cliffs* (1992–93), Bernhard Gander's *Bunny Games* (2006), Zubel's *Bildbeschreibung* (2016), and Brian Howard's *Sentinel* (2020). Among these examples, the use of glissandi in a duet for contrabassoon and contrabass clarinet in Xenakis's *Kraanerg,* a monumental piece for twenty-three instruments and four-channel analogue tape, was a catalyst prompting me to investigate different ways in which the contraforte could play glissandi. As this piece was written to include a contrabassoon, I was intrigued by the possibilities of finding a solution to an old problem on a new instrument. Since there is no evidence of any collaboration with a contrabassoonist at the time Xenakis composed this piece, there is no information regarding the intended approach to performing the glissandi. However, there are seven significant recordings of *Kraanerg* available, which may provide insight into how different players have interpreted these glissando duets since the work's composition.[162] More intriguingly, Xenakis employed these duelling glissandi between the contrabass clarinet and the contrabassoon twice in the course of the ballet, emphasising his strong conviction in this technique. The example from the contrabassoon part below illustrates the wide range of the glissando in the first duet—an uninterrupted ascent and descent spanning over an octave (Fig. 2. 28).

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[161] David D. Boyden and Robin Stowell, "Glissando," in *The New Grove Dictionary of Music and Musicians*, Vol 10, second ed., ed. by Stanley Sadie (London: Oxford University Press, 2001), 13.

[162] In the contrabassoon part, the first glissando occurs at 28:14 and the second at 51:44. These timings are approximate in the recordings.

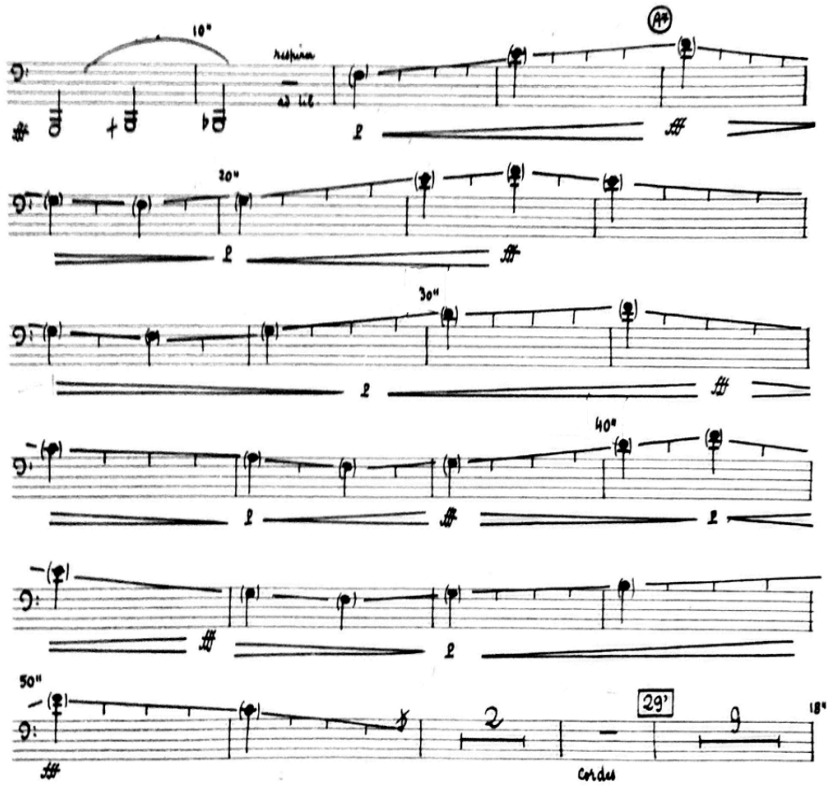

Figure 2.28: Xenakis, *Kraanerg*, 28:12: contrabassoon glissando.

2.6.1 Method

I initially approached Xenakis's glissandi by playing a chromatic scale and smudging notes together with the help of a flexible embouchure, a common practice amongst players.[163] Seeking a more convincing approach, I experimented with three different methods, starting with an experiment in ergonomics (Fig 2.29).

[163] In the recordings of *Kraanerg* by the Alpha Centauri Ensemble, the Callithumpian Consort and Ensemble Ars Nova available on YouTube, the contrabassoon glissando is played by smudging chromatic notes together.

Figure 2.29: Experiment using a saxophone mouthpiece to produce glissandi on the contraforte.

I explored glissandi using a single-reed mouthpiece for three reasons. First, I was inspired by that effortless-sounding slow glissando of the clarinet.[164] Second, I knew that a single-reed mouthpiece could be used for bassoon playing. Third, the contraforte has no open tone holes that would allow the execution of finger glissandi, so I hypothesised that a single-reed mouthpiece might compensate for this. While single-reed mouthpieces were initially designed for bassoonists doubling in big bands, there is no available research on their applicability for performing glissandi on bassoons.[165] I reasoned that if a clarinet could achieve glissandi with single-reed mouthpieces, why couldn't a bassoon, and, consequently, why not a contraforte? In addition to the contraforte, Eppelsheim had also created the tubax, which functions with a saxophone mouthpiece. Therefore, the next logical step was to experiment with saxophone mouthpieces on the contraforte. My goal was to produce a glissando while still being able to play the instrument normally. I created fragile and difficult-to-construct cork extensions to be able

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[164] I was inspired to try a single-reed mouthpiece on the contraforte by hearing the opening clarinet glissando in George Gershwin's *Rhapsody in Blue*.

[165] Two manufacturers of these mouthpieces are Santy Runyan and Bettoney. A single-reed mouthpiece for the bassoon was first invented and used by saxophonist/woodwind doubler Santy Runyan when he played in the Chicago Theatre Orchestra (1931–42). The dimensions were smaller than those of an E♭ clarinet mouthpiece. Paul Coats, "Bassoon Mouthpiece," Sax on the Web, accessed August 3, 2024, https://www.saxontheweb.net/threads/bassoon-mouthpiece.4584.

to mount the mouthpiece onto the bocal. After experimenting with soprano, alto and tenor saxophone mouthpieces, I discovered that I was not able to execute any glissandi, and that I could only play within a two-octave range. Additionally, the sound was more like a saxophone rather than an instrument an octave lower than a bassoon.

The second experiment was based on hearing a trumpet colleague playing a convincing chromatic glissando in Xenakis's *Kraanerg.* He combined bisbigliandi with flutter tonguing—which covers the unevenness—to achieve the fluid effect. This prompted me to explore alternatives for executing a glissando without smudging a chromatic scale. However, playing quarter- and eighth-tone fingerings with additional auxiliary keys in rapid succession, combined with flutter tonguing, resulted in excessive key work noise and clumsiness, ultimately undermining the effectiveness of any potential glissandi.

The third idea stemmed from my exploration of glissandi when learning Luciano Berio's *Sequenza XII* for bassoon (1997). The *Sequenza* is a piece focusing on a series of small-interval glissandi over the bassoon range of B1–B4.[166] The nineteen-minute piece also requires mandatory circular breathing, adding to the idea of seamlessness, the exact nature of a glissando. I learned the two techniques simultaneously, adapting a non-standard fingering glissando chart—from B♭1 to D#5—to suit my instrument and my way of playing.[167] With this as a basis, I formalised a combination of fingerings that had enough resistance to support my circular breathing *and* had the resistance to aid slow changes in fingering, creating the auditory illusion of a trombone glissando. With this knowledge, I undertook the task of devising a glissando chart—whilst using circular

[166] Berio's *Sequenza XII* features glissandi that span no more than six semitones at a time. These glissandi are often interrupted by bisbigliandi and various tonguing techniques. This approach contrasts with Xenakis's use of long, continuous glissandi for the contrabassoon, which do not include additional effects.

[167] Heinz Riedelbauch, *Systematik Moderner Fagott- und Bassontechnik* (Celle: Moeck, 1988), 35–36.

breathing—for the contraforte,[168] focusing on two main objectives: achieving smoothness, given the absence of open tone holes where a finger glissando could be used; and minimising key movement or changes.[169] The awareness that the contraforte double reed can produce a lip glissando to a quarter-tone below a standard pitch proved beneficial in constructing this glissando chart. This process involved a great deal of experimentation, particularly in the top register, where I sought simple fingerings as alternatives to standard ones. I also explored the use of auxiliary keys to support slow fingering changes and to provide enough resistance to cover the breaks in sound between opening and closing flageolet keys. Ultimately, adding keys in the right hand to the chosen fingerings produced the maximum amount of resistance. This search was further facilitated by the finger patterns I had devised for the top register, as well as my quarter- and eighth-tone fingering systems, in addition to a comprehensive understanding of the contraforte's acoustic construction.

The result was a simple chart where A1 to F2 involves a lip bend and slow coordination of the fingers, reminiscent of the old approach of smearing chromatic notes. Beyond F2, variations on standard fingerings are employed to create a glissando specific to the contraforte; while some parts are convincing, others, particularly in the lowest register—F2 to A1—are less so. Conceptualising the contraforte as a continuous tube allowed me to improve on my initial attempt at producing a glissando chart. The chart serves as a foundation, and I often devise different glissando fingerings for shorter stretches when working on different pieces.[170] Upon reflection, ascending glissandi are easier due to the tighter embouchure required, whereas descending glissandi require a relaxed embouchure in order to maintain a continuous sound, with the risk of interruption if the embouchure becomes too relaxed.[171] An example of some contraforte

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[168] As the contraforte has a wide bore, more air is required, making circular breathing an even more necessary part of the structure of the glissando on the contraforte.

[169] Similar to a long glissando played on the bassoon.

[170] See Appendix B for the link to the chart titled 'Contraforte Glissando Fingering Chart.'

[171] See Lorelei Dowling, "Glissandi," Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/07/10/glissandi.

glissandi achieved using the fingering chart can be found in Muir's *Pigeonholed* (2019–2022) (Fig. 2.30).

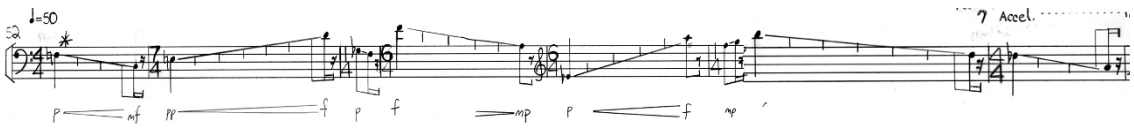

Figure 2.30: Muir, v, bb. 52–60: contraforte glissandi achieved using a fingering chart. [172]

2.7 Tremolo

A tremolo is a rapid oscillating movement (measured or unmeasured) between any two notes. However, I define a tremolo on the contraforte as a movement of an interval exceeding a major second, because the sound of rapid movements of smaller intervals is undefined, sounding similar to a trill. In the course of my research on contraforte tremoli, I identified three different types, two of which were influenced by examples in the bassoon repertoire. The first type was inspired by Berio's *Sequenza XII (1997)* for bassoon, which features rapid tremoli spanning intervals greater than an octave using conventional fingerings (Fig. 2.31).

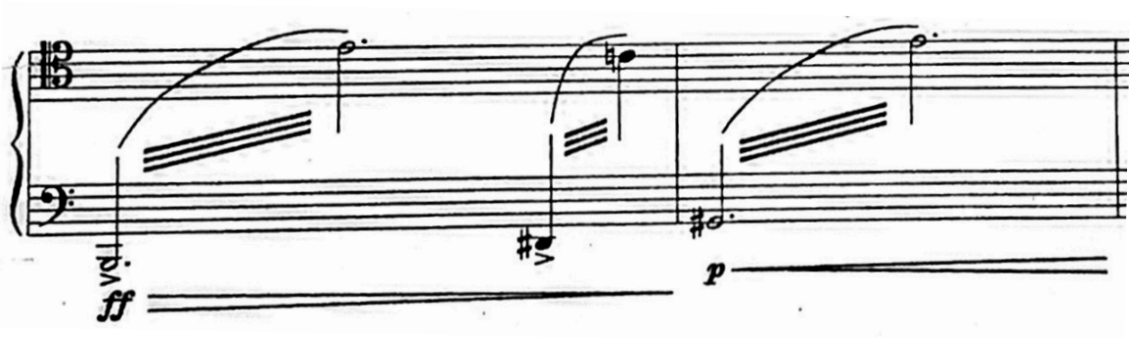

Figure 2.31: Berio, *Sequenza XII*, page 8, line 3: example of fast bassoon tremoli of intervals greater than an octave using standard fingerings.

The results when playing these tremoli on the bassoon are different from those when playing them on string instruments or piano owing to the excess of audible overtones.

[172] Audio example: Leah Muir, *Pigeonholed*, performer Lorelei Dowling, 2022.

The player can emphasise either the high or low overtones by adjusting their embouchure tension.[173] Examples of these tremoli can be found in many ensemble compositions by a variety of composers.[174] The second type consists of tremoli using standard fingerings that feature intervals smaller than an octave but exceeding a major third. The third type consists of tremoli using non-standard fingerings, as exemplified in the fifth movement, 'Metrio,' Billone's *Legno. Edre* (2004). Owing to non-standard fingerings, these tremoli respond at a slower speed, requiring measured execution (Fig. 2.32).

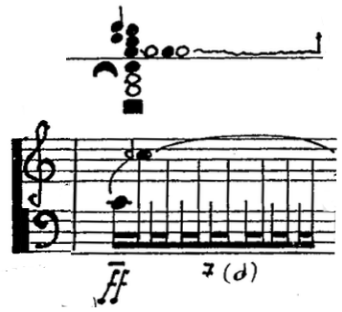

Figure 2.32: Billone, *Legno. Edre, v*, page 5, line3: example of a slow tremolo using a non-standard fingering on the bassoon. [175]

2.7.1 Method

My goal was to find a diverse selection of contraforte tremoli, rather than merely enumerating the different fingerings, as carried out for the contrabassoon by Richard Bobo.[176] Berioesque tremoli are best performable on contraforte in the lowest register,

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[173] 'For instance, the quick alteration of distant registers (real tremolos) brings forth sometimes a new and complex timbre resulting from the fusion of all the acoustic and harmonic characters activated in that particular moment.' "Sequenza XII (Author's Note)," Centro Studi Luciano Berio, accessed August 3, 2024, http://www.lucianoberio.org/sequenza-xii-authors-note.

[174] Some examples of the use of Berioesque tremoli for bassoon in ensemble compositions can be found in Clara Iannotta's *a star among the stairs, a making away* (2019–20), Book Pongtorn's *Viaje* (2023), and Olga Neuwirth's *Torsion* (2001) for bassoon, ensemble and sampler.

[175] Audio example: Pierluigi Billone, *Metrio*, performer Lorelei Dowling, 2013.

[176] Richard Bobo, "Tremolo Fingering Chart," Subcontrabassoon, accessed August 3, 2024, https://me.subcontrabassoon.com/Bobo_Contranomicon_2.pdf.

where overblowing occurs. For tremoli based on standard fingering, I focused on the registers above C3 where they can be clearly heard. I also worked systematically through the standard fingerings in the range between C3 and C5, searching for interesting tremoli by trilling one of five auxiliary keys.[177] These five keys, chosen for their small tone holes, were prioritized over auxiliary keys that open large tone holes on the contraforte, which result in a micro-trilling or bisbigliando effect when utilised. I explored the use of these five auxiliary keys in combination with four variations of finger movement and lip pressure:

1. Playing the tremolo slowly with a normal embouchure;
2. Starting slowly, then accelerating and decelerating the tremolo speed with a normal embouchure;
3. Starting the tremolo slowly and adding lip pressure whilst increasing the tremolo speed. This introduced the harmonic overtones into the tremolo;
4. Beginning the tremolo as fast as possible with a tight embouchure then decelerating.

Tremolo notation can be confused with trill notation. However, examples from Brian Howard's *Carlotta's Memoirs* (2021) and Posadas's *Ga* (2021) clearly distinguish tremolo notation for the contraforte. Howard's piece employs a fast tremolo using standard fingering (1.), while Posadas's piece (2.) features a slow tremolo using non-standard fingering (Fig. 2.33).[178]

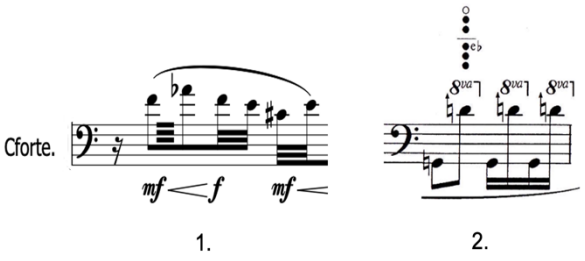

Figure 2.33: Howard *Carlotta's Memoirs*, bb. 47–48 (1.) and Posadas, *Ga*, bb. 33–34 (2.): tremolos using standard and non-standard fingerings on the contraforte.

[177] The five auxiliary keys I refer to are the three flageolet keys and the C# and E♭ keys.

[178] Audio example: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

2.7.2 Bichromatic Trills

Coined by composer Alberto Posadas, this effect is associated with the tremolo category. To achieve this technique, one plays a chromatic scale in the left hand whilst trilling one key in the right hand.[179] We worked on this together during our collaboration on his solo piece *Ga.* Posadas anticipated the sonic outcome on the contraforte to be akin to bichromatic trills on the clarinet in his piece *Sinolon* (2000). While trilling a single key over a rapid chromatic movement was effective on the clarinet, it did not work on the contraforte, leading to the abandonment of this exploration. Conversely, trilling two keys simultaneously on the contraforte whilst playing a short chromatic run in the left hand produced an interesting timbre.[180] Introducing different lip pressures during this process resulted in the building up of harmonic layers.[181] A similar effect for bassoon, somewhat akin to a bichromatic trill, was used in the fifth movement, 'Metrio,' of Billone's *Legno. Edre* (2004) (Fig. 2.34).

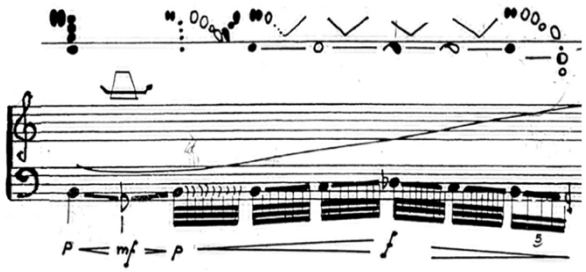

Figure 2.34: Billone, *Legno. Edre, v,* page 6, line 4: notation for a bichromatic trill on the bassoon.[182]

[179] Alberto Posadas, e-mail message to the author, February 15, 2019.

[180] See Lorelei Dowling, "Tremolo," Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/08/19/tremolo.

[181] Audio example: Lorelei Dowling, *Travelling suite*, performer Lorelei Dowling, 2024.

[182] Audio example: Pierluigi Billone, *Legno. Edre*, Metrio, performer Lorelei Dowling, 2016.

2.8 Experimental Approaches

> "The experimentalist path is guided by a process of continuous searching rather than refining the points of 'finding.' This means it prefers questioning over answering: the experimental approach is ready to risk a result that is not assured, not completely resolved, and not completely mastered."[183]

The contraforte is a blank canvas, ideal for exploration via 'the experimentalist path' described by Chaya Czernowin, where any sound concept can be imagined, conceived, and developed.[184] The contraforte offers room to thrive when embracing a philosophy of continuous exploration, rather than fixating on arriving at definitive findings, and by being ready to risk outcomes that are not ensured or that have not been entirely mastered. The contraforte, which has a range extended by an octave (from C5 to C6) compared to the contrabassoon, served as the focal point of my initial experimentation. My experimentation included finding ways to play subtones, playing with resonators and mutes, creating air sounds, singing while playing and playing with different mouthpieces. In this section, where the effects discussed have been used in pieces, I have included examples of notation.

2.8.1 Ethereal Sounds

Having a predilection for extremities of pitch, I was interested in seeking out ethereal sounds to coax from this instrument that is all but synonymous with bass tones. Beat Furrer's *FAMA* (2006), a piece I have participated in multiple performances of, really captured my love of seemingly intangible high frequencies.[185] For performances of this piece, the audience is seated in a specially constructed box. The musicians surround the outside of the box, creating acoustic phenomena by either walking around it whilst playing or by shifting between fixed positions, then playing. Of particular interest were two flute players who, whilst walking around the box, would stop at small cracks at the

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[183] Chaya Czernowin, "Experimentation, Invention and Discovery," in *Experimental Encounters in Music and Beyond,* ed. Kathleen Coessens (Leuven: University Press, 2017), 31.

[184] Ibid., 31.

[185] *FAMA* by Beat Furrer is an acoustical theatre piece in eight scenes for large ensemble, eight voices and actress composed in 2005.

intersection of the walls and play 'whistle tones' into these cracks, aurally disarming the captive audience inside. These high, airy, haunting sounds inspired me to find a similar effect on the contraforte. I was already convinced that I could find at least one whistle tone because of my success with finding one for the bassoon in Andre's piece *da*,[186] which concludes with a whistle tone with a notated pitch. Andre and I had not discussed or contemplated such a phenomenon during our collaboration, so finding a solution for this was really entering new territory for me. My *da* methodology involved experimenting with reed materials capable of standing teeth pressure—crucial to executing a whistle tone—but which could also produce and sustain the playing of a melodic line. The double reed serves as the voice of the instrument, and the 'generator' or 'excitor'—the acoustic term for the reed—'both stabilises and determines the pitch of the note produced.'[187] I discovered the properties necessary for producing whistle tones on the contraforte in reeds made with cane from the San Francisco Bay Area in the USA. The most likely explanation for this was that this cane is very porous. When made into a reed, this porosity means that slightly biting on the back of the reed does not choke the sound, but rather results in a whistle tone.

I discovered a whistle tone, with a pitch of approximately a F+7, by using my teeth while playing a non-standard fingering. To create an oscillation on the F+7, I moved my bottom jaw forward. I was able to control the F+7 in three ways: starting with a sounding B3 and then the F+7, producing only the F+7 pitch or playing an oscillating F+7. This whistle tone was employed in Johannes Kalitzke's ensemble piece *Werckmeister Harmonies* (2020) and Alberto Posadas's *Ga* (2021) for solo contraforte. Kalitzke (1.) and Posadas (2. and 3.) [188] used the whistle tone in different ways, as indicated by the notation (Fig. 2.35).

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[186] Recording Lorelei Dowling, 'Whistle tone excerpt from *da*' 2012, https://youtu.be/KycClXyDsQc?si=-CExPFiJpXPVuSqT&t=270.

[187] Will Janson, The Bassoon: Its History, Construction, Makers, Players and Music (Buren: Uitgeverij F. Knut, 1978), 144.

[188] Audio examples: Johannes Kalitzke, *Werckmeister Harmonies, Klangforum Wien,* 2020 *and* Posadas, *Ga,* performer Lorelei Dowling, 2022.

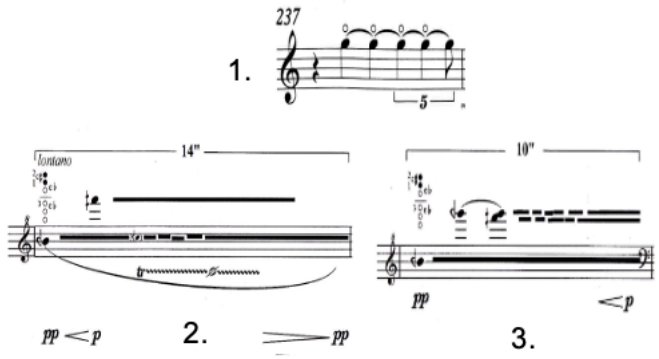

Figure 2.35: Kalitzke, *Werckmeister Harmonies*, ii, bb. 237–236, (1.), Posadas, *Ga, b.* 61, (2.) and b. 105, (3.): three different ways of executing a whistle tone on the contraforte.

Through further experimentation, I discovered I could also achieve a similar-sounding whistle tone on the contraforte by biting the tip of the reed while closing all of the keys. In my ongoing pursuit of ethereal sounds, I also developed a new performance practice: trilling an auxiliary key while lip bending the standard fingering on notes in the range F5 to B♭5.[189] This technique produces a pitch that is an interval of a third either above or below the fingered note, owing to the standard fingerings having two flageolet keys open.[190] Trilling an auxiliary key whilst lip bending mitigates the abruptness of the change in notes, yielding an airy, beautiful, high sound.

2.8.2 Tremolo–Roll Tone–Multiphonic–Portamento Sequence

I first began experimenting with this idea in 2018, starting with a non-standard tremolo fingering that evolves into a roll tone through the addition of lip pressure. Adding an auxiliary key triggered a multiphonic, and with a lip bend, a portamento sounded between the multiphonic and a high note. This effect works on F2 and G2. It is featured in Русский пафос (2019), my trio for heckelphone, contraforte and harp.[191]

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[189] Audio example: Lorelei Dowling, *Travelling suite*, performer Lorelei Dowling, 2024.

[190] Lorelei Dowling, "Ethereal Sounds," Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/08/19/ethereal-sounds.

[191] Audio example: Lorelei Dowling, *Русский пафос*, performers Lorelei Dowling, Markus Deuter and Virginie Tarrête, 2019.

2.8.3 Subtone: F0

Figure 2.36: The extension used to produce the pitch F0.

Lim's *Extinction Events and Dawn Chorus* (2018) requires the contraforte to imitate a bullfrog fish, pulsing out a pitch of F0 (42 Hz). To achieve this, I developed an extension from plastic piping for the contraforte. I added triangular pieces of foam inside the piping at the beginning, middle and end of the extension construction to add some resistance for when I played. The contraforte can be played normally, except that the A1 does not sound. This note is also featured in Kalitzke's *Werckmeister Harmonies* (2020) using the notation below (Fig. 2.37).

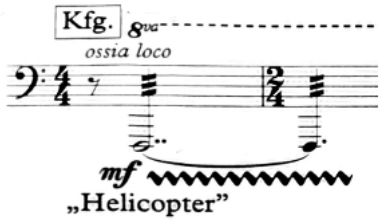

Figure 2.37: Kalitzke ii, bb. 206–208: notation for playing F0.

2.8.4 Aluminium Disposal Plate

This idea arose out of the experience of playing bassoon in Maria Gstättner's piece for bassoon quartet, *frauen in vasen* (2018), and performing on the contraforte in Elizabeth Shimana's *Virus #3.3* (2018), both of which demand a metallic sound. By placing an aluminium plate over the bell of the contraforte, a harsh metallic sound can be achieved when overblowing A1, B♭1 and B1. In the tenor region of the contraforte, this setup causes the plate to resonate, producing a high-pitched sound similar to metal being scraped. This works particularly well on G4.[192]

2.8.5 Harmon Mute

I experimented with using a Harmon trombone mute with the contraforte because I was interested in the way multiphonics can be produced on the trombone when using this mute, as well as the fact that it fits into the bell of the contraforte.[193] The mute proved effective only on the lowest three notes of the contraforte. The resulting sound was a blend of overblowing characterised by a nasal quality. Unfortunately, I was unable to experiment with covering or cupping the stem inside the mute as I had no spare hand available.[194]

2.8.6 Slightly Releasing the Pressure on One Key, Resulting in a Multiphonic

Reflecting on the incredible multiphonics that can be produced when playing old, leaky contrabassoons and bassoons (despite their tuning issues and difficulty in attacks and sustaining notes) led me to explore this concept on the contraforte. While playing and experimenting with overblowing, I tried slightly releasing finger pressure on various

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[192] See Lorelei Dowling, "Aluminium Plate," Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/08/19/aluminum-plate.

[193] 'Harmon' is the type of trombone mute, and the one I used for these experiments was produced by J. Alessi. There are two different types of Harmon mute: bubble cup Harmon mutes, which have a smaller cup, and traditional straight-cup Harmon mutes, such as the one I used for these experiments.

[194] See Lorelei Dowling, "Playing with a Trombone Harmon Mute," Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/08/19/playing-with-a-trombone-harmon-mute.

keys. Through the process of experimentation, I found that releasing the pressure of the third finger of my right hand (the G key) allowed air to leak slightly, resulting in a multiphonic when overblowing. I tried this technique when overblowing the fundamentals from A1 to E2, with the most convincing result occurring on C2. However, finely controlling the amount of finger pressure such that the key only opens slightly remains a challenge; this area requires further investigation.[195]

2.8.7 Keypad Pitches

When compositions have required key clicks to be played on the contraforte, I found that forcefully and quickly closing individual keys in the lower register produced distinct pitches. Using a tuning machine, I documented the pitches produced by each pad:

- A1 pad emits the pitch F#3
- B♭1 pad emits approximately the pitch E♭ 3
- B1 pad emits a pitch between G2 and Ab2
- C2 pad emits a pitch between A1 and B♭1
- D2 pad emits approximately the pitch F#2
- E2 pad emits the pitch F4
- F#2 pad emits the pitch B3

I incorporated a combination of these pad pitches and key clicks in 'Slipstream', the first movement of my composition *Travelling Suite* (2023).[196]

2.8.9 Air Sounds

Salvatore Sciarrino used air sounds for bassoon throughout his compositions.[197] His ideas—which I further developed on bassoon—also work on the contraforte. Using the

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[195] See Lorelei Dowling, "Overblowing and Resolving to a Multiphonic," Lorelei Dowling, accessed August 19, 2024, https://contemporary-contraforte.com/2024/08/19/overblowing-and-resolving-to-a-multiphonic.

[196] Audio example: Lorelei Dowling, *Travelling suite*, performer Lorelei Dowling, 2024.

[197] Air sounds for the bassoon are used in Sciarrino's *Macbeth* (2002) and *Quaderno di Strada* (2005) to depict insect sounds and rain.

contraforte as a resonator, eerie air sounds result from flutter tonguing while playing chromatic scales in the low register. Meanwhile, blowing air through the instrument without adding flutter tongue whilst playing a chromatic scale is not as audible.

Slap tongue with or without the reed has the same result as it does on the bassoon and is best implemented in the bottom register of the instrument. Using the reed, the slap effect is quiet, sounds at the fingered pitch and can be played at a fast tempo. Without the reed, the tongue is slapping on the bocal and the result is loud, sounding a quarter-tone lower than the fingered pitch, and cannot be executed quickly.

I experimented with the syllables 'choo,' 'fttt' and 'ta,' while playing two centimetres away from the bocal. This had the effect of amplifying the syllables. Ghosting, a term used to describe playing with minimal sound, works particularly well in the bottom register of the contraforte. One effective way to achieve this is by pinching the reed between two fingers when playing, which produces a sound of ten percent note and ninety percent air. I employed this technique when playing ghosting sounds on the contraforte in Yann Robin's *Toccata I* and *Toccata II* for piano and ensemble (2023).

2.8.10 Singing and Playing

I found singing while playing the contraforte to be very effective. If I sang in the high register while playing a sustained note on the contraforte above E2, both the voice and the instrument could be clearly heard.[198] However, playing the contraforte below E2 made singing uncomfortable and indistinct. Experimenting with singing and playing multiphonics, I discovered that this only amplified the multiphonic, making my singing inaudible. Singing a contrary glissando while playing a chromatic scale on the contraforte in the middle register produced a mixture of flutter-tongue-like sounds and octave jumps from the contraforte notes. This is an area for future exploration Additionally, I found that singing slightly above a played contraforte pitch created a flutter tongue effect.

[198] Audio example: Lorelei Dowling, *Travelling suite*, performer Lorelei Dowling, 2024.

2.8.11 Experimentation with Minimal Outcomes

Experimentation that results in minimal outcomes is a crucial part of the creative process, reflecting the continuous search for new possibilities. This embrace of uncertainty and unsatisfactory results aligns with the philosophy that experimentation involves questioning as much as finding answers, as illustrated by the quote by Chaya Czernowin that opened this section.

Attempts to play using saxophone mouthpieces and reeds made from unconventional materials like plastic cups and fibreglass resulted in no immediate or added value. The resulting sounds were muffled, unfocused and physically challenging to produce. My explorations extended to trying different styles of contrabassoon reed on the contraforte, including those with short lengths, wide blades and varied thicknesses. However, these were unable to match the dynamic range I was able to achieve with contraforte reeds. Even experimenting with contraforte reeds on brass or silver extensions—typically used on the contraforte crook when using a contrabassoon reed—yielded no distinct change. I tried unconventional approaches: playing the contraforte with the side of my mouth which—although uncomfortable—resulted in the same sound, but quieter. I tried trilling the water valve key with my right hand when playing notes with my left hand, resulting in a sound reminiscent of normal bisbigliando; this is a technique, however, that can easily be achieved without such modifications. Beyond reed variations and mouthpiece experiments, my explorations also extended to using brass mouthpieces on the contraforte, with the aim of identifying a diversity of sonic possibilities.

2.8.12 Trumpet Mouthpiece

Observing trumpet and trombone colleagues using bassoon or contraforte reeds in their mouthpieces inspired me to try their mouthpieces on the contraforte. While a trombone mouthpiece fits loosely, a trumpet mouthpiece fits perfectly on the bocal of a contraforte. Playing the trumpet mouthpiece alone, without an instrument, produced an F#4, but on the contraforte the pitch produced was D4, meaning that the standard fingerings do not correlate with the intended pitch. Despite this challenge, I experimented with playing a bassoon reed inside the mouthpiece on the contraforte. Although this setup is complicated, I found it quite easy to adapt to. As I change instruments regularly over the course of an individual piece (bassoon to contraforte and vice

versa), the idea of changing mouthpieces mid piece does not present a challenge. The resulting sound was similar to that produced by my trumpet colleague when using a bassoon reed, but I developed a harsh brassy sound. I would later employ this technique in the last movement, 'Between Worlds,' of my piece *Travelling Suite.*[199]

2.9 Conclusion

With the knowledge that the contraforte offers a staggering sixty-seven million fingering possibilities, it is evident that there is a vast array of sounds yet to be explored. This chapter's contribution to the mapping of the topography of the contraforte represents only the initial stage, and I have selected specific areas of modern techniques that pique my interest and that will be of interest to other players and composers. I believe that the more versatile the sounds produced by the contraforte can be, the more likely it will be that composers will incorporate it in their ensemble compositions. The flexibility of the embouchure and the ability to memorise the settings needed to perform certain techniques are crucial factors that greatly influence how different techniques are to be executed. It is my wish that future players will also recognise and harness these important skills. In line with this, expanding the contraforte's capabilities through the development of advanced techniques will enhance its suitability for inclusion in ensemble performances in the twenty-first century. Composers' utilisation of certain effects will be examined in the following chapter. The majority of the sounds discussed in section 2.8 are employed in my composition *Travelling Suite* for solo contraforte, which is included in this research. The research pertaining to this chapter will be published on my website—https:contemporary-contraforte.com/—which will undergo periodic evaluation and revision.

[199] Audio example: Lorelei Dowling, *Travelling suite*, performer Lorelei Dowling, 2024.

Chapter 3 Introduction: Established Composers and Collaborations

After working in isolation to discover contraforte timbres, and in mind of my aim to promote and demystify the contraforte for composers, the next step forward was to create practical realisations. I planned to do so in the form of new contraforte pieces from selected composers, which would necessitate collaboration.

In the past, I had encountered a definite division between 'them' (composers) and 'us' (performers) in my collaborations, resulting in a hierarchical form of collaboration where the results were not as I had hoped. The results where 'composer composes score, and performer performs score'.[200] This was frustrating in all my collaborations as the case was that each composer and I had decided which direction the piece would go based on the bassoon demonstration of extended techniques I had given. When the said final piece arrived all convincing bassoon effects were replaced by idiosyncratic techniques belonging to other wind instruments, i.e. isolating extremely high partials from a fundamental note, ghosting sounds, and vowels while playing. These are effective on flute and clarinet but are not convincing on bassoon. This time, I anticipated that the presence of a new instrument for this collaborative situation could change this scenario. I felt encouraged by the literature I read from performers in the new music world regarding their collaborative experiences. They all related at least one personal artistic development. Clarinettist Heather Roche stated that 'my understanding of the instrument was dramatically affected,'[201] while pianist Zubin Kanga exalted that 'there is a particular focus on the performer's re-imagin[ing] of concepts.'[202] For soprano Juliet Fraser, her artistic growth was breaking the mould in which 'the

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[200] Juliet Fraser, "The Voice that Calls the Hand to Write: Exploring the Adventure of Agency and Authorship within Collaborative Partnerships" (online paper, Harley Residency, Southampton University, 2019), 6.

[201] Heather Roche, "Dialogue and Collaboration in the Creation of New Works for Clarinet" (doctoral thesis, University of Huddersfield, 2011), 91.

[202] Zubin Rustom Kanga, "Inside the Collaborative Process: Realising New Works for Solo Piano" (doctoral thesis, Royal Academy of Music, 2014), 3.

performer is the servant of the work, and nothing more.'[203] Each performer compartmentalised the features of a working collaboration in a list. Roche's list included: the 'importance of dialogue, focus on the process of collaboration, mutual respect/trust, humour, intimacy, and conflict.'[204] This was similar to Fraser's list, which pointed to ' a shared aesthetic mission, a non-hierarchical structure, a mutual dependence, a dialogue-rich process and shared vulnerability.'[205] Kanga listed two sets of criteria for collaborating with young or 'older and more senior composers.'[206] The points often overlapped, including questioning the mode of collaboration, the power play, and whether composers use idiosyncratic methods and language in their collaboration process. I wondered if my collaborations with established composers would create resonances with other performer's personal artistic developments such as Kanga's. In my doctoral journey, a crucial decision involved choosing the type of composer—established or non-established—for collaborations. My collaborations would focus on jointly exploring undocumented contemporary effects on a newly developed instrument.

While acknowledging that 'working with a fresh generation of composers is vital to keep abreast of the growth of the art,'[207] I intentionally chose to collaborate with established rather than young composers for this project. One attractive aspect about established composers is their relatively fixed aesthetic, which I anticipated they would endeavour to transfer to the contraforte.[208] Moreover, I approached composers who had previously included interesting contrabassoon or contraforte parts in their ensemble works but had not written anything extensive for the contraforte. Despite the risk that they

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[203] Fraser, "The Voice that Calls the Hand to Write", 9.

[204] Roche, "Dialogue and Collaboration", 85.

[205] Fraser, "The Voice that Calls the Hand to Write", 4.

[206] Kanga, "Inside the Collaborative Process", 46.

[207] Mark Andrew Gaydon, "Berio's Sequenza XII in Performance and Context: A Contribution to the Australian Bassoon Repertory Synthesising Extended Techniques into Newly Commissioned Works" (doctoral thesis, University of Adelaide, 2012), 41.

[208] The two new pieces from Aperghis and Haas for contraforte are based on their aesthetic of microtonality.

might not be interested in composing for the contraforte, I opted for this path. While it might have been simpler to ask new, young composers, I wanted to avoid this: most have yet to experience composing for a bassoon, let alone a contrabassoon or contraforte. Choosing established composers might also increase their interest in considering the contraforte in their future commissions, aligning with my goal of developing the contraforte for twenty-first-century ensemble compositions.

In selecting composers for solo works for this doctorate, I was committed to diversity in cultural backgrounds and gender equality. As a result, I approached two female composers and two male composers. Liza Lim, Leah Muir, Alberto Posadas and Georg Friedrich Haas—composers with whom I have strong connections and whose compositions I have enjoyed both playing and listening to—agreed to compose for the contraforte as a solo instrument. Additionally, Klangforum commissioned a fifth work by Georges Aperghis for a CD recording during the pandemic.[209] Klangforum requested an established, older composer independent of my doctoral project to compose a solo piece for the contraforte. The sixth piece in my doctorate is my own composition, a work synthesising new techniques with classical performance practices.

Fitch and Heyde declare that '[c]ollaboration is frequently a matter of the performer giving the composer access to his [her] toolbox.'[210] However, even though I had a new instrument and had developed contemporary techniques, this did not occur. Instead, I provided each composer with one short sound bite of unusual timbres, specifically in the top two registers, titled 'ethereal effects' prior to our first contact. This approach aimed to confront the conventional tendency to focus on the bottom register of the instrument. It offered composers a clear understanding of the contraforte's possibilities while not instantly identifying that such high sounds–whistle tones and airy high trills—

[209] Aperghis's contraforte solo is featured in the Kairos recording label's box set, *SOLO*.

[210] Fabrice Fitch and Neil Heyde, "'Recercar'–The Collaborative process as Invention," *Twentieth-Century Music* 4, no. 1 (2007): 73.

could be produced from this bass instrument. The audio would challenge their preconceived auditory sense of the instrument as an instrument similar to the contrabassoon. The sound bite contains:[211]

1. Variations on a whistle tone (based on F↑) with the presence of lower notes (B4 and B+4)
2. A Sciarrino-inspired dyad (F#4 and C#4)[212]
3. Lip-bending on A5, producing the sequence A5, B5, F#5, A5, and B5, and A5, while trilling the B♭ key simultaneously
4. Biting the reed while playing C6 and quickly alternating fingers on the left hand to produce the notes C#6 and D6
5. Biting the reed while playing F4

I had certain expectations from participating in these collaborations. My goal was to improve my technique, develop my facility on the contraforte and obtain new pieces to play worldwide. Each composer had their way of approaching the collaborative process based on their musical personalities and compositional styles. In two cases, the process was not collaborative. Each section of this chapter explains these experiences in the following order:

- Leah Muir: *Pigeonholed* for contraforte and spoken text (2019–22)
- Georges Aperghis: *Tag ohne Nacht* (2020)
- Georg Friedrich Haas: *Was mir Beethoven erzählt,* concertante symphonic poem for violin, contraforte and orchestra (2020)
- Alberto Posadas: *Ga* (2021)
- Liza Lim: *Nautilus* (2022)
- Lorelei Dowling: *Travelling Suite* (2023)

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[211] Lorelei Dowling, "Contraforte Ethereal Sound Bite,'" 2024, ,https://youtu.be/l2V2EAS_DyU?si=XneWHOSnSmz1zQbS.

[212] This is one of the most beautiful effects which the Italian composer Salvatore Sciarrino has used in his compositions on clarinet and bass clarinet. Examples of clarinet dyads are heard in his *Let me die before I wake* (1982) and for bass clarinet, in his opera, *Macbeth* (2002).

All the composers have granted permission to use excerpts from their pieces and have their scores included in this research. The scores can be viewed from the links in Appendix C. Additionally, the recording of each piece, which includes time stamps of contraforte techniques, can be heard when the QR code at the beginning of each section is scanned.

With the introduction of these pieces to the repertoire, it is my hope that the demand for contraforte in new ensemble compositions will increase. In the following five sections of this chapter, I address the composers' prior use of the contrabassoon in their ensemble pieces, our methods of exchanging information, the composers' application of contraforte techniques, and the concerns that emerged during our collaboration.

3.1 Leah Muir: *Pigeonholed* (2019–22)[213]

Apart from incorporating theatrical elements in her compositions—a feature I enjoy in her music—Muir also has a keen interest in the contraforte and contrabassoon.[214] She has already explored the instrument's contemporary timbres and incorporated them into her compositions.[215] Owing to this experience, she was an ideal choice as a composer for a piece for solo contraforte.

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[213] The score for Muir's piece can be viewed via the link: https://phaidra.kug.ac.at/o:134691. See Appendix C for all links to scores.

[214] Muir's bassoon quartet *Crossfire* (2013) incorporates acting and speaking while playing. The Lindsay Cooper bassoon quartet commissioned it and premiered it at Vienna's Porgy & Bess Club on March 19, 2018.

[215] In her ensemble piece *Sound House* (2007), the contrabassoon part requires the player to perform multiphonics, slap tonguing, overblowing, reed noises and growl while playing. In her duo, *I Frammenti di Desiderio* (2008) for contraforte and accordion, Muir employs roll tones, multiphonics, and overblowing. She ends the duo with an agile melodic line for the contraforte.

Muir's *Pigeonholed* (2019–22) for contraforte and text is about time. It has nine short episodes, three of which are titled: I. 'Contrapuntally', III. 'Backwards and forwards' and IX. 'Ultra-particulate'. The title of the piece alludes to the role of the contrabassoon, often perceived in music as incompetent and commonly employed only for reinforcement in loud tutti passages.[216] The pandemic crisis dictated the process for this composition. We communicated through e-mail for information exchange, and short Zoom meetings were followed up with e-mailed recordings. This type of exchange was problematic. For instance, Muir discovered an online contraforte fingering chart with blank spaces for non-existent notes (C#6 and D6). Assuming their playability, she incorporated these notes in her initial sketch of the piece. This led to a discussion on the limitations and possibilities of the contraforte. Her concept of using teeth on the reed led to experimentation. Before starting her composition, Muir sent me a detailed questionnaire that compares the contrabassoon and contraforte. This questionnaire which ranged from general to specific inquiries, provided an insight into her compositional approach:

1. What are the highest and lowest pitches you can play on contraforte and contrabassoon?
2. Glissando possibilities in different ranges: What is the maximum duration of a glissando, and what intervals are possible on contraforte versus contrabassoon?
3. How fast can you play tongue slaps? How do these differ from the contrabassoon?
4. Multiphonic possibilities on the attached pitch sets: how do these differ from the contrabassoon?

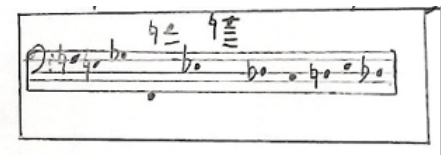

Figure 3.1: Muir's pitch sets used as a basis for multiphonics in question 4.

[216] Walter Piston remarks on the contrabassoon's role in orchestral writing in *Orchestration* (New York: W. W. Norton & Company, 1955), 203, stating that '[a] certain clumsy impression is inevitable.'

5. How loud are keyclicks on contraforte versus contrabassoon?
6. How many different fingering possibilities exist on any given single note (in the attached pitch set) on contraforte vs contrabassoon? This is very general but would be interesting because of bisbigliando.
7. How long can you sustain a multiphonic (changing dynamics f to p to f) and not changing dynamics (just piano) or (just forte)
8. How long can you sustain a multiphonic with overpressure on the reed (changing dynamics forte to piano to forte) and not changing dynamics (just piano or just forte)?
9. What is your favourite notation for reed pressure/position changes?
10. Is sucking the reed to produce a slight kissing effect something possible on the contraforte/contrabassoon? Which one is louder?
11. What, if any, difference is there between molto vibrato on the contrabassoon and the contraforte?
12. How long can you sustain the highest and lowest pitch on the contrabassoon vs. the contraforte?
13. Are there any interesting effects that I should be aware of on contraforte that are not possible on contrabassoon?[217]

I have been playing the contraforte since 2006, so my knowledge of contemporary techniques on the contrabassoon is limited. Although I found some of the comparisons challenging to answer due to my limited experience with the contrabassoon, the process encouraged me to reflect on and articulate the nuances of the contraforte. For example, in addressing question twelve, the contrabassoon and contraforte have different resistances on individual notes. The resistance of a note determines the stability of the pitch when circular breathing is used. I could only answer from my experience of this on the contraforte. I informed Muir that my ability to circular breath to sustain the highest and lowest notes is contingent on her desired dynamic. I gleaned from the questions that Muir had a grounded understanding of the contrabassoon and at-

[217] Leah Muir, e-mail message to the author, September 15, 2018.

tempted to assimilate a new sonic concept for the contraforte. Her approach, comparing the contraforte to the contrabassoon, differed from other composers I worked with who related the contraforte to single reed instruments.[218] After I responded to her questionnaire, Muir sent graphic sketches which mapped out the topography of her piece, albeit without text. I will elaborate on six musical effects and how they manifest in the final version of *Pigeonholed*. Including the initial sketches enables a comparison to Muir's final draft of these effects. Her first sketch explores various durations, speeds, and registers employed when utilising her first technique of the piece: vibrato (Fig. 3.2).

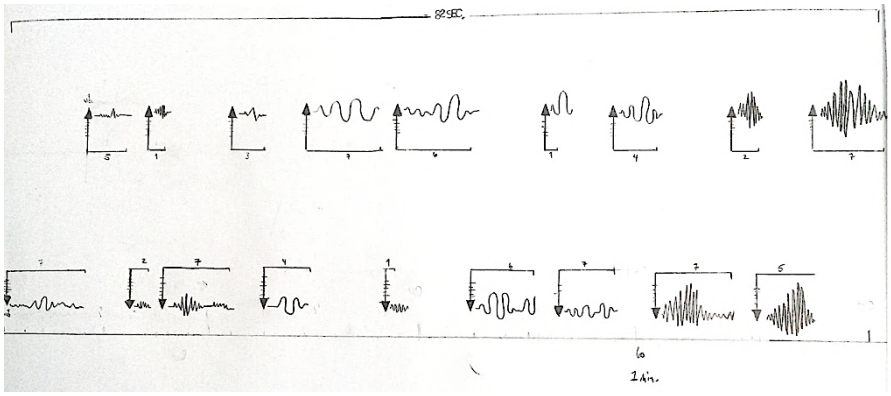

Figure 3.2: Muir, i: sketch of vibrato and register variations.

For me, the variation in vibrato on the contraforte was a new concept. In her printed version of episode I, Muir adhered to the form of her original sketch but also incorporated the technique of teeth on the reed on notes already coloured with fast, wide vibrato. Using teeth is mostly used to produce a high frequency on a reed instrument. In *Pigeonholed* this was a challenge to implement on notes in the high register of the contraforte and still sustain the pitch (Fig. 3.3).

[218] Aperghis compared the contraforte to the contrabass clarinet (section 3.2) while Posadas compared the contraforte to the saxophone and clarinet (section 3.4).

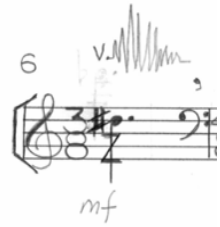

Figure 3.3: Muir, i, bb. 6–7: D#5 played with teeth and a wide, fast vibrato. [219]

The desired result Muir wanted was a quasi-distorted, choked sound. Simultaneously performing these two physical acts while playing a note on the contraforte can offer a risk, potentially leading to a cracking sound instead of the desired strangled sound. This required experimentation to find the sound Muir desired. Also employing a wide vibrato on the highest note of the instrument (C6), as suggested in the graphic in the sketch is a risk (in Fig. 3.2). In this instance, Muir also wanted a slow vibrato which reduced the risk of cracking the note (Fig. 3.4).

Figure 3.4: Muir, v, bb. 63–65: C6 played with a broad, slow vibrato.[220]

Nevertheless, Muir's wide, slow vibrato did not work on all pitches owing to the different resistance in individual notes. We discussed this and concluded that lip vibrato in those cases could be used as an alternative for diaphragm vibrato.

The concept of monophonic notes played with teeth—without vibrato—was influenced from the sound bite I sent her, which contained a distorted sound produced by playing F4 with my teeth, and therefore used this effect. In *Pigeonholed,* she featured this in episode IV (Fig. 3.5).

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[219] Audio example: Leah Muir, *Pigeonholed*, performer Lorelei Dowling, 2022.

[220] Ibid.

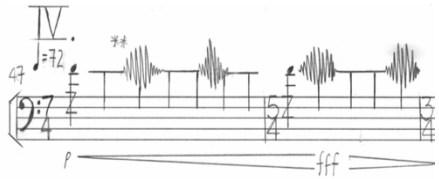

Figure 3.5: Muir, iv, bb. 47–48: F4 played intermittently with teeth. [221]

Using teeth while playing F4 once as an isolated sound like the example on the sound bite, works. However, sustaining the repetition of distortion from using teeth is difficult to control. While the repeated use of this technique on one note posed challenges in terms of control and consistency, it opened up possibilities for a new effect on the instrument. This use of teeth was employed on high and low notes of short duration. Biting on the reed stops the vibrations, which are needed to produce the sound, producing a nasal sound. Muir uses this effect often in episode I (Fig 3.6).

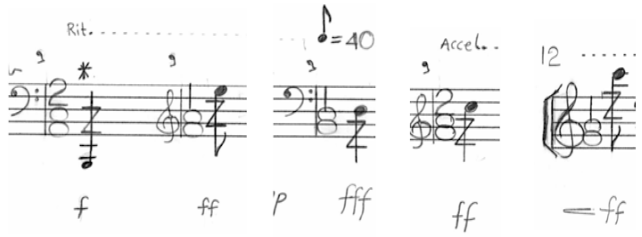

Figure 3.6: Muir, i: range of notes played with teeth.[222]

Muir was looking for a particular sound distortion, but biting on the notes did not produce the desired effect. Instead, I found, after experimenting, that resting my teeth on the reed created the desired strained sound. Playing in the lower register typically requires more air support, so it felt unnatural to restrict the sound with my teeth while playing a single note. To address this, I developed a technique of playing the note first and then resting my teeth on the back of the reed, rather than starting with the teeth already restricting the sound.

Overblowing is a familiar effect for Muir, which she used for contrabassoon in her opening of *Sound House* (2007). Muir's original sketch for overblowing illustrates how she planned to use this effect in *Pigeonholed* (Fig. 3.7).

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[221] Ibid.

[222] Ibid.

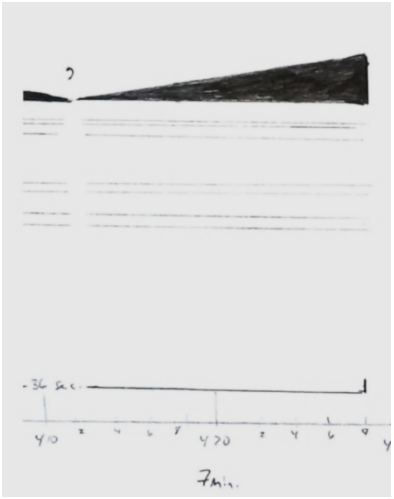


Figure 3.7: Muir's sketch of graphic notation indicating overblown harmonic layering.

However, Muir introduced two new techniques when overblowing in her final draft: using teeth and adding bisbigliandi. She desired the layering of overtones when she included teeth to be added when overblowing, as indicated by the graphic 'Z' (Fig. 3.8).

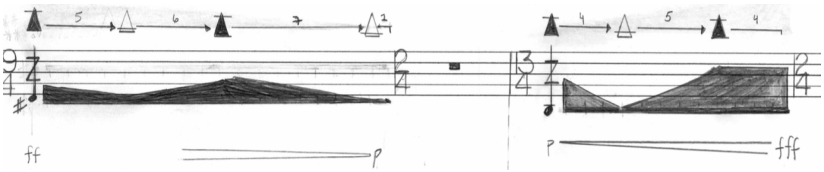


Figure 3.8: Muir, vii, bb. 103–106: overblowing with teeth.[223]

Overblowing technique involves changing the lip pressure to create harmonic layering, but adding the use of teeth hinders the sound quality. After adding dynamics, it was challenging to control and sustain, resulting in an effect that almost did not sound. In contrast, when Muir added only bisbigliandi to an overblown fundamental note, the result was clear and easy to execute. She was precise with her notation for this as she was when indicating teeth to be used when overblowing. The bisbigliandi are rhythmically notated and includes instructions on which auxiliary key to employ (Fig. 3.9).

[223] Ibid.

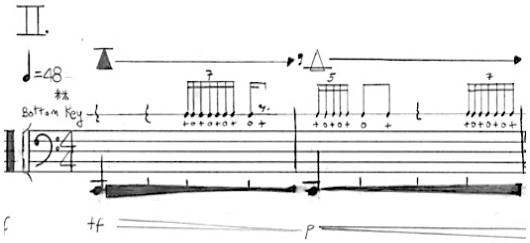


Figure 3.9: Muir, i, bb. 22–23: overblowing with bisbigliandi.[224]

The spoken text written by Muir, based on Stephen Hawking's *A Brief History of Time*, allows the performer to have a symbiotic role of narrator and player. Muir includes instructions regarding dynamics, rhythm, and the text's performance. The spoken text, at times, reflects the musical gestures. In episode II, 'Does dark matter affect time?' is implied from bisbigliandi on an overblown C1 fundamental (See Fig. 3.9.). In episode III, the question 'Can you stop time with enough gravity? If the universe contracts, does time go in reverse?' is interwoven between ascending and descending musical motifs. 'Can you bend the speed of time?' in episode V is indicated by various vibrato speeds. In addition to using the voice for the spoken text, Muir employs the technique of growling with playing. Her sketch for employing growling corresponds with her final draft (Fig. 3.10).

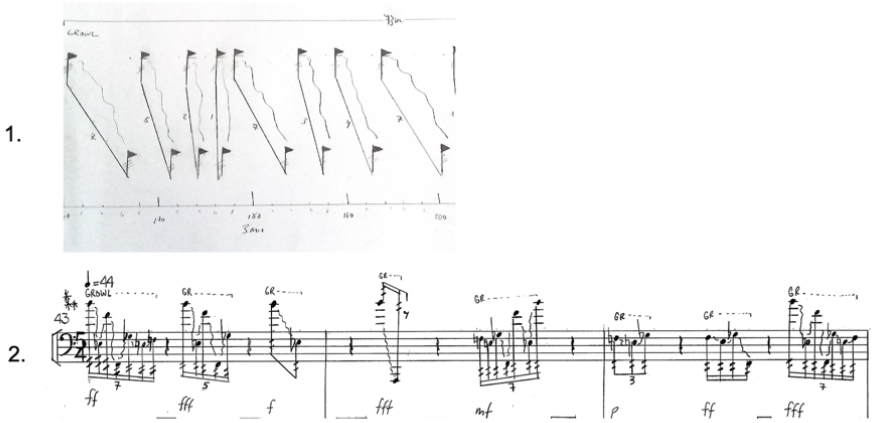


Figure 3.10: Muir, iii, bb. 43–46: sketch (1.) and final daft (2.) indicating growling.[225]

[224] Ibid.

[225] Audio example: Leah Muir, *Pigeonholed*, performer Lorelei Dowling, 2022.

Even within wider intervals and varying dynamics, using the effect of growling, I discovered that the pitch still remained stabile. The contraforte sounds agile at the indicated tempo (♩ = 44). The juxtaposition of growling alongside teeth pitches, spoken text, and musical performance contributes to the composition's documentary-like quality about time.

In an e-mail, Muir asked about the contraforte's glissandi capabilities.[226] At the time, I was experimenting with a saxophone mouthpiece to execute glissandi, which led me to suggest that she compose what she envisioned, and I would find offer her some ideas (Fig. 3.11).

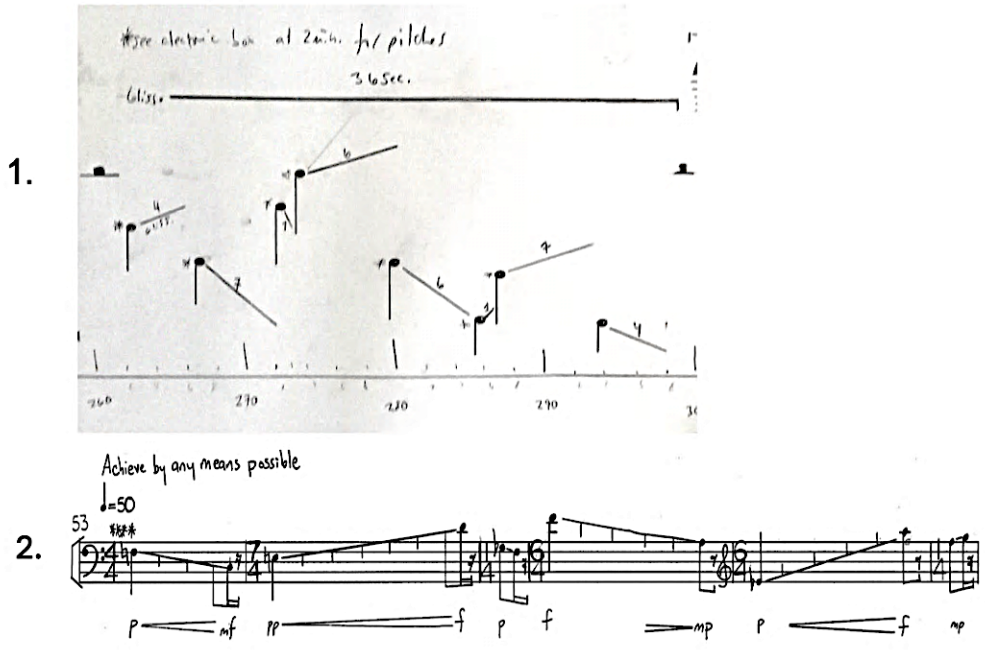


Figure 3.11:Muir, v, bb. 53–59: sketch (1.) and final draft (2.) indicating glissandi.[227]

In her initial sketch, she depicted lip glissandi (1.), which later transformed into glissandi over a wide range in her final draft (2.). As Muir and I discussed the possibility of using a single reed mouthpiece to play the glissandi, she added the text '[a]chieve by any means possible'. Muir anticipated the changing of mouthpieces, so she added

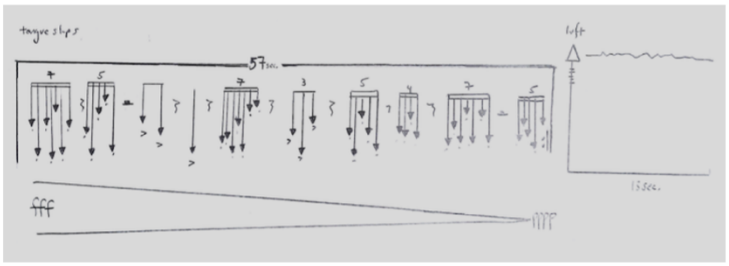
[226] Muir, e-mail message to the author, February 5, 2019.

[227] Audio example: Leah Muir, *Pigeonholed*, performer Lorelei Dowling, 2022.

rests before and after the glissandi sections. After much experimenting with saxophone mouthpieces this did not happen. Instead, I devised a fingering system to execute the glissandi effectively.[228]

Muir's final sketch conveys the idea of fast slap notes played in the bottom register of the contraforte. This segment is followed by a high air note, signalling the end of *Pigeonholed*. In the final draft, the notes were staccato and played at a fast tempo with intervals of wide leaps (Fig. 3.12).

1.



2.

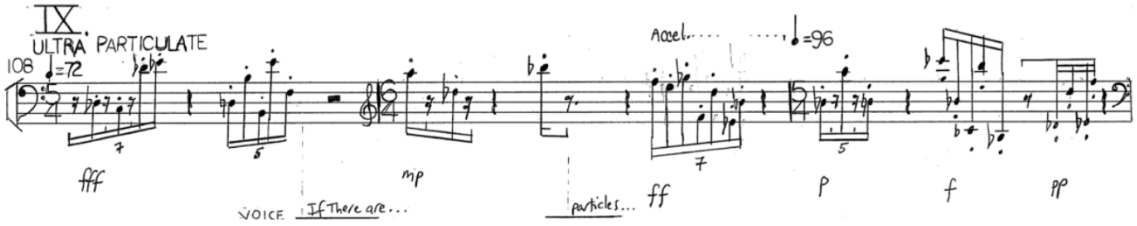


Figure 3.12: Muir, ix, bb. 108–111: sketch (1.) and final draft (2.).[229]

Owing to the slower response time of contraforte notes in this particular passage, I played the notes slightly longer to ensure no cracking occurred at the fast tempo. Nevertheless, the tempo was still too quick for the wide intervals to be heard clearly. After a discussion addressing tempo limitations on staccato notes played over wide intervals, Muir revised the tempo and removed several C6 notes. These were previously incorporated into septuplet rhythms between wide intervals.

She replaced the high air note in her original sketch (See example 1 in Fig. 3.12) with a low A1 that incorporated bisbigliandi and vowels. Her addition of extra layers to the

[228] See section 2.6 Glissandi.

[229] Audio example: Leah Muir, *Pigeonholed*, performer Lorelei Dowling, 2022.

low-frequency air sound produced on A1 resulted in an amplification of the air sound (Fig. 3.13).

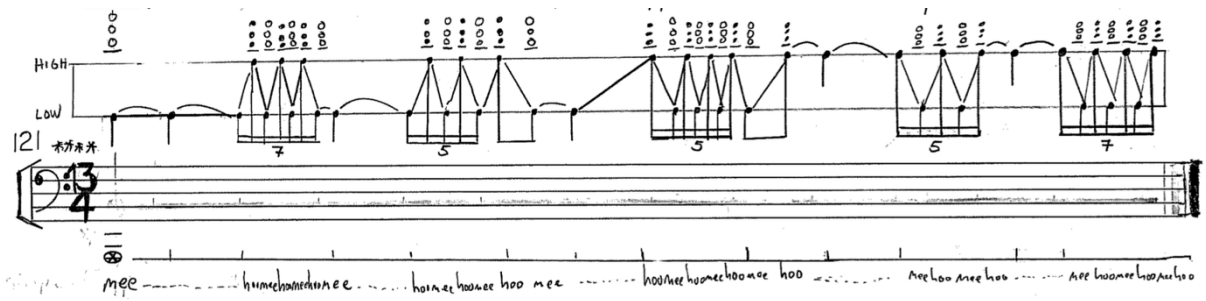


Figure 3.13: Muir, ix, bb. 121–122: A1 played with air, bisbigliandi and vowels.[230]

The cumulative result of the above-described effects is a piece where the main contemporary effects result from external physical actions: vibrato, voice, and the use of teeth. I found executing the quick application of teeth to the reed to produce the required nasal sound difficult. This action posed three risk factors when performing: biting too hard and preventing sound from coming out, biting too hard and destroying the reed, and biting and producing an undistinguishable pitch. But despite these risks, I took the opportunity to explore this technique, recognising that it added a different expressiveness to the piece. I experimented further by using less teeth and more lip pressure and I was able to execute Muir's idea with conviction. This experience allowed me to develop an understanding of how unconventional techniques need time to develop. Muir's employment of glissandi in *Pigeonholed* stands out as a highlight of the piece. I was 'stretched' artistically and creativity while finding a solution for this aspect of her composition, a term Fraser refers to in collaborative outcomes.[231] In reflection, Muir's introduction of new timbres through physical actions—voice, teeth, and vibrato—introduces additional contraforte sounds that can be used by composers. Sadly, Covid-19 enforced a new parameter that restricted our collaboration, preventing

[230] Ibid.

[231] Juliet Fraser, "The Voice that Calls the Hand to Write: Exploring the Adventure of Agency and Authorship within Collaborative Partnerships" (online paper, Harley Residency, Southampton University, 2019), 7.

us from experimenting and discussing new ideas in the same room. Aperghis's *Tag ohne Nacht*, outlined in the next section was also composed in these circumstances.

3.2 Georges Aperghis: *Tag ohne Nacht* (2020)[232]

Aperghis and I first met when he was composing his ensemble piece *Situations* (2013), and, as a result the piece includes a challenging contraforte part. After Klangforum invited him to write a solo piece for the contraforte, we began corresponding by e-mail. He was particularly interested in information on the range of possible quarter-tones on the contraforte, the impossible quarter-tones, the possibility of tremolo between quarter-tones and the potential of bisbigliandi and quarter-tones. Additionally, Aperghis shared a copy of *Solo* (2013) for contrabass clarinet (Fig. 3.14).[233]

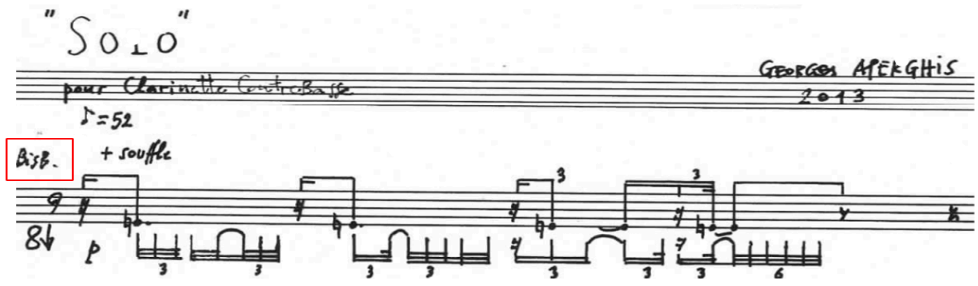


Figure 3.14: Aperghis, Solo, bb. 1–2: opening bisbigliandi contrabass clarinet.

Solo begins with bisbigliandi on a single note. Aperghis refers in his e-mail to the effect of the contrabass clarinet bisbigliandi as *parlando* or *speaking'* and inquired whether the contraforte could produce the same effect on the same note. He later asked whether I could make the whistle tone in the 'Ethereal' sound bite 'talk' or if I could

[232] The score for Aperghis's piece can be viewed via the link: https://phaidra.kug.ac.at/o:134690. See Appendix C for all scores.

[233] Georges Aperghis, e-mail message to the author, May 5, 2020.

'shake this sound' on the contraforte.[234] Instructions on how to make the instrument talk are characteristic of Aperghis's music. Aperghis has created a novel auditory system referred to as 'speaking music'.[235] His use of the words '*parlando', 'speaking',* and '*shaking'* in his e-mails suggested that his piece would focus on my ability to create a voice for the contraforte. His endeavour to find a specific instrumental voice is evident in examples of his solo pieces.[236] Shortly after his first e-mail, a sketch of the first page arrived (Fig. 3.15).

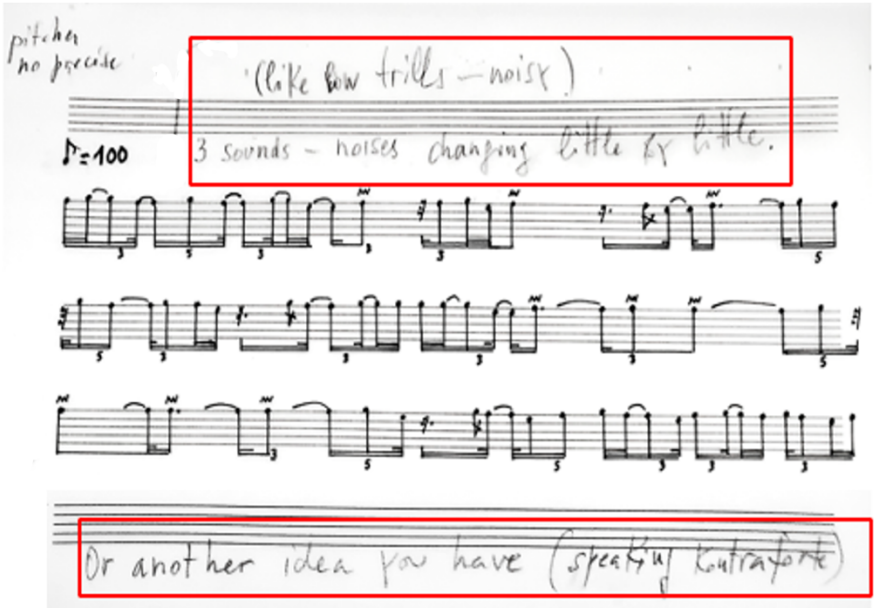


Figure 3.15: Aperghis: sketch of the first page of *Tag ohne Nacht*.

His sketch illustrates the rhythmic structure of the opening. The music's 'speaking' characteristic is evident from his written comments: 'contraforte to speak' and 'noisy' trills. Aside from asking the player to find ways for the instrument to speak, Aperghis also approaches the compositional process in an unusual manner. He describes his method for composing as 'thinking of the musicians and their personality […] it is as if

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[234] 'Ethereal sounds' is the sound bite I had sent to all composers for this project. See Chapter 3, Introduction.

[235] Sylvia Wendrock, "George Aperghis Solo" CD liner notes (Kairos: 0015099KAI, 2021), 4.

[236] Examples of solo pieces where Aperghis indicates the instruments 'speak', *Parlando* (2007) for double bass, *Deux cents quatre-vingt measures* (1979) for clarinet, and *Ruinen* (1994) for trombone.

I was sending my thoughts through a prism. They get refracted and redirected.'[237] While we were working on the solo piece, I was in a state of grief, a theme which I link to his aesthetic of 'speaking music'. Grief, defined as 'the pain of mind produced by loss,'[238] may be heard in *Tag ohne Nacht*, a title that suggests the absence of a clear line between day and night. That absence for me is characteristic of a grief-stricken state: time ceases; days and nights blur into one another.

Aperghis employs many techniques in the piece that I can interpret as representing the emotions associated with grief, including moments of peace and calm. The table below lists the chronological appearance of those techniques correlated with their corresponding musical embellishment, the 'speaking language' indicated by Aperghis, and my interpretation of the emotion evoked (see Table 3.1).

Technique	**Musical embellishments**	**Aperghis's 'speaking' indication**	**Grief-related emotion**
Quarter–tones	played with mordents, appoggiaturas and bisbigliandi	'singing' while playing, 'trembled sounds', 'airy half sounds', 'noisy' and 'air'	Wailing, twitching, agitation, restlessness and lamenting
Overblowing and harmonic layering	glissandi	'noisy' 'trembled sounds' 'air' 'speaking lips'	anger, calmness and reflectiveness
Multiphonics		'wild'	crying
Bisbigliandi	tremoli	'speaking'	uneasiness and nervousness
Vibrato			stillness, peace, reflectiveness
Glissandi		'trembled sound'	peacefulness

Table 3.1: Dowling: contraforte techniques, the composers' 'speaking' language, and the grief emotion evoked.

[237] Sylvia Wendrock, "George Aperghis Solo" CD liner notes (Kairos: 0015099KAI, 2021), 5.

[238] *Cambridge Dictionary*, s.v. "Grief," accessed August 3, 2024, https://dictionary.cambridge.org/dictionary/english/grief.

Starting from the beginning of *Tag ohne Nacht,* I will elucidate how I interpreted quarter-tones, overblowing, multiphonics, bisbigliandi, vibrato, and glissandi to match Aperghis's indicated 'speaking' language. Several techniques have musical embellishments to enhance the emotion of grief (Fig. 3.16).

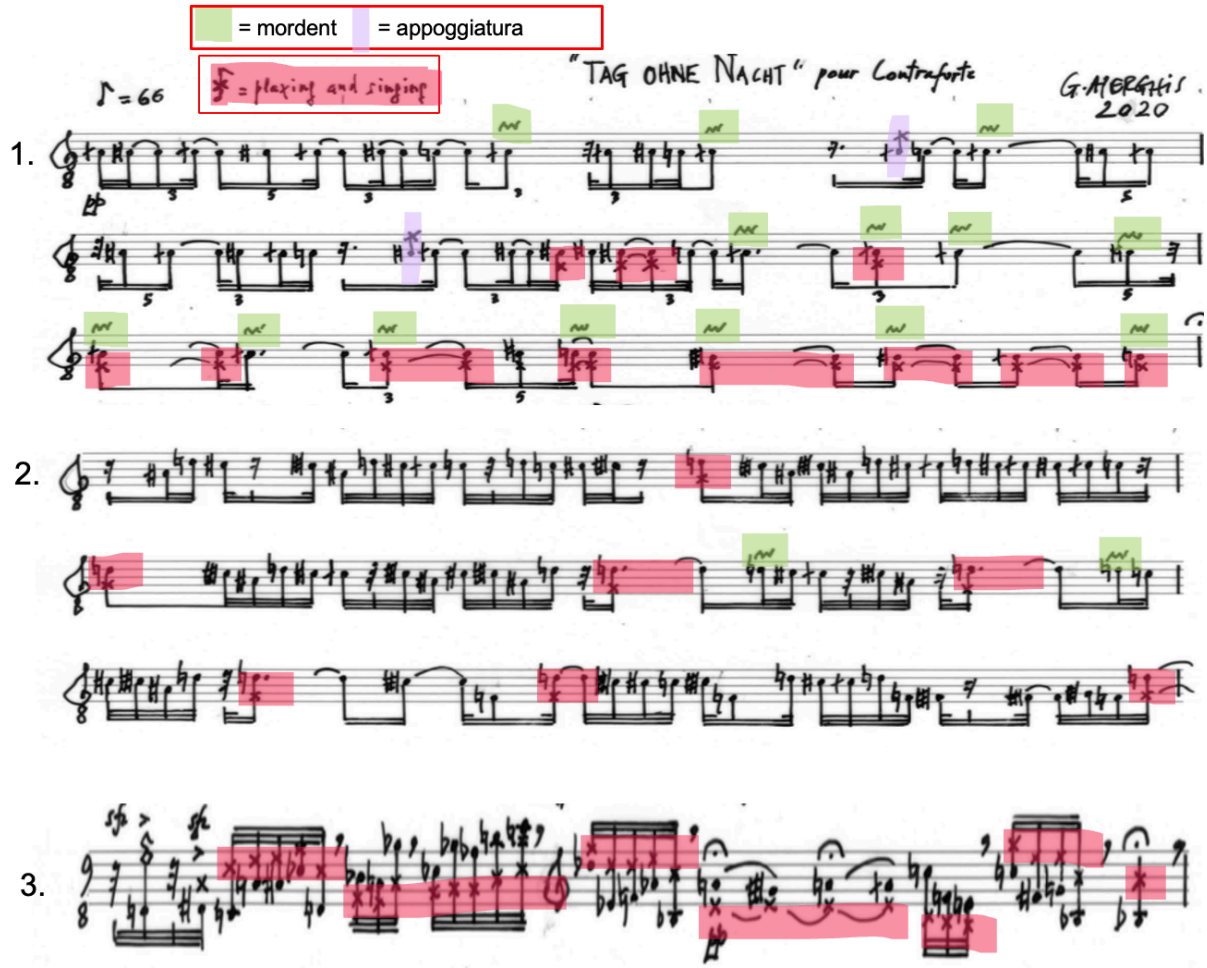


Figure 3.16: Aperghis, *Tag ohne Nacht*, bb. 1–3 (1.), bb. 13–16 (2.) and bb. 39–40 (3.): examples of quarter and monophonic tones with singing. [239]

The piece commences with quarter-tones between A#4 to G4, embellished with mordents and appoggiaturas (1.). Mordents add a twitching feel, while appoggiaturas add agitation to the opening. Additionally, I am required to sing while playing. To me, this effect signifies grief-related wailing. I use a mixture of screaming and shouting in the high register to achieve an equal volume between playing and singing. Singing a low

[239] Audio example: Georges Aperghis, *Tag ohne Nacht,* performer Lorelei Dowling, 2022.

pitch resulted in the contraforte sounding note in this register to 'crack'. This is an effect that results when I play in this register using an open throat to sing in a low register. At the end of example (1.), Aperghis's employment of singing while playing increases as the rhythmic complexity decreases.

The rhythm in example (2.) is less complex than the opening, and a broader range of quarter-tones are used: F4–D5. The legato passage sounds relaxed compared to the twitchiness of the articulated beginning. I found singing and playing on a repeated D5 easier to execute than the different pitches of the opening. Aperghis also employs singing and playing over fast articulated semi-quaver passages (3.). I felt a sense of anguish and distress as I hummed instead of sang over the rapid passage. Aperghis's 'speaking language' also applies to quarter-tones (Fig. 3.17).

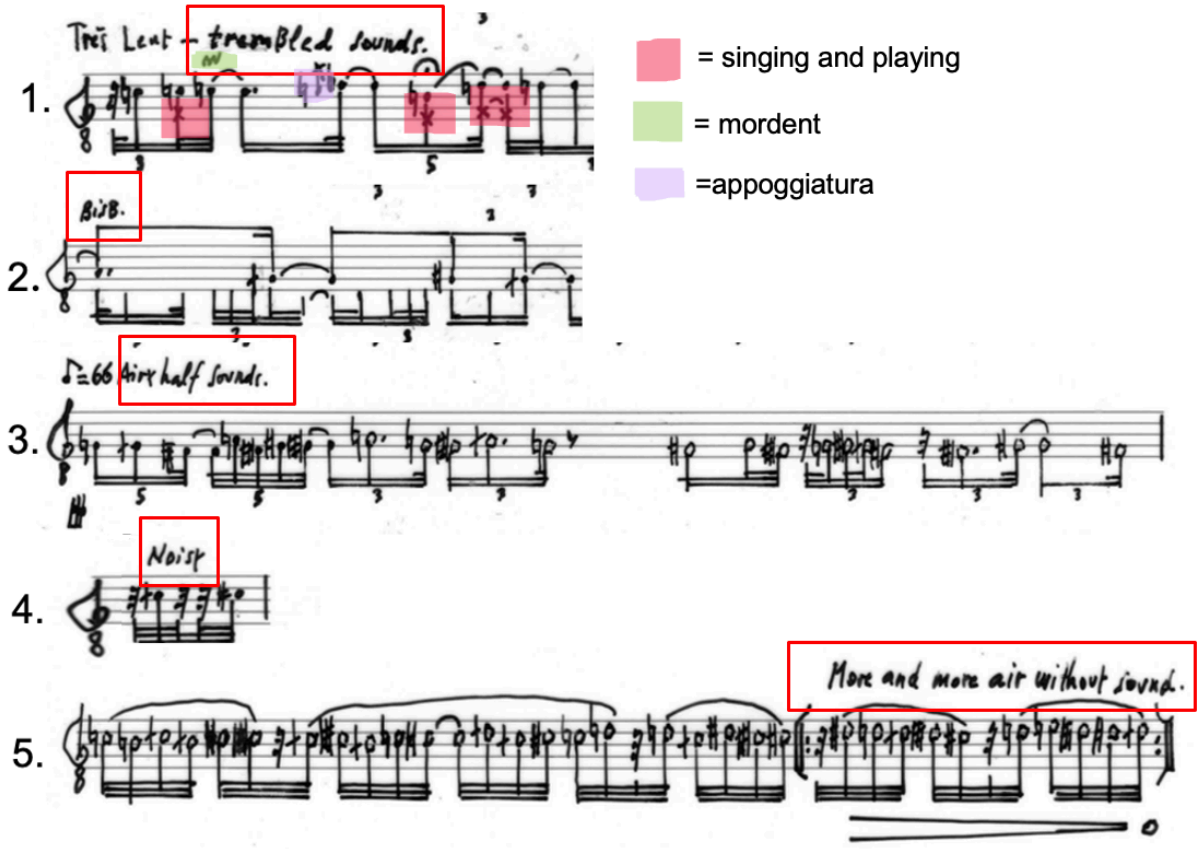
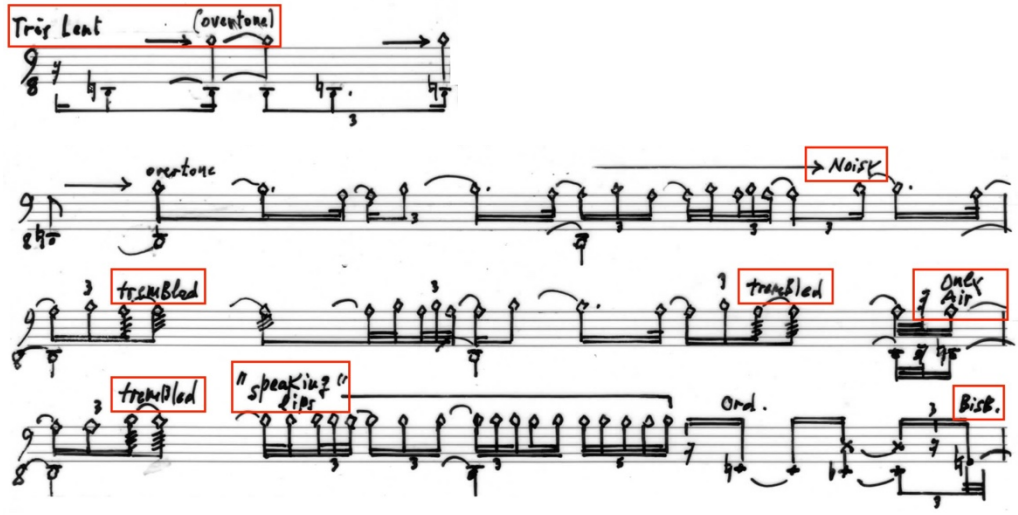


Figure 3. 117: Aperghis, *Tag ohne Nacht*, bb. 5–6 (1.), bb. 7–8 (2.), bb. 3–4 (3.) bb. 42–43 (4.) and bb. 48–49 (5.): examples of quarter-tones with Aperghis's 'speaking' language.

Like trembling, I used side-to-side jaw movement to produce Aperghis's 'trembled sound' (1.).[240] Agitation and uneasiness—a grief emotion—come from either singing, a mordent or an appoggiatura, which Aperghis adds to the 'trembled sound'. In the descending quarter-tone passage reminiscent of the opening, bisbigliandi is applied instead of singing (2.),[241] adding restlessness to the piece. Using auxiliary keys to execute this works in this register. 'Airy sounds' resulted from clenching the reed with my lips so barely any sound came out (3.).[242] I aimed for more key noise rather than pitches. This timbre invoked a lamenting feeling in me which I tried to portray when playing. To achieve a 'noisy' effect I hit the keys before playing the note (4.).[243] At the end of the piece the noise of the keys for the quarter-tones is the only sound that is heard (5.).[244] Just like grief, the piece doesn't end but fades away, implying through the repetitive musical motif that there is no end. In a grief-stricken state there are, however, moments of relief. To me, Aperghis conveys this through his sustained overblowing (Fig. 3.18).

1.



2.

[240] Ibid.

[241] Ibid.

[242] Ibid.

[243] Ibid.

[244] Ibid.

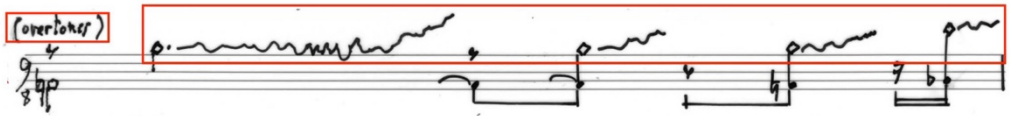
3. 

Figure 3.18: Aperghis, *Tag ohne Nacht*, bb. 4–5 (1.), bb. 21–24 (2.) and bb. 35–36 (3.): examples of overblowing.

After the agitation evoked from the quarter-tone opening, calm comes as an overblown D2 (1.).[245] I feel a sense of release from the unsettling twitchiness of playing quarter-tones when I overblow the D2. Observing the tempo indication, *trés lent*, I sustained the effect and enjoyed the moment for as long as possible.

Aperghis desires the overblown effect to be 'noisy,' 'tremble' and 'speak' with the 'lips' (2.).[246] To add noise to the overblown fundamental, I replayed the fingering, hence the key noise was audible. 'Trembling' to me implied using a mixture of vibrato and lip movement. 'Speaking lips', written over a consistent pitch, required I spoke while playing. In addition, Aperghis sought isolated harmonics from the fundamental played within a rhythmic pattern. This is a technique a clarinet can execute but not a contra-forte. As I was unsure about how to implement this, I sent Aperghis six examples of my interpretation of playing a rhythmic line of isolated harmonics:[247]

1. Opening keys when overblowing
2. ‘Grunting’ while overblowing
3. In legato, manipulating the embouchure to pick out the overtones
4. Articulating every overtone with the embouchure
5. Playing different overblown fundamentals in the rhythmic parameter
6. Producing the overtones using bisbigliando

Aperghis preferred ‘grunting’ while overblowing. Although he applied overblowing to a strong fundamental—D2—he also used overblowing on weak fundamentals A2 and

[245] Ibid.

[246] Ibid.

[247] Aperghis, e-mail message to the author, August 9, 2020.

B♭2 (3.).[248] Aperghis embellished these with glissandi. I searched for a sound depicting anger, which is how I interpreted the effect in terms of grief. The solution lay in adding flageolet keys, lip bends and slow ascending finger movements as I opened the keys for the glissandi. Aperghis also incorporates multiphonics into the piece, which is not typically part of his musical language (Fig. 3.19).

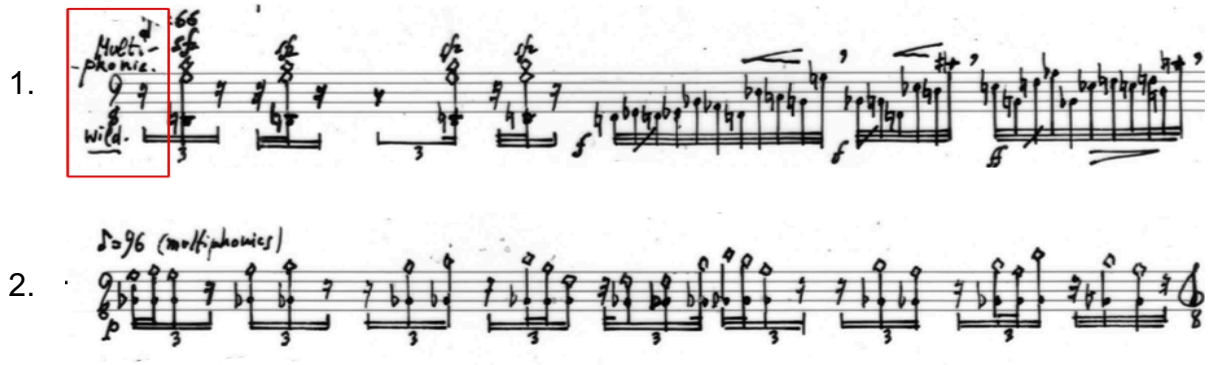


Figure 3.19: Aperghis, *Tag ohne Nacht*, bb. 39–40 (1.) and bb. 29–30 (2.): examples of multiphonics.

Aperghis required a repeated multiphonic with a D fundamental to be played in a 'wild' manner aiming to evoke the visceral quality of a 'cry' (1.).[249] Using short staccato articulation, I achieved an abrupt, harsh sound that sounded 'wild'.[250] He uses a single multiphonic to introduce a fast semiquaver passage (See (3.) in Figure 3.16.). For multiphonics used as melodic material (2.).[251] I selected finger-compatible ones that, when tongued, responded quickly, enabling the rhythmic pattern to be heard. Aperghis additionally employs bisbigliandi in rhythmic patterns. Influenced by the opening of his contrabass clarinet piece (See Figure 3.14.), Aperghis couples bisbigliandi with tremolo and 'speaking' (Fig. 3.20).

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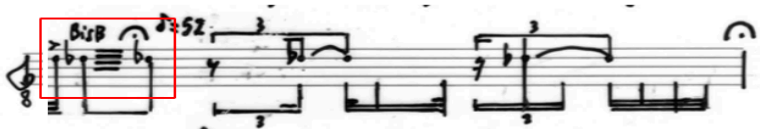
[248] Audio example: Georges Aperghis, *Tag ohne Nacht,* performer Lorelei Dowling, 2022.

[249] Aperghis, e-mail message to the author, June 17, 2020. In this e-mail he stated that the multiphonics 'must sound like a cry,' even when they are static.

[250] This is way of articulation is used for bassoon in Johannes Maria Staud's *Celluloid* (2010).

[251] Audio example: Georges Aperghis, *Tag ohne Nacht,* performer Lorelei Dowling, 2022.

1.



2.

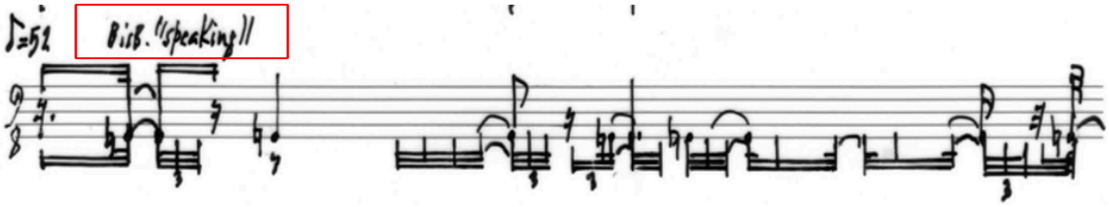
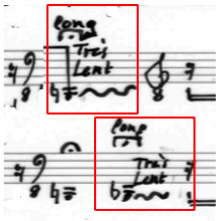


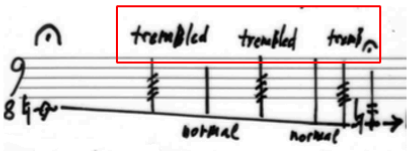
Figure 3.20: Aperghis, *Tag ohne Nacht*, bb. 5–6 (1.) and bb. 24–25 (2.): examples of bisbigliandi.

Playing bisbigliandi with a tremolo and a rhythmic pulse achieved a nervous, uneasy feeling (1.).[252] When Aperghis wanted the bisbigliandi to sound like speaking, I played while mumbling on the reed (2.).[253] I had the image of someone so overwhelmed by grief that they constantly muttered. I tried to imitate this when I was playing. Bisbigliandi are used to evoke uneasiness in the piece. Vibrato and glissandi serve as a contrast that offers a moment of musical peace and stillness (Fig. 3.21).

1.



2.



3.

Figure 3.21: Aperghis, *Tag ohne Nacht*, bb. 6–7(1.), bb. 18–19 (2.) and bb. 20–21(3.): examples of vibrato and glissandi.

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[252] Ibid.

[253] Ibid.

Like the first overblown D2 in *Tag ohne Nacht*, the sustained B1 and B♭2 embellished with a slow, wide vibrato allow for a moment of calm in the piece (1.).[254] These two pitches have long pauses and act as arrival points to reflect. Instead of the vibrato indicated, I used a slow key trill with a lip bend. This way I could control the oscillations more effectively than I could by employing a vibrato. In the low register, glissandi are played with either a trembling effect (2.) or with more air than pitch (3.), which, when I played, I likened to a peaceful meditative moment.[255]

Throughout our e-mail correspondence, I sent Aperghis several contraforte sound bites. He was intrigued in particular by the sound bite with air starts on low notes. He asked whether I could 'transform the sound little by little with more noise.'[256] He particularly enjoyed the effect of barely any pitch in the low register and eventually used this idea in the middle part of *Tag ohne Nacht* (3.).

As discussed above, *Tag ohne Nacht* symbolises grief for me. I conveyed my grief to the listener through Aperghis's physical effects—'singing', 'trembling', and 'noisy speaking lips,'—when playing the contraforte. Aperghis's terms are not only used on conventional notes but also on quarter-tones, overblowing, multiphonics, glissandi, and bisbigliandi. He does not use the entire range of the contraforte—A1–E5—thereby allowing the possibility of transcription for contrabassoon. We discussed this option, but I felt the contrabassoon could not replicate the agility and ease with which the quarter-tones are executed on the contraforte.

Tag ohne Nacht portrays the contraforte in an unfamiliar, unrecognisable role: that of a solo instrument and not always playing sustained low notes. Aperghis flet the same remarking after hearing the recording of his piece, 'the best part is that we do not know what instrument is playing. We can only guess.'[257] This phenomenon supports my goal of challenging the preconceived notion that the contraforte only plays long, low notes.

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[254] Ibid.

[255] Ibid.

[256] Aperghis, e-mail message to the author, May 5, 2020.

[257] Aperghis's observation came after serendipitously seeing him after a concert of his piece, *Situations*.

In his piece, Aperghis highlighted the many colours in the instrument, particularly from the language associated with grief.

Tag ohne Nacht was not a genuinely collaborative effort. It was also not as Fraser states, 'composer composes a score, performer performs score'.[258] Aperghis composed in his style, incorporating voice and embouchure techniques for added colour and I supplied him with audio recordings of my interpretations of this. In this I had artistic input into the compositional side, by using my artistic research to provide him with different examples. Haas's piece, examined in the next section, was created through a similar process. Like Aperghis, Haas followed a fixed aesthetic—in this case quarter-tones—and how to execute them on the contraforte. More importantly, Haas reversed the predictable role of the contraforte by employing it as a melodic instrument in the high register, proving it can have a worthy position in ensemble compositions.

3.3 Georg Friedrich Haas: *Was mir Beethoven erzählt* (2020), Concertante Symphonic Poem for Violin, Contraforte, and Orchestra[259]

Haas had previous experience composing for the contraforte in his ensemble piece *Hyena* (2016) and his speaker and chamber orchestra version of *Das kleine Ich bin Ich* (2016) by the Austrian Mira Lobe.[260] In both compositions, he employs the contraforte actively rather than merely as a reinforcement instrument to sustain long low notes. Inspired by these pieces, I approached Haas, describing my interest in extended techniques and providing him with relevant sound bites. Haas said he preferred exploring

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[258] Juliet Fraser, "The Voice that Calls the Hand to Write: Exploring the Adventure of Agency and Authorship within Collaborative Partnerships" (online paper, Harley Residency, Southampton University, 2019), 6.

[259] The score for Haas's piece can be viewed via the link: https://phaidra.kug.ac.at/o:134695. See Appendix C for all links to scores.

[260] *The little me is me*. English translation by the author.

the aesthetic of ‘microtonal possibilities [rather] than extended playing techniques.’[261] This preference posed a challenge for an instrument not associated with melodic microtonal possibilities. Haas was still uncertain about the specific format for the composition, stating ‘I don't know yet whether it will be a solo work. Maybe something else…’.[262]

In 2019, when a performance of *Hyena* was scheduled in Perm, Russia, I arranged a brief meeting with him to discuss the contraforte’s potential. Our approaches to the meeting differed significantly. Anticipating the common composers’ assumption that all wind instruments can play quarter-tones, I prepared a preliminary sketch of a quarter-tone chart to demonstrate the instrument's range (the definitive one is available on my website) and to allow Haas to hear the tone quality of each quarter-tone. Haas, however, drawing inspiration from Beethoven's music,[263] had already decided to compose a double concerto for violin and contraforte instead of a solo work. He was intrigued by Beethoven's struggle with tinnitus and therefore focused primarily on how I could explore this condition on the contraforte.

For me, playing a sound similar to tinnitus would require a pitch with two elements: a metallic sound coupled with white noise. Considering how that concept applied to the contraforte, I suggested to Haas a harsh, percussive effect for the metallic element and a barely audible sound for the white noise element. This sound lay in the lowest register of the contraforte, where most people find it challenging to define the frequencies. The combination of slap tonguing to produce a metallic sound and a hint of an overblown fundamental could be interpreted as resembling the sound of tinnitus. Haas liked this idea, but our meeting, the only time met to discuss the potential of the contraforte, was too brief to permit further exploration and discussion.

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[261] Georg Friedrich Haas, e-mail message to the author, October 10, 2018.

[262] Ibid.

[263] Haas, e-mail message to the author, March 3, 2019.

The question of whether there was a 'focus on a particular phase of the process, performance preparation or composition phase' in collaboration, was evident in our meeting. [264] Haas was focused on finding a sound that represented tinnitus, whereas I was focused on playing him quarter-tones. After Perm, Haas e-mailed to confirm the fixed date for the first performance of his double concerto and asked me the following specific questions about the contraforte's high register:

> Can you start right away with an extremely high pitch? Notated F5? Maybe even higher? I assume that microtones in this register are not a problem. Is that correct?[265] I would like an unaccompanied duo at the beginning of the work, the violin between the minor g and the minor a, the contraforte a sixth to seventh higher. Are there 'noisy' trills in the low register? [266]

In an e-mail exchange several months later, Haas deviated from his initial opening concept as well as posing new questions:

> The new beginning will be a long-sustained low F sharp on the contraforte.
>
> 1. Is this note 'beautiful' – or does its sound quality suffer from fork fingerings or the like? Would F be better? Or G?
> 2. How long can you sustain this note? Is circular breathing possible here?
> 3. If circular breathing is possible: Is it possible without affecting the pitch? You will be playing the foundation of an overtone chord, so nothing should waver. Of course, I could also compose breathing pauses for you, which would then be filled by the double basses.[267]

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[264] Zubin Kanga, "Inside the Collaborative Process: Realising New Works for Solo Piano" (doctoral thesis, Royal Academy of Music, 2014), 46.

[265] In *Was mir Beethoven Erzählt* only quarter-tones are used in the contraforte part. The violin plays eighth and quarter-tones.

[266] Haas, e-mail message to the author, November 9, 2019. English translation by the author from the following text: 'Jetzt habe ich 2 Fragen an Dich: 1. Kannst Du gleich mit einer extrem hohen Tonhöhe beginnen? Notiertes f'? Eventuell noch höher??? Ich vermute, Mikrotöne in diesem Register sind kein Problem. Stimmt das? - Ich wünsche mir am Anfang des Werks ein unbegleitetes Duo, die Violine zwischen dem kleinen g und dem kleinen a, das Kontraforte eine Sext bis Sept höher. 2. Gibt es 'lärmende' Triller in der extremen Tiefe?'

[267] Ibid.

I sent him a recording of a sustained F#2 lasting twenty-three seconds, without circular breathing, so that Haas could evaluate the sound quality objectively. Two months later he delivered the opening eight minutes of the symphonic poem *Was mir Beethoven erzählt*, together with an explanation of the work's conceptual framework. "The piece is programme music in the tradition of Berlioz. The programme is written into the score ('I write my music', 'overtone chords', etc.) and printed in the programme booklet."[268]

Haas also sought clarification regarding the tempo for playing staccato semiquavers, particularly on C3.[269] This marked the culmination of our collaboration on the piece. *Was mir Beethoven erzählt* is a twenty-eight-minute composition for violin, contraforte, and Haas's written texts. In addition to the classical instrumentation, the orchestral ensemble included the bass clarinet, accordion, and three percussionists.[270] Haas's explanation of the piece, taken from his music publisher's website, provides a conceptual framework for the composition. It offers insights into his perspective on tinnitus, from which he, like Beethoven, suffers. Humanity, too, implied by Haas, will survive the malaise of our day.

> Beethoven's deafness' was not silent. Quite the opposite: he was constantly tortured by loud sounds produced by his auditory system. We can find some of it in his compositions, such as the chains of trills in the *Waldstein Sonata*.
>
> That he was able to create his art considering this is unbelievable. I understand this tinnitus as a symbol of what is happening in the world right now: the gruesome, growing strength of European fascism, the growing inhumanity, the helplessness in the face of change, of the redistribution of wealth from bottom to top, the deliberate dumbing-down of the masses, the mockery of reason, and the killing of solidarity. It is not just the chains of high-frequency trills but vibrations, knocks, and drones – everything will try to fill up Beethoven's fragile art. But Beethoven's work survived his illness and humanity, too, will survive the malaise of our day.

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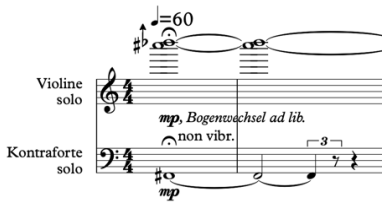
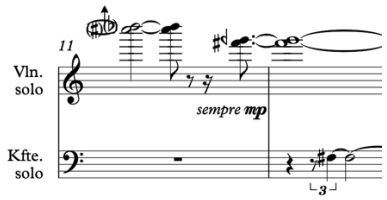
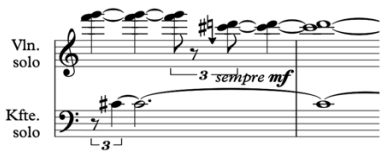
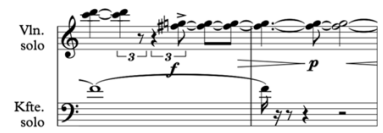
[268] Haas, e-mail message to the author, February 26, 2020. He uses the contraforte playing repeated C3's in the role of a double bass near the end of the piece.

[269] Ibid.

[270] Apart from these three instruments, the orchestra is scored for double woodwind, two french horns, two trumpets, eight first violins, five second violins, five violas, and three double basses.

> Two solo instruments are set against the orchestra: the violin – one of the oldest orchestral instruments – and the contraforte, perhaps one of the youngest, first presented in 2004 as a substantial improvement to the contrabassoon. The two instruments have only a few notes in common–not even an octave. They could not be more opposite. Ultimately, I am concerned not with darkness and despair but with hope and light.[271]

This explanation sheds light on why this composition is a symphonic poem: to send a message of hope to the world through his music. His texts regarding his music and hope are dispersed throughout the score. They serve as thematic guideposts within the musical narrative. In *Was mir Beethoven erzählt*, Haas divides the utilisation of the contraforte and violin into sections: an introduction, five duets, a cadenza, and a conclusion. Haas employs the contraforte in various capacities throughout the composition. Beginning with the opening, I will explain these roles in each section (See Table 3.2).[272]

Bar	**F#1 Fundamental and the Corresponding Overtones**	**Contraforte**	**Violin**
1–12		Fundamental	48th and 49th partials
12–18		2nd partial	32nd and 33rd partials
18–23		3rd partial	24th and 25th partials
23–28		4th partial	16th and 17th partials

[271] Ricordi, "Haas: Was mir Beethoven erzählt," Ricordi, accessed August 3, 2024, https://www.ricordi.com/en-US/News/2021/09/Haas-Was-mir-Beethoven-erzaehlt.aspx.

[272] Copyright by G. Ricordi & Co. Bühnen-und Musikverlag GmbH.

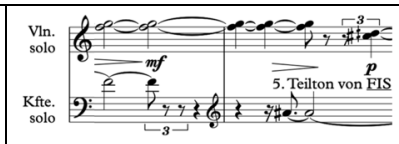
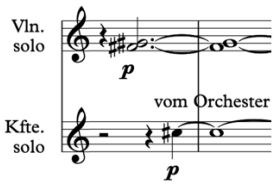
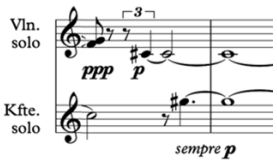
28–34		5th partial	12th and 13th partials
35–41		6th partial	8th and 9th partials
41–43		9th partial	6th partial

Table 3.2: Dowling: an overview of the F#1 fundamental and the corresponding overtones performed by the contraforte and violin.[273]

The overtone series, a characteristic of Haas's music, and his text, 'I write my music', written over the first bar, begin a forty-five-bar introduction. This introduction is based on F#1 fundamental and its partials.[274] The table above outlines the relationship of the sounding F#1 fundamental and its corresponding overtone series between the contraforte and the violin.[275] The sustained first bar illustrates the extreme register difference between the contraforte fundamental F#1 and the violin's 48th and 49th partials. The duration of the contraforte's ascent and of the violin's descent over the overtone row of F# is indicated by the number of bars. Though Haas's orchestration is dense, the partials are audible. The introduction leads to the first microtonal melodic duet a diminished fifth apart (Fig. 3.22).

[273] Audio example: Georg Friedreich Haas, *Was mir Beethoven erzählt*, performers Carolin Widmann, violin, Lorelei Dowling, contraforte, Basel Chamber Orchestra, Sylvain Cambreling, conductor, dress rehearsal, 2021.

[274] 'Ich schreibe meine [musik].' English translation by the author.

[275] On the contraforte a sounding F#1 is a written F#2.

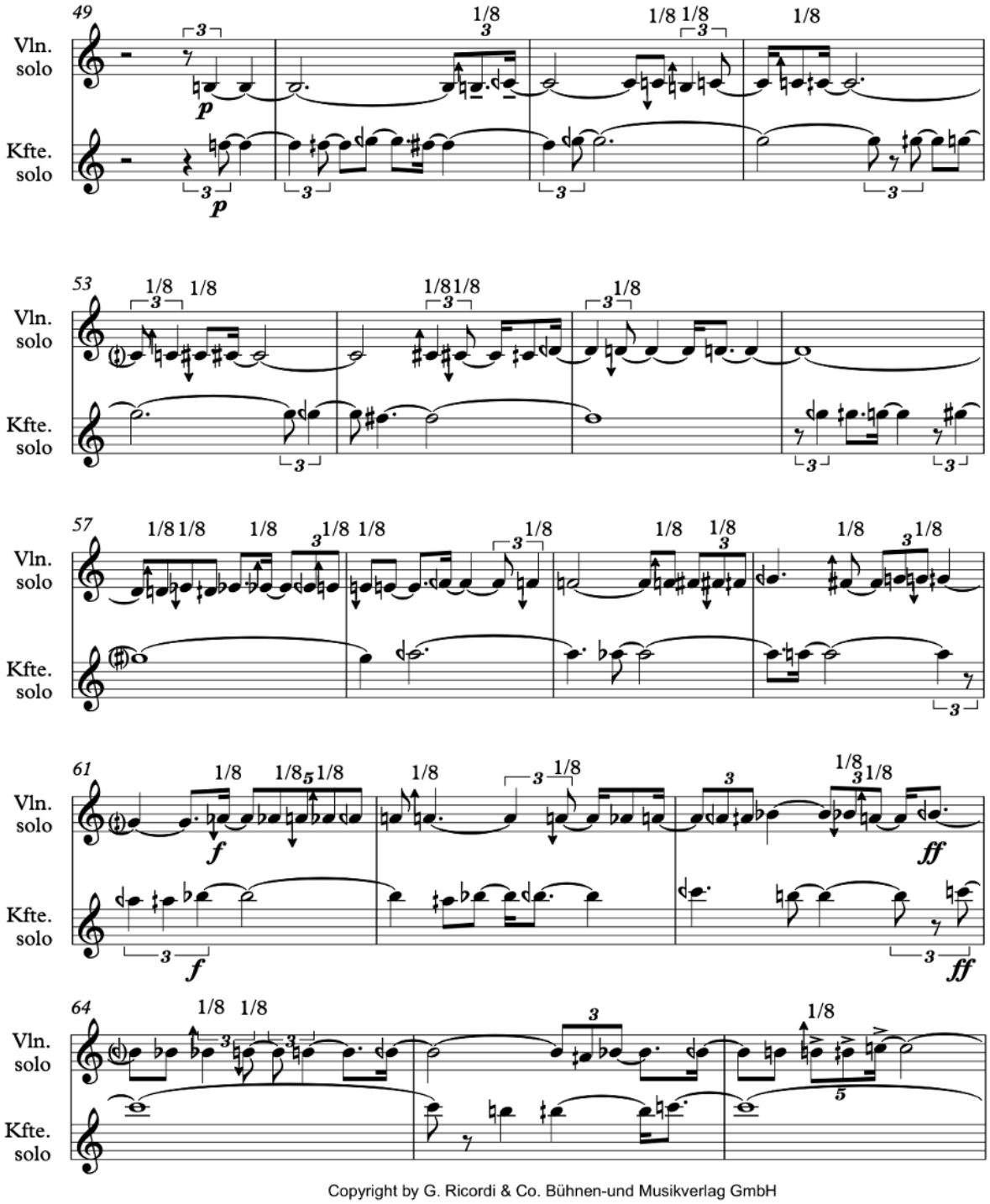


Figure 3.22: Haas, *Was mir Beethoven erzählt*, bb. 49–67: first duet. [276]

[276] Audio example: Georg Friedreich Haas, *Was mir Beethoven erzählt*, performers Carolin Widmann, violin, Lorelei Dowling, contraforte, Basel Chamber Orchestra, Sylvain Cambreling, conductor, dress rehearsal, 2021.

Figure 3.22 illustrates the contraforte's slow quarter-tone steps ascent from F5 to its highest note, C6. The violin's active ascending melody in eighth- and quarter-tones contrasts with this: the melodic line is faster, and the violin begins on a B3, a third above its lowest note. Here the contraforte accompanies the violin. The orchestra is not playing, which allows the two instruments to be audible in their extreme registers. After both instruments reach the C5, Haas introduces a faster-moving melodic micro-tone passage (Fig. 3.23).

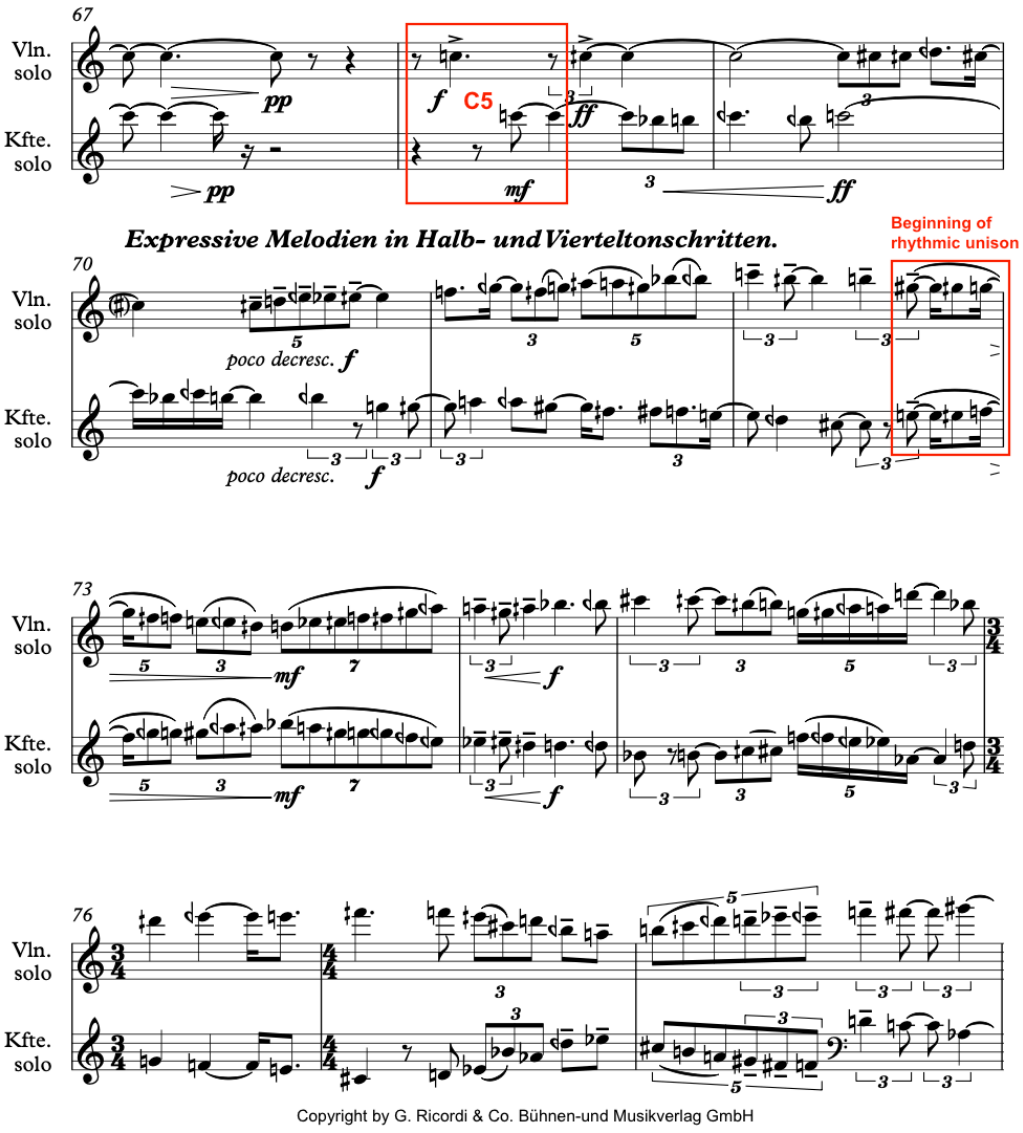


Figure 3.23: Haas, *Was mir Beethoven erzählt*, bb. 67–79: second duet. [277]

[277] Ibid.

This is the most agile passage for contraforte in the piece. The 'expressive melody in semi and quarter-tones,'[278] weaves around C6 on the contraforte. Both instruments ascend and descend in contrary melodic motions. The first three bars of the duet begin with the melodic material alternating between the contraforte and the violin. The two instruments arrive in rhythmic unison at bar 72 and continue until Haas's text, 'I am becoming aware of my tinnitus' introduces the third duet (Fig. 3.24). [279]

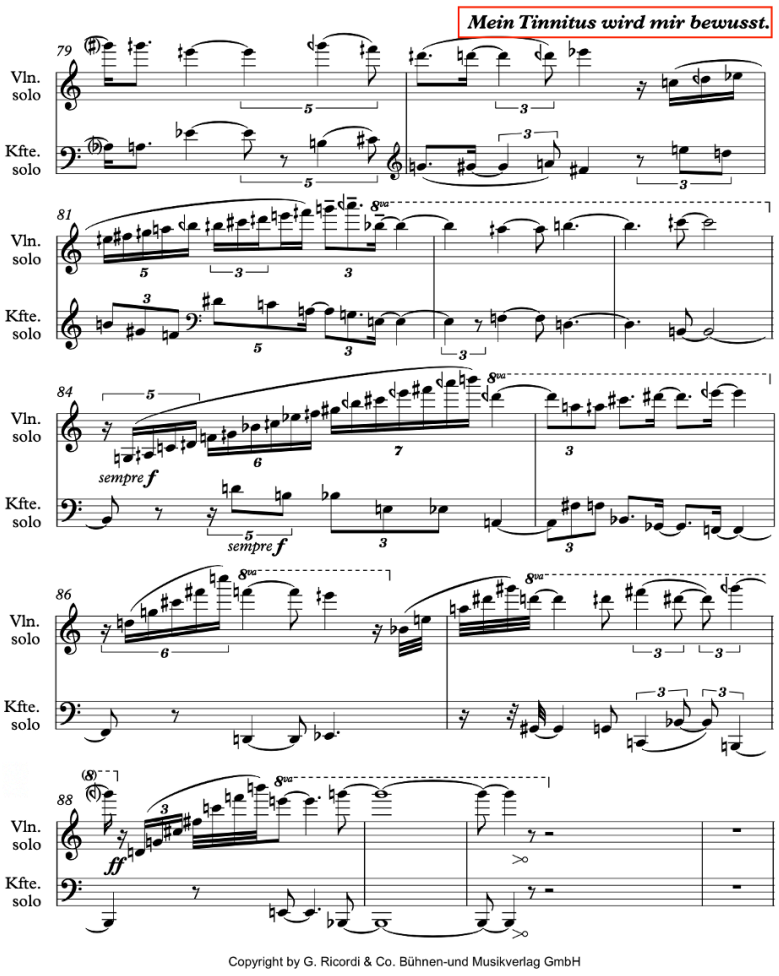


Figure 3.24: Haas, *Was mir Beethoven erzählt*, bb. 79–92: third duet. [280]

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[278] 'Expressive Melodien in Halb–und Vierteltonschritten.' English translation by the author.

[279] 'Mein Tinnitus wird mir bewusst.' English translation by the author.

[280] Audio example: Georg Friedreich Haas, *Was mir Beethoven erzählt*, performers Carolin Widmann, violin, Lorelei Dowling, contraforte, Basel Chamber Orchestra, Sylvain Cambreling, conductor, dress rehearsal, 2021.

In Figure 3.24, the contraforte ends its melodic role and becomes an instrument of chordal support. In contrast, the violin ascends with rapid microtonal motion and remains in the role of soloist. Haas's use of the two instruments' contrasting registers and same dynamic could metaphorically suggest the sound of tinnitus. The orchestra is introduced in the middle of this duet, and the sound of the two instruments diminishes, perhaps suggesting another effect of tinnitus: the inability to hear. After a loud orchestral interlude, a fourth duet begins (Fig. 3.25).

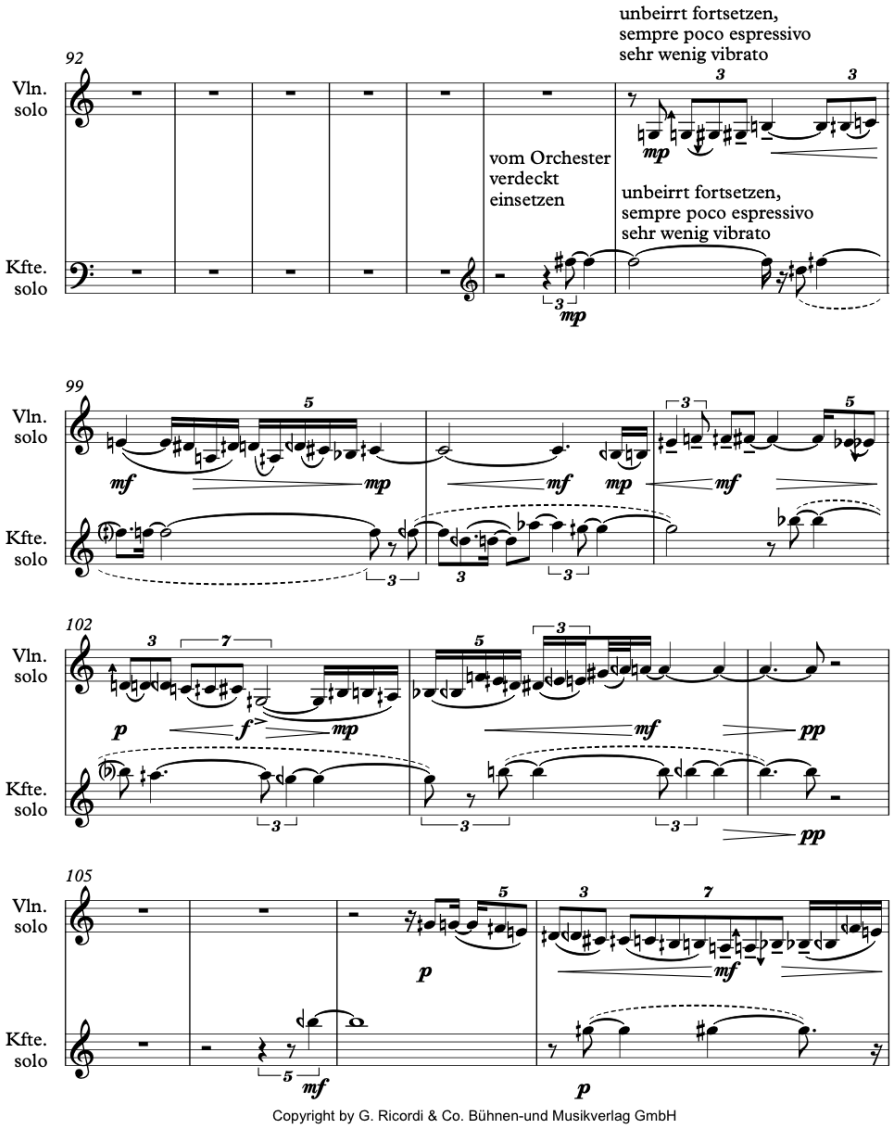

Figure 3.25: Haas, *Was mir Beethoven erzählt*, bb. 92–109: fourth duet.[281]

[281] Ibid.

The violin melody begins on its lowest note (G3) while the contraforte, reminiscent of its first duo appearance, plays in its highest register. Haas initially intended this duet to be at the beginning of *Was mir Beethoven erzählt.* [282] Even with this register distance and both instruments playing the same dynamic, the contraforte and violin are surprisingly balanced.[283] Again, Haas does not use the orchestra. The fifth duet introduces the only extended technique for the contraforte in the piece: multiphonics (Fig. 3.26).

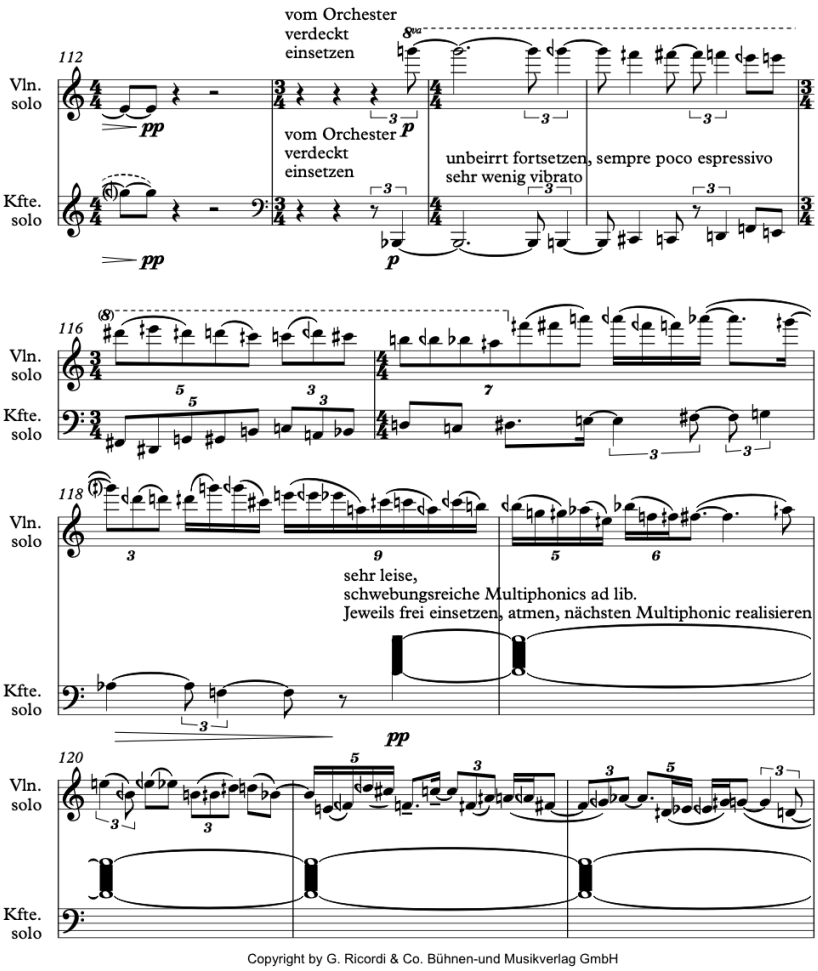

Figure 3.26: Haas, *Was mir Beethoven erzählt*, bb. 112–123: fifth duet.[284]

[282] Haas, e-mail message to the author, November 9, 2019.

[283] This can be heard in the recording.

[284] Audio example: Georg Friedreich Haas, *Was mir Beethoven erzählt*, performers Carolin Widmann, violin, Lorelei Dowling, contraforte, Basel Chamber Orchestra, Sylvain Cambreling, conductor, dress rehearsal, 2021.

In sharp juxtaposition with the fourth duet, Haas commences with registers that align with the expected range of the instruments. While not the lowest note on the contraforte (B♭1), this offers a stark contrast to the violin's G7. Here too, Haas composes a melodic line in contrary motion. This gathers momentum owing to the microtonality in the violin and the increasing complexity of the rhythmic material. For the contraforte, the augmentation of the rhythmic melodic line ends in a cadenza for multiphonics. I chose homogenous multiphonics to accompany the continuing melodic line of the violin. I decided on multiphonics that are based on finger and embouchure compatibility. And as indicated by Haas, I selected multiphonics that I could play softly. At the end of the fifth duet, a sublime moment between the two soloists is heard, correlating with Haas's text: 'Beethoven comes to mind...but thoughts of the impending catastrophes of the 21st century are returning' (Fig. 3.27).[285]

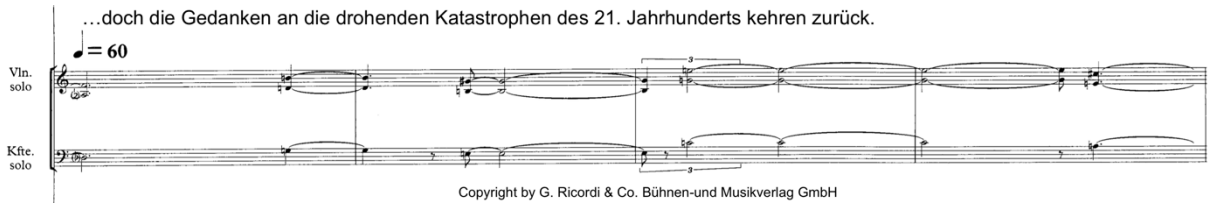

Figure 3.27: Haas, *Was mir Beethoven erzählt*, bb. 138–142: end of the fifth duet bringing a sense of tonal relief.[286]

Tonal relief from microtonality occurs when the two instruments perform in their classical roles. A simple harmonic structure passing through a series of sixths on the violin and the root of the chord is played by the contraforte. This creates a fleeting moment of beauty. Perhaps Haas's text at this point—'thoughts of the impending catastrophes'—implies that beauty is leaving us, hence the moment of harmonic relief. The

[285] '...doch die Gedanken an die drohenden Katastrophendes 21. Jahrhunderts kehren zurück.' English translation by the author.

[286] Audio example: Georg Friedreich Haas, *Was mir Beethoven erzählt*, performers Carolin Widmann, violin, Lorelei Dowling, contraforte, Basel Chamber Orchestra, Sylvain Cambreling, conductor, dress rehearsal, 2021.

only time the contraforte is not playing in a duo constellation is when Haas's text, '...between panic and resignation,' signals the start of separate cadenzas for the two instruments (Fig. 3.28).[287]

[287] '*...zwischen Panik und Resignation'*. English translation by the author.

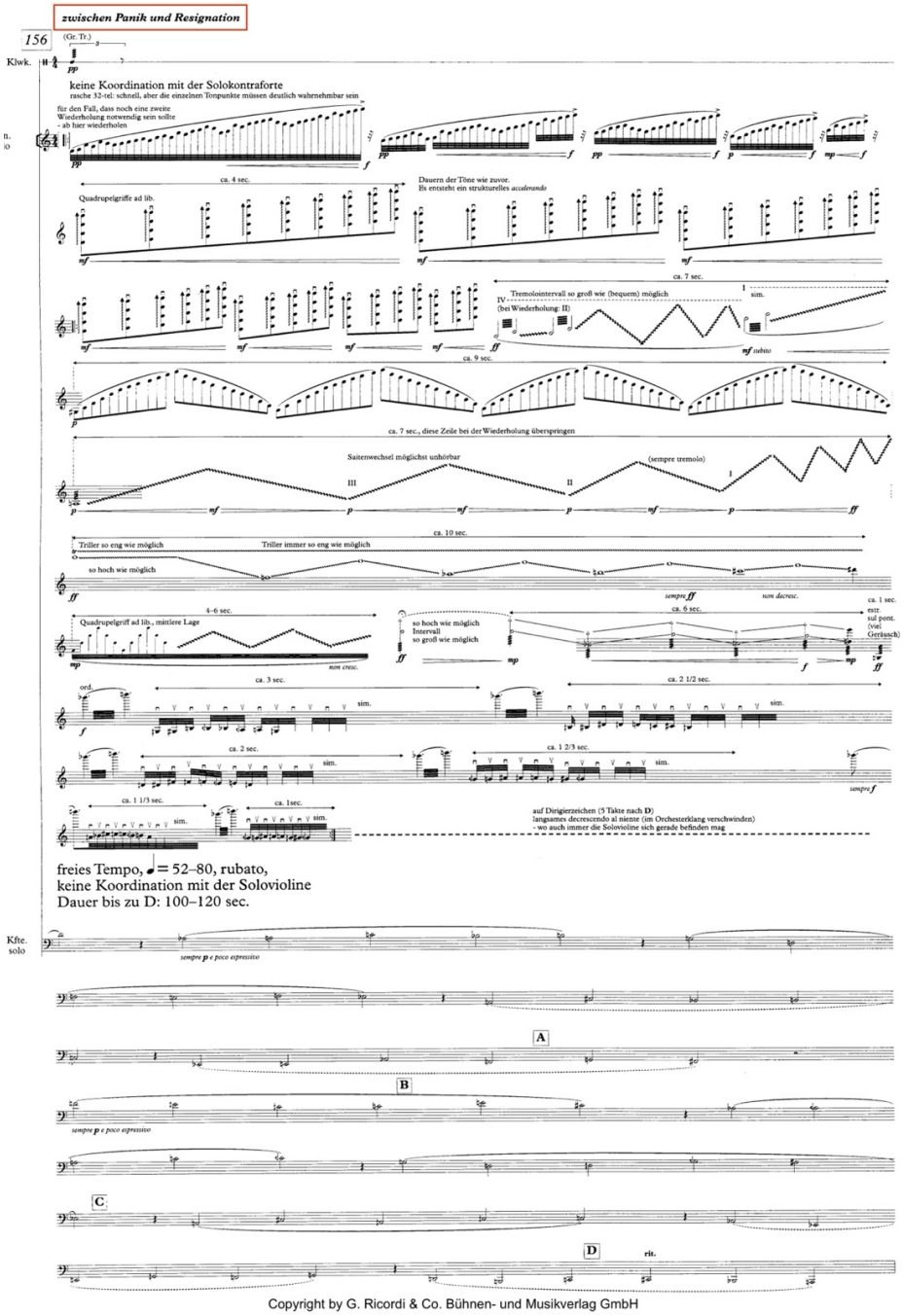

Figure 3.28: Haas, *Was mir Beethoven erzählt*, bb. 156–156a: cadenzas with the text from Haas '…between panic and resignation' signals the start of individual violin (top) and contraforte (bottom) cadenzas.[288]

[288] Audio example: Georg Friedreich Haas, *Was mir Beethoven erzählt*, performers Carolin Widmann, violin, Lorelei Dowling, contraforte, Basel Chamber Orchestra, Sylvain Cambreling, conductor, dress rehearsal, 2021.

In Figure 3.28, the scores for each cadenza reflect Haas's text. The violin score is graphic with complex and detailed notation at a fast tempo, indicating a state of panic. In contrast, the contraforte part is notated, not visually complex, and it is at a slow tempo, implying a state of resignation. The orchestra accompanies the two cadenzas with quotes—tonal and Haas's versions—from the 'Gewitter' movement of Beethoven's Sixth Symphony.[289] The 'panic' and 'resignation' cadenzas are the beginning of the complex end of the piece (See Table 3.3).

FIGURE–BAR	BEETHOVEN QUOTE	INSTRUMENTATION
A–157	Symphony No. 6, op. 68, IV. mvt (♩=160)	Orchestra
D–193	Sonata op. 53, *Waldstein*, I. mvt (♩=176)	Strings, percussion
E–1	Symphony No. 7, op.92, III. mvt (♩⌣♩⌣♩=132)	Orchestra and contraforte, which is playing as an added (fourth) double bass part
G–1	Piano concerto No. 5, I. mvt (♩=138)	Timpani, maracas, accordion
H–1	Sonata *quasi una fantasia*, op. 27/2, III. mvt (♩⌣♩=80)	Timpani, maracas, accordion
I–1a	Romance for Violine and Orchestra, op. 50. (♩≈36)	Solo violin, solo contraforte
I–7	Symphony No. 9, op. 125, II. mvt	Timpani
I–49	Piano concerto, op. 58, from the end of the II. mvt	Six first violins
J–1	Sonata op. 53, *Waldstein*, I. mvt	Four violincellos, three double basses
K–1	Sonata op. 53, *Waldstein*, Finale. (♩=88)	Two oboes, two clarinets, eight first violins, five second violins
KX–1	Sonata op. 109, II. mvt Var. VI.	Solo violin and solo contraforte
K–20	*Grosse Fugue*, opus 130	Woodwind, brass
K–31	Symphony No. 9 op. 125, I. mvt (♩=88)	Strings
L–1	Symphony No. 7 op.92, II. mvt (♩=44)	Solo violin, solo contraforte
M–1	Sonata op. 110, I. mvt (♩≈63)	Accordion
N–1	String quartet, op. 132, beginning (♩⌣♩≈40)	Four violincellos
O–1	Sonata *quasi una fantasia*, op. 27 No.2, I. mvt (♩=44)	Three double basses

[289] The 'Gewitter' or thunderstorm movement is the fourth movement of Beethoven's Sixth Symphony which is also referred to as the *Pastoral* Symphony.

R–1	*Grosse Fugue*, op. 130 (♩≈48)	Two oboes, two bassoons
S–1	*Egmont* Overture, op. 84 (♩≈72)	Two horns, two trumpets
P–1	Sonata *quasi una fantasia*, op. 27/2, III. mvt (♩𝅮♩≈68)	Five violas
Q–1	Sonata, op. 13, *Pathétique*, II. mvt (♩≈40)	Four violincellos
L–33	Symphony No. 7 op.92, II. mvt (♩=60)	Solo violin, solo contraforte
T–1	*Egmont Overture*, op. 84 (♩𝅮♩≈80)	Two flutes, two clarinets, bass clarinet
M–20	Sonata *quasi una fantasia*, op. 27/2, III. mvt (♩𝅮♩≈80)	Accordion
U–1	Sonata, op. 13, *Pathétique*, I. mvt (♩≈30)	Five second violins
V–1	Sonata, op. 110, *Fuga* (♩.≈92)	Five violas
W–1	Sonata, op. 110, *l'inversione della fuga* (♩.≈88)	Five second violins
X–1	Sonata, op. 110, ♩≈60	Eight first violins
Y–1	Sonata, op. 110, *Fuga* ♩.≈76	Two flutes, two clarinets
L–73	Symphony No. 7 op.92, II. mvt (♩=76)	Solo violin, solo contraforte
Z–1	Sonata op.81a, beginning, (♩𝅮♩≈112)	Timpani, xylophone, vibraphone
AA–1	Sonata, op. 110, *Fuga* (♩.≈72)	Two oboes, two bassoons
BB–1	Sonata op.81a, beginning (♩≈36)	Two horns, two trumpets
L–85	Symphony No. 7 op.92, II. mvt (♩=82)	Solo violin, solo contraforte
CC–1	Sonata, op. 13, *Pathétique*, I. mvt (♩≈30)	Five first violins
L–97	Symphony No. 7 op.92, II. mvt (♩=88)	Solo violin, solo contraforte
DD–1	Violin concerto, op.61, I. mvt (♩≈120)	Three double basses
EE–1	Sonata op.81a, beginning, (♩≈36)	Two horns, two trumpets
FF–1	Symphony No. 6, op. 68, I. mvt (♩𝅮♩≈66)	Eight first violins
L–120	Fidelio, I & II, (♩=120)	Solo violin, solo contraforte
GG–1	Symphony No. 6, op. 68, V. mvt (♩.≈60)	Two horns, two trumpets
II–1	Piano concerto No. 5, I. mvt (♩=114)	Timpani, xylophone, vibraphone
HH–1	Symphony No. 6, op. 68, I. mvt (♩𝅮♩≈63, slower than FF–1)	Five second violins
L–125	Symphony No. 7 op.92, II. mvt (♩=76)	Solo violin, solo contraforte
JJ–1	Piano concerto No. 5, I. mvt (♩=108, slower than II–1)	Two flutes, two clarinets
KK–1	Sonata op. 109, I. mvt, Var. VI (♩=66)	Two oboes, two bassoons
L–134	Fidelio, I & II, (♩=120)	Solo violin, solo contraforte

LL–1	Piano concerto No. 5, I. mvt (♩=114)	Eight first violins
NN–1	Symphony No. 8, op. 93, I. mvt (♩≈176)	Three double basses.
MM–1	Sonata, op. 28, I. mvt (♩≈30)	Timpani, xylophone, vibraphone
L–139	Symphony No. 7 op.92, II. mvt (♩=76)	Solo violin, solo contraforte
OO–1	Sonata, op. 28, I. mvt (♩𝅝♩𝅝♩≈68)	Five violincellos
L–147	Fidelio, I & II (♩=120)	Solo violin, solo contraforte
L–149	Symphony No. 7 op.92, II. mvt (♩=68)	Solo violin, solo contraforte
L–154	Fidelio, I & II (♩=120)	Solo violin, solo contraforte
L–157	Symphony No. 7 op.92, II. mvt (♩=60)	Solo violin, solo contraforte
PP–1	Sonata, op. 28, I. mvt (♩≈144)	Second violins (5)
L–162	Fidelio, I & II (♩=120)	Solo violin, solo contraforte
L–165	Symphony No. 7 op.92, II. mvt (♩=60)	Solo violin, solo contraforte
L–168	Fidelio, I & II (♩=120)	Solo violin, solo contraforte

Table 3.3: Dowling: the complex ending illustrating Haas's use of musical quotes from Beethoven.

The three columns in Table 3.3 display the letter and bar of the start of the musical quote, Beethoven's quote, and the instrumentation. The texts in red are the quotes played by the violin and the contraforte. Observing the detail in the table, one can hear the cacophony generated by the overlapping quotes, which is Haas's interpretation of the suffering Beethoven endured from tinnitus. It was difficult to organise the playing of this part. While the conductor gave the occasional entrance and a few endings, the composer expected that the chamber music constellations, upon hearing each other's quote, would start or end their sections accordingly. Haas's use of the contraforte at E–1 in the table should be noted. Here, Haas utilises the contraforte as a fourth double bass to play repeated B♭2's. Interestingly, it was not uncommon—though not indicated—that Beethoven used the contrabassoon to support the double bass section in his Third, Fifth, Sixth, Seventh, Eighth, and Ninth Symphonies. In his thesis, "Beethoven's Double Bass Parts: The Viennese Violone and the Problem of Lower Compass", Buckley hypothesises that there is evidence of this from the written double bass parts: 'Some of Beethoven's bass parts between op. 55 and op.125 do in fact descend to C (sounding C1), yet there is no evidence supporting the existence of a double bass instrument capable of C1 in Beethoven's day.' Buckley further suggests this could be

because there was 'the unwritten practice of reinforcing the double bass with one or more contrabassoons. The contrabassoon in Beethoven's day had a lower compass of C1, and Vienna was an early centre of its production and use.' [290]

Another reference point in the table is L–1. Here the contraforte and violin commence what Haas indicates to be a 'barely audible' rendition of the second movement of Beethoven's Seventh Symphony (Fig. 3.29).[291]

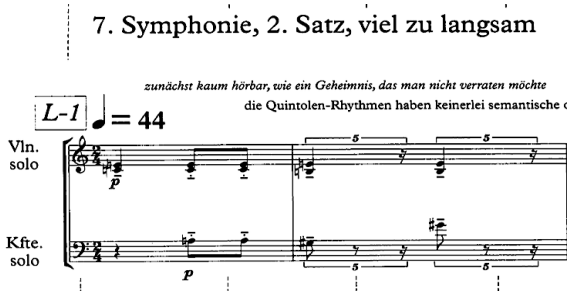

Figure 3.29: Haas, *Was mir Beethoven erzählt*, L–1.[292]

It was a challenge to execute this theme within the chaos of loud Beethoven quotes. The violin and the contraforte play this quote ten times, each time at a different tempo, as indicated in the table. I moved from a seated position in front of the conductor to a standing position beside the violinist. Given the independent nature of the tempi of the second movement of Beethoven's Seventh Symphony, I created a click track to help me learn Haas's tempi changes. As an independent duo voice, we also had to co-ordinate our accelerating tempo with the other quotes. The trumpets and horns' loud entrance of the Sixth Symphony at GG–1 contributed significantly to the difficulty of this task. Intertwined into the second movement of the Seventh Symphony of Beethoven played by the violin and contraforte is a repeated excerpt from *Fidelio* beginning at L–120. Here Haas uses the contraforte as the main soloist, imitating the words of

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[290] Stephen George Buckley, "Beethoven's Double Bass Parts: The Viennese Violone and the Problem of Lower Compass" (doctoral thesis, Rice University, 2013), 2–3.

[291] '*…kaum hörbar…*' English translation by the author.

[292] Audio example: Georg Friedreich Haas, *Was mir Beethoven erzählt*, performers Carolin Widmann, violin, Lorelei Dowling, contraforte, Basel Chamber Orchestra, Sylvain Cambreling, conductor, dress rehearsal, 2021.

Florestan sung in the 'Dungeon' Aria 'to freedom, to freedom, to the heavenly kingdom'[293] (Fig. 3.30).

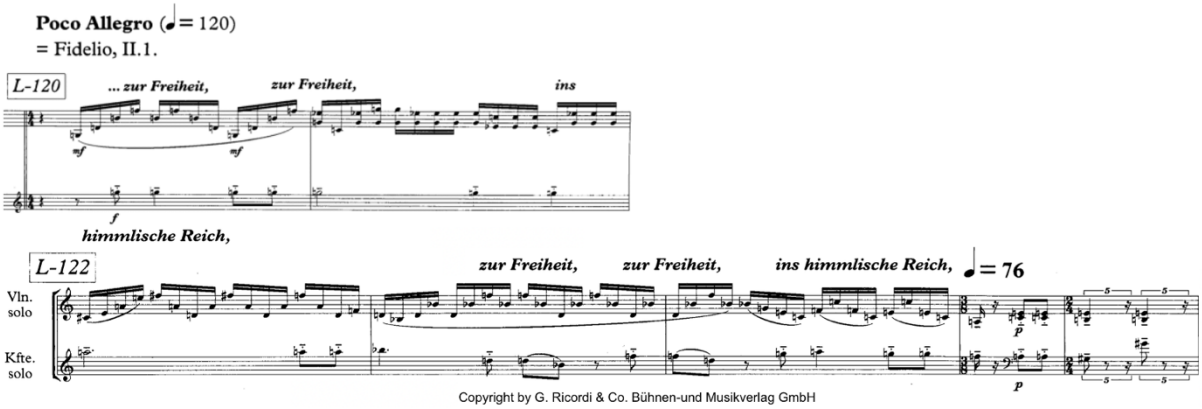

Figure 3.30: Haas, *Was mir Beethoven erzählt*, bb. L–120–127: *Fidelio* quote.[294]

The rhythm of the contraforte mirrors the text and, as Haas informed me, indicates the triumphant spirit in which I should play the *Fidelio* excerpt. Haas uses this quote five times, with the same tempo (See Table 3.3). As Beethoven's other quotes diminish and stop, the contraforte and violin are left playing this excerpt intermittently. Perhaps this reflects Haas's idea of hope in a world that is suffering? One short word—'Freedom'—with a musical excerpt brings *Was mir Beethoven erzählt* to an end (Fig. 3.31).[295]

[293] ' zur Freiheit, zur Freiheit, ins himmlische Reich…' English translation by the author.

[294] Audio example: Georg Friedreich Haas, *Was mir Beethoven erzählt*, performers Carolin Widmann, violin, Lorelei Dowling, contraforte, Basel Chamber Orchestra, Sylvain Cambreling, conductor, dress rehearsal, 2021.

[295] 'Freiheit…' English translation by the author.

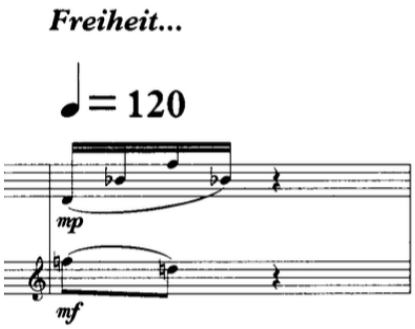

Figure 3.31: Haas, *Was mir Beethoven erzählt*, bb. L169–170: Haas's text 'Freedom' imitated by the contraforte ends the piece.[296]

Haas also composed a short piece for contraforte and violin to play as an encore. Akin to the concertante, the violin line is complex, but the contraforte part is not. The contemporary techniques used here for contraforte are not quarter-tones but multiphonics and circular breathing. Haas may view circular breathing performed by woodwinds as requiring virtuosity: in his trio, *catch as catch can* (2018) for clarinet, violoncello and piano, the clarinet part focuses on circular breathing on one tone while the cello and piano play relentless semiquavers. The piano and violoncello parts sound virtuosic compared to the clarinet. On the contraforte, it is difficult to circular breathe due to the resistance on specific notes. In *Was mir Beethoven erzählt*, Haas's desire for circular breathing on C#5, as stipulated in the part, does not work. The standard fingering requires two flageolet keys to be open; therefore, using circular breathing would result in a wavering note. For the contraforte, the virtuosity of Haas's *Was mir Beethoven erzählt* lies less in the application of circular breathing than in the pitching of quarter-tones to provide a seemingly effortless melodic line. I had the opportunity to play the piece four times, and this resulted in revision and improvement of the fingerings as I continuously searched for a timbre and dynamic that comported with the violin sound.

Although the makers of the contraforte praise the contraforte for having an extensive dynamic range and '…large tone holes for a free response and a large dynamic

[296] Audio example: Georg Friedreich Haas, *Was mir Beethoven erzählt*, performers Carolin Widmann, violin, Lorelei Dowling, contraforte, Basel Chamber Orchestra, Sylvain Cambreling, conductor, dress rehearsal, 2021.

range,'[297] in the high register, an orchestra can overpower the instrument, just as it can the lowest register of the violin. Haas cleverly composed unaccompanied duets without fully knowing how the two instruments would sound together. His idea for the two instruments, as illustrated by the examples, is a contrast of registers and parallel melodies: the violin is in its lowest register playing fast eighth and quarter tones, whilst the contraforte in the extreme register is playing long, pure operatic-like quarter-tone phrases. One can hear on the recording how the two individual voices of the contraforte and the violin surprisingly complimented each other. Without having heard the two instruments play together before the first rehearsal, Haas could not have predicted this would work. Yet his comments contrasting the contraforte with the contrabassoon demonstrate his conviction about the instrument's potential:

> A better contrabassoon with a wider dynamic range, better high register, and precise intonation. I am sure that the contrabassoon will be replaced by the contraforte in orchestra music within the next few decades. I always ask for contraforte instead of contrabassoon and sometimes my wishes are fulfilled.[298]

Roche's 'Dialogue and collaboration in the creation of new works for clarinet' highlights two qualities of a good collaboration: trust and respect.[299] Even though we had only a few exchanges, the meeting and e-mails I exchanged with Haas had those qualities: 'What pleases me the most is no protest from your side against the madness that I put the instrument (and thus you) through. That all this works borders on a miracle for me.'[300]

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[297] Benedikt Eppelsheim, "Kontraforte" Eppelsheim, accessed August 3, 2019, http://www.eppelsheim.com/instrumente/kontraforte. '…große Tonlöcher für freie Ansprache und einen großen Dynamikbereich.' English translation by the author.

[298] Haas, e-mail message to the author, January 22, 2024.

[299] Roche, "Dialogue and Collaboration in the Creation of New Works for Clarinet" (doctoral thesis, University of Huddersfield, 2011), 85.

[300] Haas, e-mail message to the author, September 3, 2021. 'Was mich am meisten freut: Kein Protest Deiner Seite gegen den Wahnsinn, den ich dem Instrument (und damit Dir...) zugemutet habe. Dass das alles geht, grenzt für mich an ein Wunder.' English translation by the author.

In contrast to the brief working time with Haas, which centred on his aesthetic preferences for the overtone series and quarter-tone melodies, my subsequent collaboration with Posadas explored various aspects of extended techniques. This prompted new avenues in artistic exploration which broadened my knowledge of the contraforte.

3.4 Alberto Posadas: *Ga* (2021)[301]

Posadas's interest in the contraforte was first piqued by a lecture I presented at the Centro Superior Katarina Gurska Madrid.[302] This led to our collaboration on the contraforte part for the third movement, 'Umbrales evanescentes', of his ensemble piece, *Poética del Espacio* (2018–19), which already focused on tremolo, overblowing, and multiphonics. As 'Umbrales evanescentes' implemented an active contraforte part, I anticipated Posadas would advance my research further when composing a solo for the instrument. Shortly before commencing our work together, I had been reading the practice-based research of Redgate and Gorton, which documents 'controlled accidents'.[303] I was curious whether Posadas, as a co-author for a new saxophone technique book,[304] chose techniques resulting from such controlled accidents, which would be a departure from the contemporary techniques in the Bärenreiter book, *The Techniques of Saxophone Playing*.[305] Posadas confirmed in an e-mail exchange that 'errors'

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[301] The score for Posadas's piece can be viewed via the link: https://phaidra.kug.ac.at/o:134689. See Appendix C for all links to scores.

[302] Centro superior KATARINA GURSKA was founded in 1985 by Katarina Gurska and is a privately funded institution for musical education.

[303] Christopher Redgate and David Gorton, "Austerity Measures and Rich Rewards" in *Artistic Practices, Experimental encounters in music and beyond*, ed. Kathleen Coessens (Leuven: University Press, 2017), 64.

[304] Ricard Capellino and Alberto Posadas, *New perspectives on the saxophone. From sonic exploration to composition* (Valencia: Edició de Música, 2018).

[305] Giorgio Netti and Marcus Weiss, *The Techniques of Saxophone Playing* (Kassel: Bärenreiter, 2010).

and ‘accidents’ were the starting point for in-depth research of new possibilities on the saxophone.[306] He further suggested ‘some [of these] research categories should be tried on the contraforte in the hope of opening new lines [paths].’[307] Our collaboration process differed from that of the other composers for this research. Posadas took far more time to explore the instrument systematically before composing due to his desire to understand the contraforte thoroughly.

Based on his investigation of the saxophone and the ethereal sound bite I sent him, Posadas set up ten categories to be researched, which he called ‘chapters’.[308] Each chapter reflects his distinct sonic preferences. As a performer, I discovered that his meticulously structured chapters revealed many minute details that I had not touched upon documenting and categorising the effects of the contraforte. To compose his solo piece, Posadas suggested investigating the dissemination of sounds in the following way:

> Chapter one: ethereal sounds
>
> Chapter two: overblowing
>
> Chapter three: overblowing linked—with legato—to multiphonics
>
> Chapter four: bichromatic tremoli
>
> Chapter five: tremolo between a monophonic note and a dense multiphonic
>
> Chapter six: multiphonics category A beating and slow oscillations
>
> Chapter seven: soft multiphonics/dyads or close to
>
> Chapter eight: multiphonics with a full sound that speak immediately and have a connection to a single note
>
> Chapter nine: underblowing

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[306] Alberto Posadas, e-mail message to the author, February 9, 2019.

[307] Ibid.

[308] The ten research topics, referred to as chapters by Posadas, are attached in Appendix D.

Chapter ten: fast bisbigliandi and velvet notes. The transition from barely audible to a concrete sound.[309]

Before embarking on our exploration, we had a Zoom conference for over an hour, during which Posadas elucidated the methodology of his chapters. Starting with chapter one —ethereal sounds—I will discuss the structure of the practice-led research, focusing on the chapters where these techniques manifest in his solo piece *Ga* (Fig. 3.32). [310]

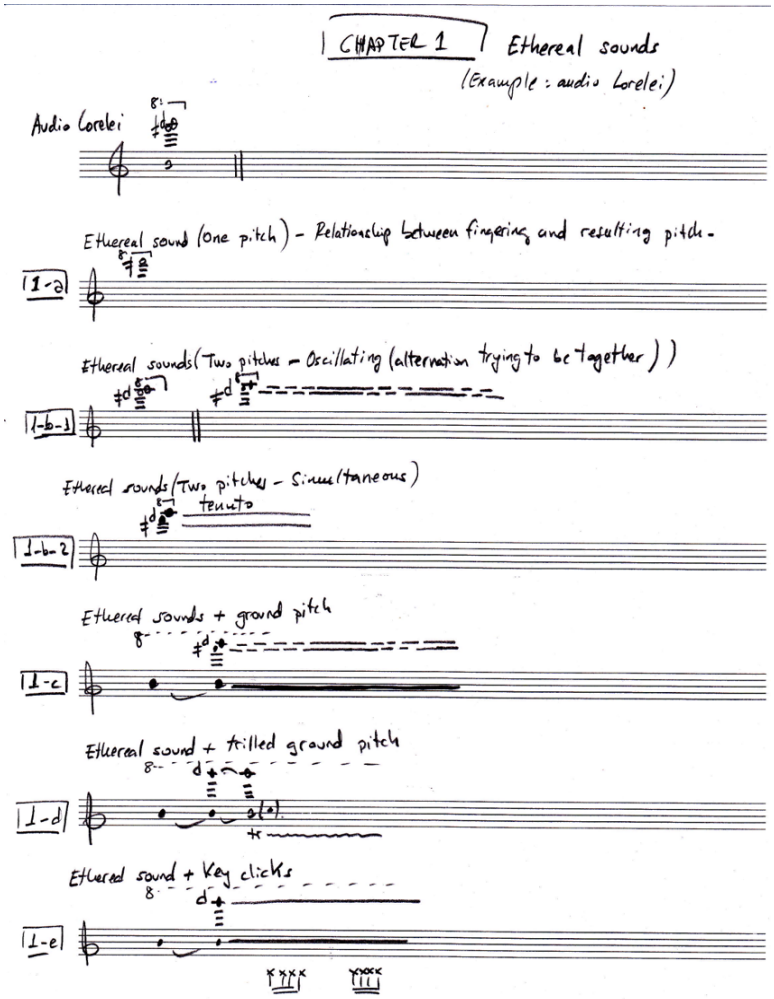

Figure 3.32: Posadas: chapter one.

[310] Alberto Posadas, interview by Lorelei Dowling, June 23, 2020, transcribed interview, Appendix D. All future references to this interview provide a timecode, so the reader can easily orient themselves within the interview.

Posadas found this sound particularly interesting because it was unrecognisable as an effect played by a bass woodwind instrument.[311] He commented that the whistle tone starts differently each time. He provided an analysis of what he heard from the sound bite (See Figure 3.32):

> 1a What is the relationship between the fingering and the monophonic resulting note?
>
> 1b1 the same two pitches oscillate but alternate in presence
>
> 1b2 two pitches oscillate simultaneously together, both as loud as each other
>
> 1c the ethereal sound with a middle range ground note, consistently a B4↓
>
> 1d the ethereal sound with the middle range ground note trilled
>
> 1e the ethereal sound with the middle range ground note and key clicks

I recorded each segment and sent them to him after which he returned a sheet with more questions (Fig. 3.33).

[311] Ibid., 02:48.

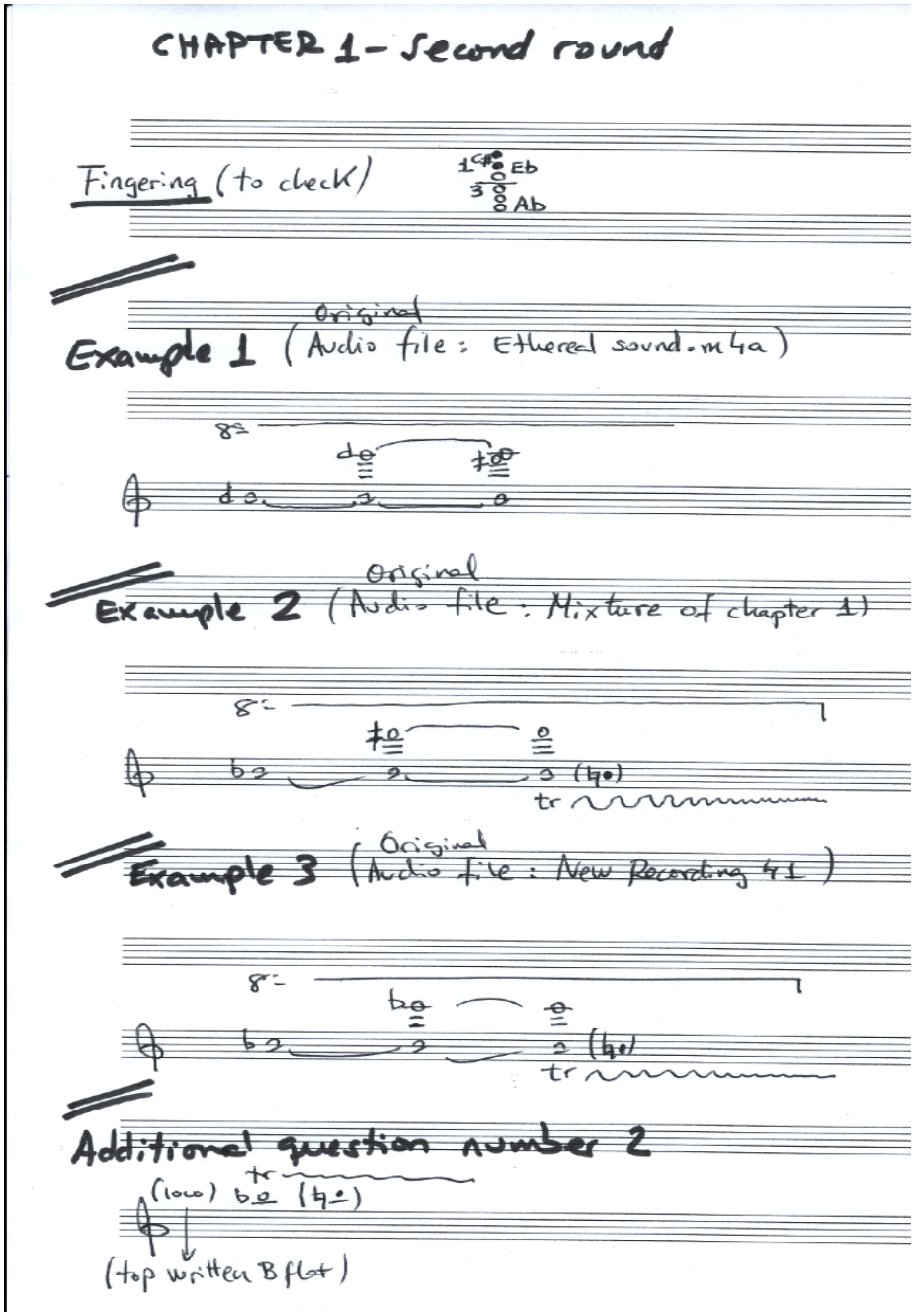

Figure 3. 33: Posadas: additional questions for chapter one.

We also discussed the type of reed used to play the whistle tones. The result—even after intense analysis of this technique—is the example I originally recorded. In *Ga* he uses the whistle tones four times in two different ways: as a single note with a bisbigliandi on a B4↓ (1.) and an oscillating frequency above a B4↓ (2.) (Fig. 3.34).

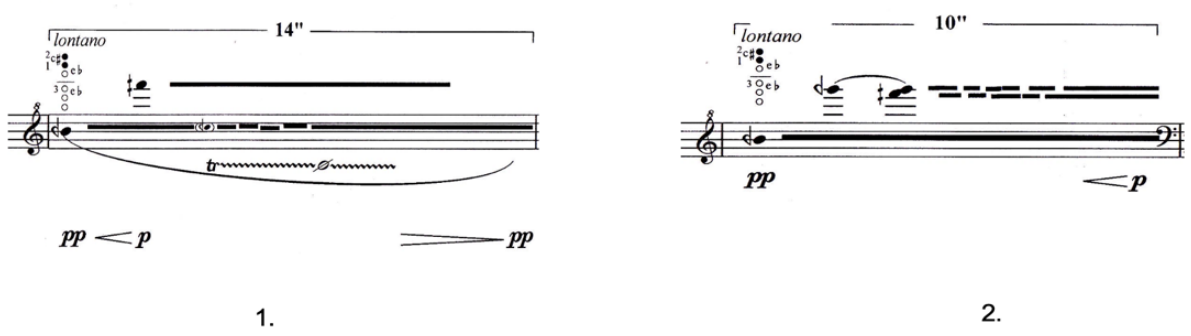

Figure 3.34: Posadas, *Ga*, bb. 105–106 (1.) and bb. 63–64 (2.).[312]

In chapters two and three Posadas investigates overblowing.[313] Referring to the outcome of overblowing as an open or full spectrum rather than a multiphonic reinforced my belief that the result of overblowing cannot rightly be called a multiphonic. These chapters on overblowing focus on the A1–G#2 range. Posadas notes that his suggested research range is theoretically significant since it spans an octave, even though the ascending spectrum is weaker in the range above F2 to G#2. This offers valuable insights for composers.[314] Chapter two focuses on six ways of exploring the overblown spectrum (Fig. 3.35).

[312] Audio examples: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

[313] Alberto Posadas transcribed interview, Appendix D, 25:30.

[314] Ibid., 37:33.

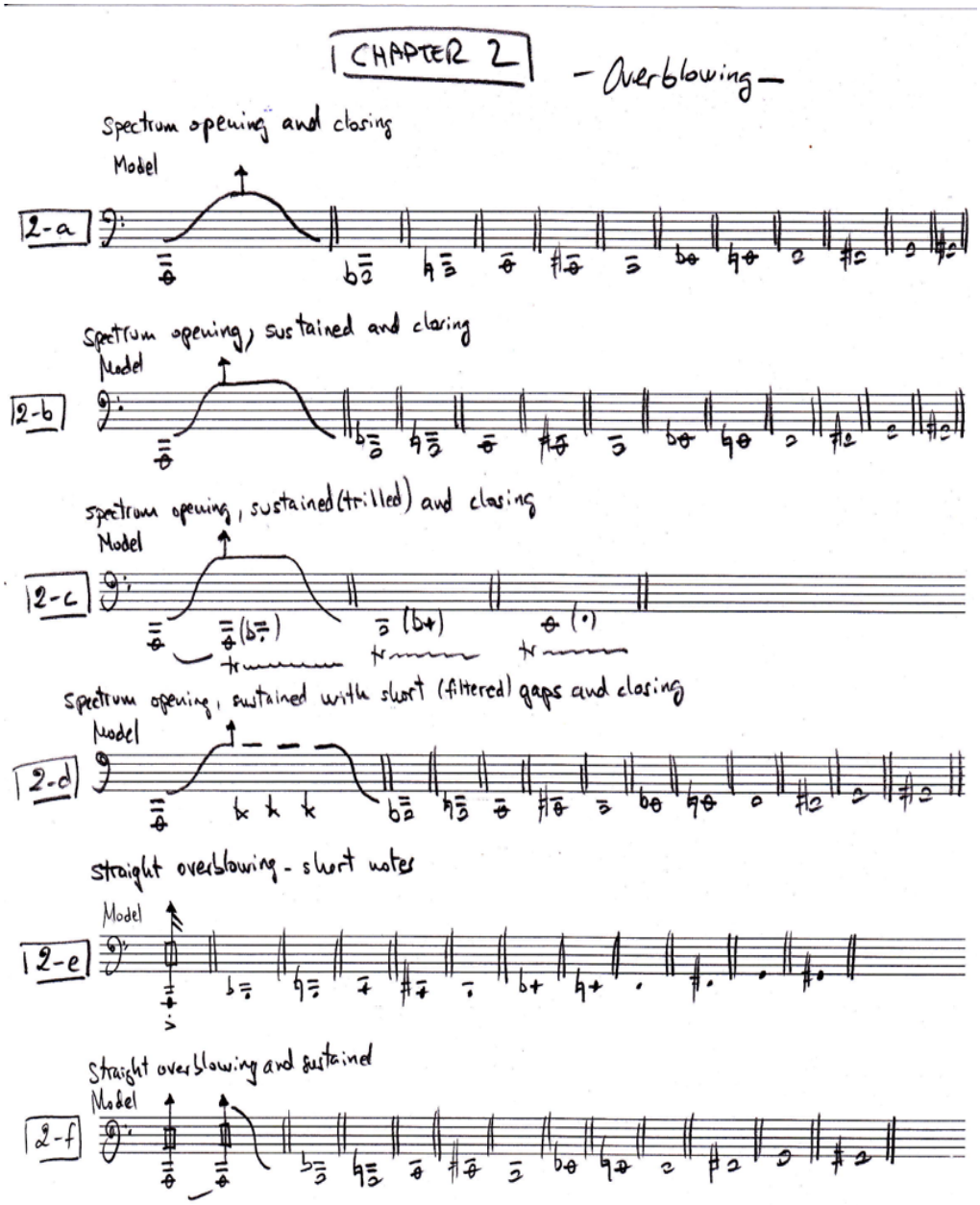

Figure 3.35: Posadas: chapter two.

The first three graphical examples for investigation are self-explanatory. The first technique, 2a, involves a gradual increase and decrease of the spectrum. The second technique, 2b, sustains a full range overblown fundamental. The third technique, 2c, involves trilling between overblown notes. The fourth technique, however, required a demonstration. Posadas explained that to achieve 2d, 'you build up the spectrum and

play a sort of grace note opening an intermittent hole [key] and then the spectrum is broken.'[315]

We then spoke about reversing the behaviour of the dynamic when overblowing. Posadas observed a consistent dynamic pattern in his *Poética del Espacio* (2018–19), where he employs overblowing on two double reed instruments: the heckelphone and the contraforte. Each time the spectrum increased, there is a natural crescendo. In contrast, a diminuendo resulted when the spectrum was reduced to the fundamental note. For Posadas, this consistent behaviour raised the question whether it's feasible to execute the inverse dynamic gesture: could one play the bottom note of the contraforte, starting loud *and* then diminuendo when overblowing? He assured me that this works on clarinet and saxophone, but he was unsure whether it would on a double reed instrument.[316] This raised the question for both of us about the exceptions of an effect between instruments. I tried beginning the note loudly, playing at the tip of the reed then moving my embouchure to the back of the reed while maintaining lip pressure and diminuendo Ing. Unfortunately, it did not work, leading to the conclusion that overblowing on the contraforte can only work with increased air pressure for the harmonic layering to sound.

The third chapter focuses on overblowing to a multiphonic using a legato connection. Here Posadas emphasises the use of the same embouchure to connect the two worlds. I had been exploring the activation of a multiphonic on an overblown C1 fundamental—which also yields a rich spectrum—by slightly releasing the finger pressure on the G key. I asked him whether this might be a concept to explore on the contraforte to connect overblowing and a multiphonic. We explored overblowing with a legato connection to an embouchure-compatible multiphonic using my method as well as multiphonics that had a finger relationship to the overblown fundamental. Posadas did not put this idea to use in his piece. Despite this, our collaborative investigation into expanding the technique of overblowing led us to develop four approaches, each with variations, which he later presented in his solo piece for contraforte as illustrated below.

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[315] Ibid., 30:25.

[316] Ibid., 36:33.

1. Overblowing a fundamental to a full spectrum, then reducing the harmonic layering and ending on a different fundamental. A dynamic for this is included in *Ga* but it is indicative of the natural behaviour of an overblown fundamental (Fig. 3.36).

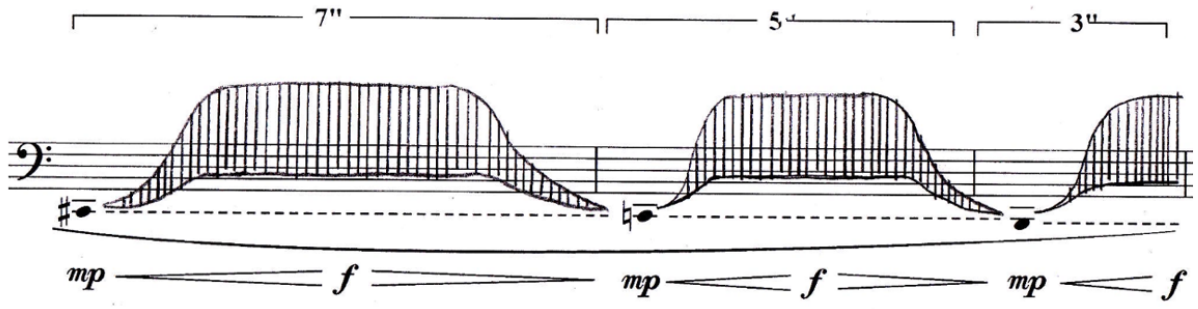

Figure 3.36: Posadas, *Ga*, bb. 1–4: examples of overblowing a fundamental.[317]

2. Overblowing a bottom fundamental and isolating a solid monophonic note at the peak of a full spectrum range. Posadas uses this idea in two ways: reaching the peak of the spectrum before returning to the fundamental and then at the peak of the spectrum without returning to the fundamental. This idea is employed on fundamentals that produce intense (**2** C2 and **3** A1)[318] and weak (1 G2 and 4 G2) spectral ranges (Fig. 3.37).[319]

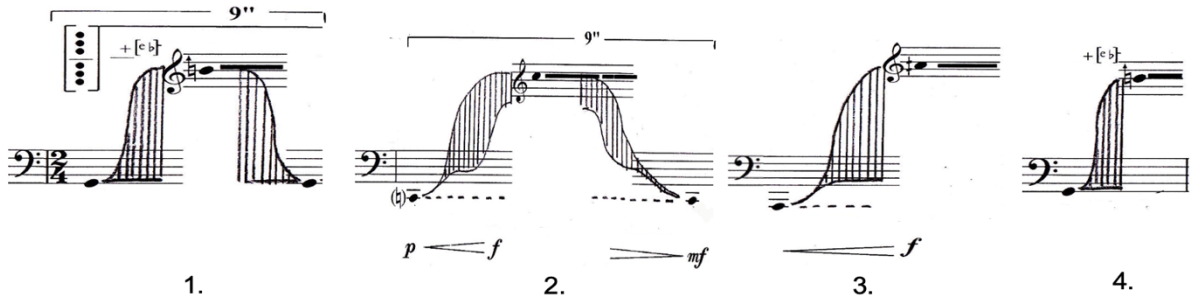

Figure 3.37: Posadas, *Ga*, bb. 49–50 (1.), bb. 13–14, (2.), bb. 23–24 (3.) and bb. 49–50 (4.): two variations on overblowing to a full spectrum and isolating a pitch.

[317] Audio example: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

[318] Ibid.

[319] Ibid.

3. Overblowing the fundamental notes G2 and G#2, not rich in harmonic overtones, to their full spectrum. These were executed within a strict tempo (♩ = 60) (Fig. 3.38).

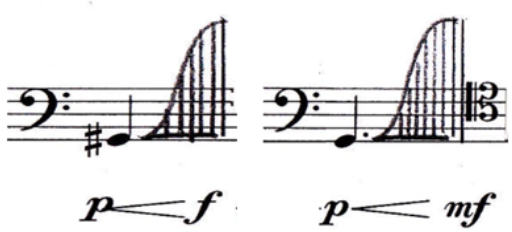

Figure 3. 38: Posadas, *Ga*, bb. 33–34 and bb. 35–36: overblowing G#2 and G2.[320]

4. Overblowing with harmonic trilling in the middle and end of the spectrum, and after consecutive overblown fundamental notes (Fig. 3.39).

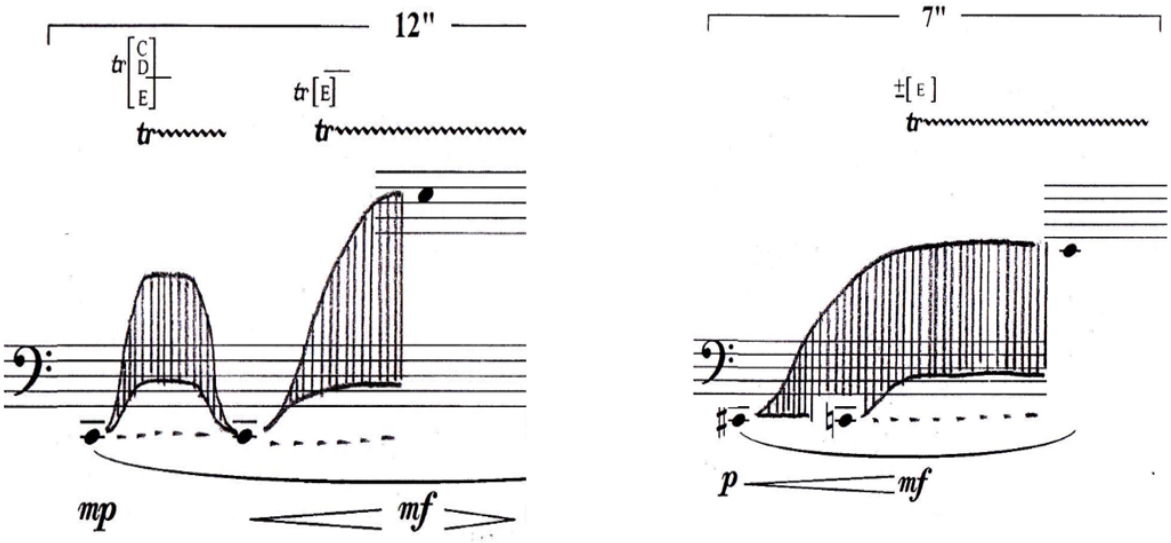

Figure 3. 39: Posadas, *Ga*, bb. 53–54 and bb. 92–93: overblowing with harmonic trilling.[321]

[320] Ibid.

[321] Ibid.

The results from chapter four—bichromatic tremolo—were not used in *Ga*. The sonic perception Posadas desired, which he demonstrated on the clarinet in our Zoom meeting, was not what the contraforte produced.[322] However, I later investigated further into this technique on the contraforte when exploring tremoli.[323]

Chapter five—tremolo between a single note and a multiphonic—revisits an effect we had already explored for *Poética del Espacio* (2018–19). Posadas employs one tremolo gesture in *Ga*, reminiscent of a Billone-type tremolo (Fig. 3.40).[324]

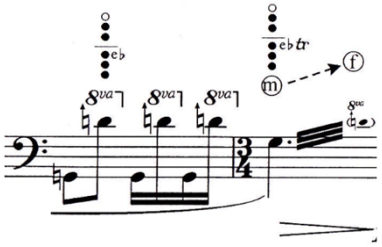

Figure 3.40: Posadas, *Ga*, bb. 34–36: tremolo using a non-standard fingering.[325]

Like Posadas's detailed examination of overblowing, his investigation into multiphonics was also extensive and broken into three distinct chapters. However, most of the multiphonic material for *Ga* comes from chapter six, which concentrates on multiphonics with two tones that beat together. The chapter is in two parts (Fig. 3.41).

[322] Alberto Posadas, e-mail message to the author, August 8, 2020. On the clarinet, a bichromatic tremoli is a slight deviation from a normal sound and produced easily. Alberto Posadas, transcribed interview, Appendix D, 42:15.

[323] Bichromatic tremoli on contraforte is discussed in section 2.7.

[324] This type of tremoli is illustrated in the fifth movement 'Metrio' V of Pierluigi Billone's *Legno. Edre* and discussed in section 2.7 Tremolo.

[325] Audio example: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

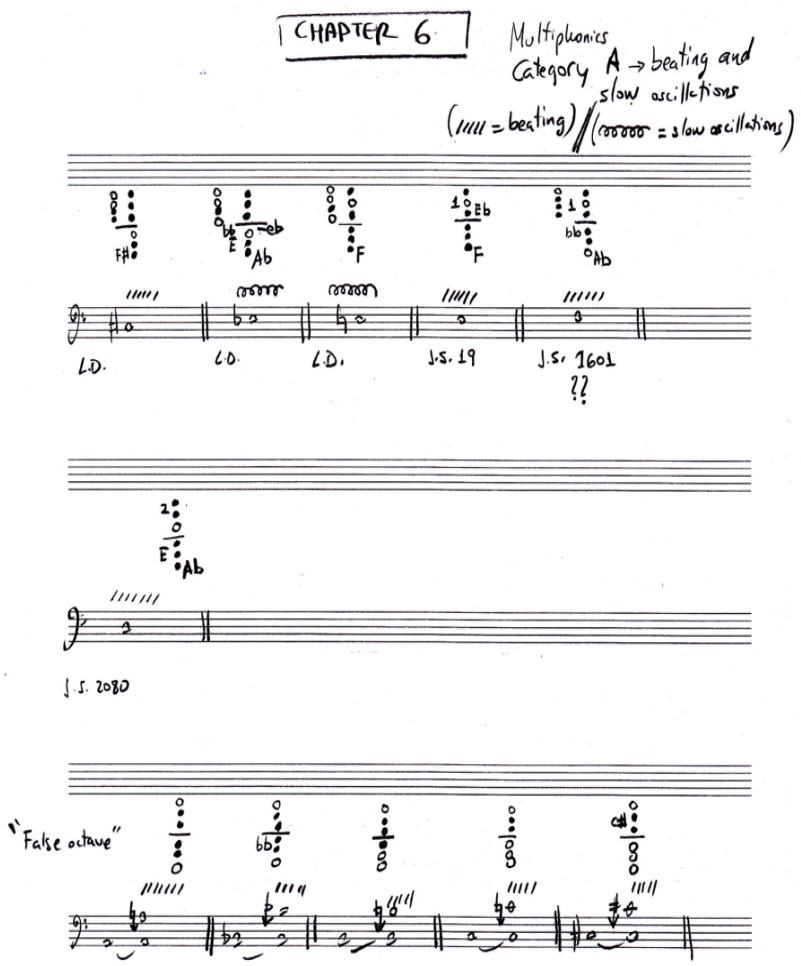

Figure 3.41: Posadas: chapter six.

The first part focuses on beating multiphonics and multiphonics with slow oscillations. Posada's use of the label 'multiphonic with slow oscillations' can easily be translated—in double-reed terms—to a roll tone with non-standard fingering. Six examples of beatings (marked ///) and oscillations (marked 𝆑) are notated in the first part of chapter six on the pitches C#3, D3, E♭3, E3 and F3. Three of the examples that resulted from our collaboration on *Poética del Espacio* (2018–19) are mine (L.D.). The other three are taken from Johannes Schwarz's contraforte *Sound Library* (J.S.).[326] The two question marks under the example J.S.1601 apply to the fingering tablature. Posadas said

[326] Sound Library Online, "Fagott Klangarchiv," Johannes Schwarz, accessed August 3, 2024, https://www.soundlibrary.online.

on Zoom that he was not sure if he had correctly understood the contraforte fingering tablature.[327] We later found out that Schwarz's instrument has an extra auxiliary key that my contraforte does not have.

Part two—termed 'false octave' by Posadas—corresponds to the results of contraforte roll tones produced from standard fingerings. The printed examples come from our past collaboration. In our Zoom call, Posadas suggested I further investigate beating multiphonics focused on a pitch centre and to note not only the fingering and pitch, but also the dynamic range that starts the oscillations.[328] Posadas also asked how the speed of the oscillations can be controlled - with the embouchure or dynamic? I explained that oscillations from roll tones can be controlled with dynamics and the diaphragm. Use of the diaphragm can trigger oscillations or continue them when the dynamic becomes too soft, and they consequently stop.

During my investigation of the first half of chapter six I recorded a sequence of beating multiphonics and roll tones. I e-mailed the soundbite to Posadas.[329] The 'Hehehe' sound bite commences with a beating multiphonic based on A↑4 that Posadas found interesting and employed two ways in *Ga*: alternating between a monophonic note (1.) that utilises a similar fingering and incorporating the effect with a tremolo (2.) (Fig.3.42).

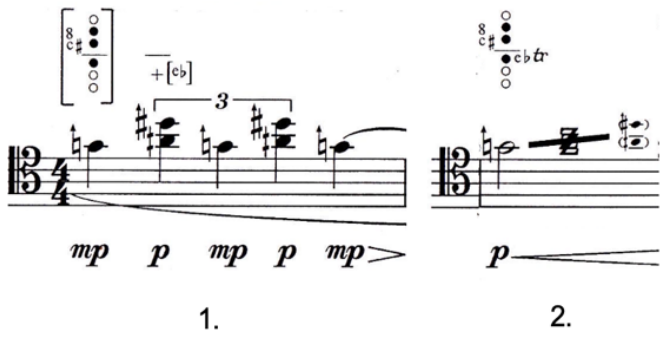

Figure 3.42: Posadas, *Ga*, bb. 27–28 (1.) and bb. 29–30 (2.).[330]

[327] Alberto Posadas transcribed interview Appendix D, 47:38.

[328] Ibid., 51:46.

[329] Lorelei Dowling, e-mail message to Alberto Posadas, October 8th, 2020.

[330] Audio examples: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

Besides using the A↑4 beating multiphonic, Posadas employed the L.D. examples in chapter six. These were used in a sequence with a finger-compatible multiphonic that came from our collaboration for *Poética del Espacio* (2018–19) (Fig. 3.43).

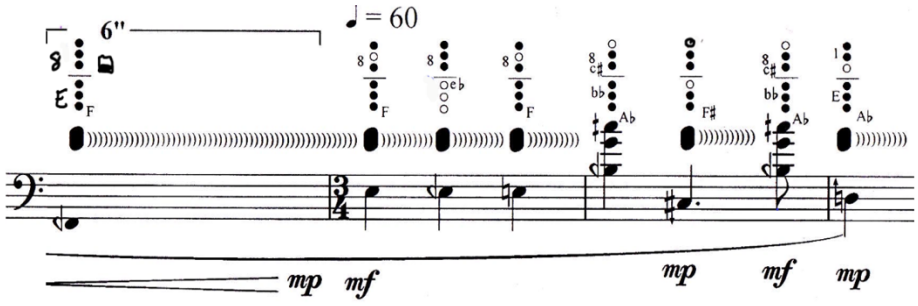

Figure 3.43: Posadas, *Ga*, bb. 16–20: sequence of roll tones.[331]

By slightly altering the fingering of this multiphonic, I discovered a lip roll based on G#4. For me, this was an important discovery in our collaboration. I played this to Posadas who uses the fingering in *Ga* to execute a lip roll and to an underblown effect (Fig. 3.44).[332]

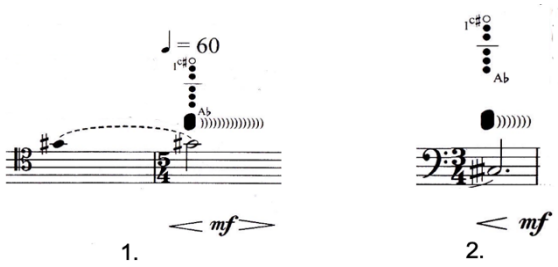

Figure 3.44: Posadas, *Ga*, bb. 25–26 (1.) and Posadas, *Ga*, bb. 48–49:G#4 lip roll (1.) and underblown (2.).[333]

I discovered a variety of roll tones while tackling the second half of chapter six. Some had the same tone centre resulting in a bisbigliandi effect when played in a sequence. I also discovered a roll tone based on the standard fingering of D2. I recorded this roll

[331] Ibid.

[332] A lip roll is different to a roll tone, being produced by exerting extreme lip pressure on the reed. See section 2.5.

[333] Audio examples: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

tone in the ‘Hehehe’ sound bite. Posadas put this example under his magnifying glass, seeking clarification of the dynamic range and possible examples of how this roll tone could transition between differing multiphonics.[334] In *Ga*, the roll tone on D2 trilled with a multiphonic begins a long sequence of roll tones (Fig. 3.45).

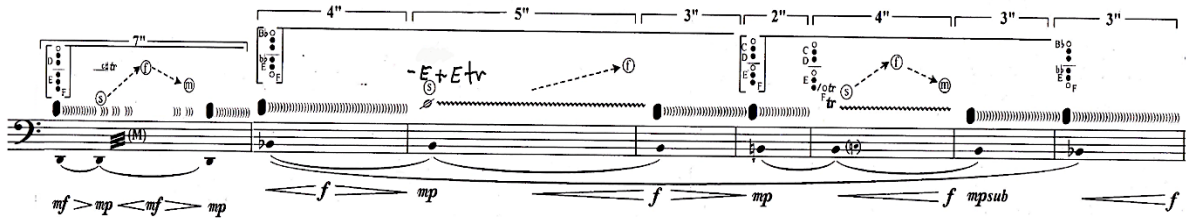

Figure 3.45: Posadas, *Ga*, bb. 4–12: a roll tone on D2 begins a sequence of roll tones with bisbigliandi.[335]

In Figure 3.45, Posadas adds bisbigliandi and a wide dynamic range. His affinity to roll tones became a feature of the first half of *Ga*, and they are used in short chromatic sequences (1.) and between a monophonic low note and a multiphonic (2.) (Fig. 3.46).

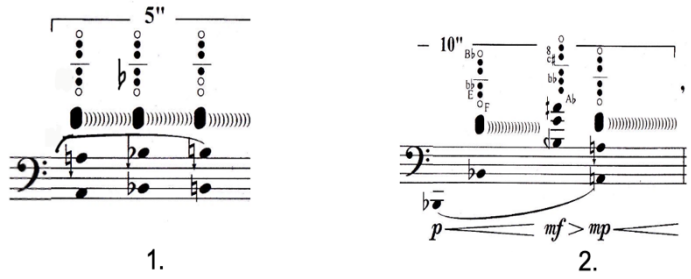

Figure 3.46: Posadas, *Ga*, bb. 96–97 (1.) and Posadas, *Ga*, bb. 43–44 (2.).[336]

Posada’s Chapter seven is labelled ‘soft multiphonic or dyads.’ Unfortunately, From my experience, the contraforte’s double reed does not aid in playing soft multiphonics. I had also recorded a dyad on the ‘Ethereal’ sound bite. He was intrigued by this sound describing it as pure and magical. His remark, ‘If I listen to just this, I would not be able

[334] Alberto Posadas, e-mail message to the author, January 9, 2021.

[335] Audio example: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

[336] Ibid.

to recognize that this is a contraforte,' further convinced me that exploring non-traditional timbres on the contraforte could lead composers to reconsider how they approach composing for the instrument.[337] Although he found this sound enchanting, *Ga* does not employ dyads.

Chapter eight, a recapitulation of our former collaboration in 2018, resulted in the dominant use of one singular multiphonic in *Ga* (See Figure 3.43). This was used either repeated with accents (1.) or within a framework of classical performance practices (2.)(Fig. 3.47).

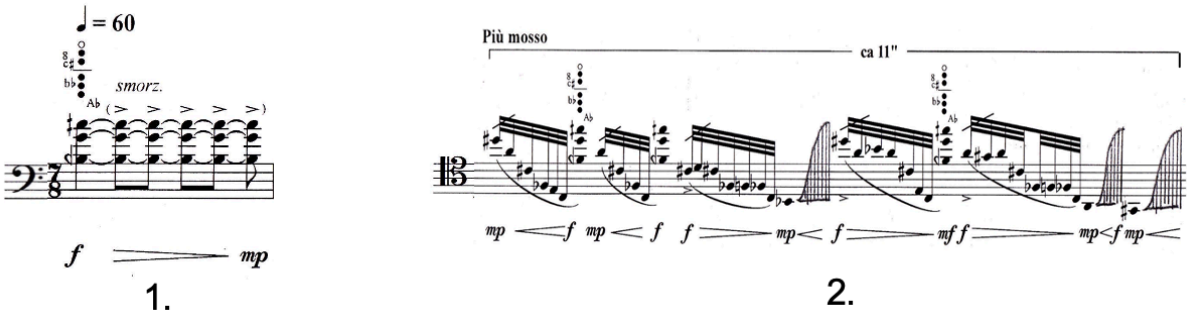

Figure 3.47: Posadas, *Ga*, bb. 81–82 (1.) and bb. 41–42 (2.).[338]

Chapter nine—underblowing multiphonics—turned out to be a significant theme in our collaboration. In our Zoom meeting, Posadas demonstrated this effect by underblowing—or relaxing the lips—on a high note on the B♭ flat clarinet, resulting in the sounding of a shadow of a lower pitch. He termed this sound 'a filtered timbre' and explained that the delicate nature of this technique makes it difficult to control and possibly does not work on a double-reed instrument.[339] To explore chapter nine, I recorded a slow ascending chromatic quarter-tone scale from E4 to C6 in which each note is underblown. Then, I focused only on recording E4–G4 with three different reeds and tried a different physical approach by relaxing my soft palate. I wanted to understand underblowing on an instrument with a very large reed instead of underblowing with a

[337] Alberto Posadas transcribed interview, Appendix D, 53:47.

[338] Audio examples: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

[339] Alberto Posadas transcribed interview, Appendix D, 56:47.

smaller reed on the bassoon. At times a single filtered timbre sounded but I produced a multiphonic each. In *Ga*, Posadas uses four examples of fundamental notes that are underblown:

1. An underblown F#5 with prescriptive and descriptive notation of a resultant multiphonic.

2. Achieving the delicate single tone of A5, B♭5 and B5 was an extreme challenge which resulted after much experimenting on my side with a compromise. Aiming for the desired single filtered sound, I executed a slight lip bend and sang quietly to humour out the desired note (Fig. 3.48).

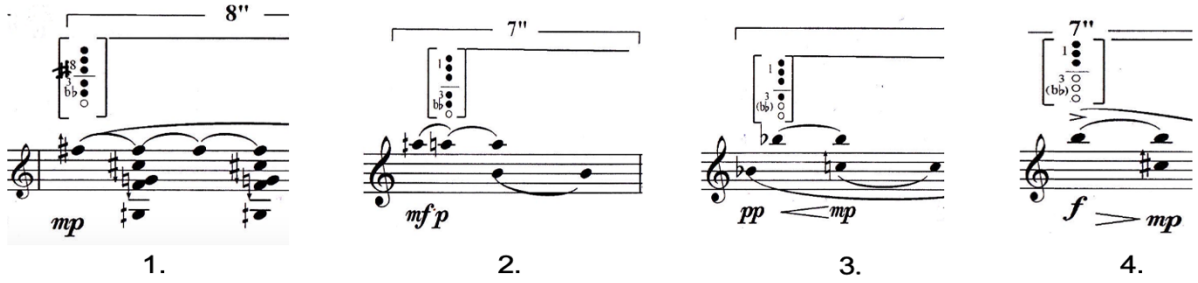

Figure 3.48: Posadas, *Ga*, bb. 87–88 (1.), bb. 74–75 (2.), bb. 99–100 (3.) and bb. 90–91 (4.).[340]

Bisbigliando and velvet notes—the focus of chapter ten— are two topics that, while not directly applicable to Posadas's piece, hold potential for future composers. Posadas suggests that there is a need for future investigation on bisbigliando to address questions which are often posed by composers: What are the notes we can apply this technique to on the contraforte? Which auxiliary keys are the best to use? Does the microtone trill mean a change of timbre? If there is a change of timbre, is it darker or lighter sound? Velvet tones mean something different to him than to me in the double-reed territory. He is interested in monophonic notes that could progress from a normal to a filtered timbre. In contrast, I use the term 'velvet tones' to sustain barely audible sounds that are best heard in the lower register, just as the bassoonist Gallois describes them in his book.[341]

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[340] Audio examples: Alberto Posadas, *Ga,* performer Lorelei Dowling, 2022.

[341] Pascal Gallois, *The Techniques of Bassoon Playing* (Kassel: Bärenreiter, 2012), 25.

The solo piece for contraforte by Posadas was completed in February 2021. It covers the range of A1 to G↓7. Posadas originally intended the piece to be sixteen minutes long—a physically Herculean challenge for the performer—but it was trimmed to eleven minutes at the request of Klangforum Wien, which was programming it.[342] The piece was not named until after the composition was completed. Posadas said the following about the disyllable he chose for the title:

> *Ga* is the symbol of Gallium, a chemical element. It is a solid metal that becomes a liquid very quickly under a standard ambient temperature and pressure, such as when heated with our hands. I am discovering this about the contraforte working with your guidance. We have a very 'solid' instrument that provides a sound nature with a big body and spectral density. But at the same time, the sound nature can be easily mutated into a 'fluid' with a considerable plasticity. This is just a short explanation, but at least it gives you an idea.[343]

From the beginning, collaboration with Posadas brought up many questions. Some of these questions related to sonic perceptions: Will specific clarinet effects such as underblowing and bichromatic tremolo work on the contraforte? If yes, how are they executed differently, and what is the speed or type of response that works best on the contraforte? Other questions emerged that led to further research on a particular theme, most notably the technique of overblowing: How does overblowing connect to a multiphonic? Why is embouchure compatibility essential to know and understand? Is it possible to isolate a harmonic when overblowing on the contraforte? Posadas was very articulate about what he wished to investigate, often pushing the boundaries of exploration that challenged my perceptions. I have become acutely aware of embouchure and finger compatibility, a concept that I could not easily articulate before this collaboration. In practice, I have unconsciously used the embouchure/finger compatibility concept, typically when a composer leaves the choice of which multiphonics to

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[342] Alberto Posadas, e-mail message to the author, May 22, 2022.

[343] Ibid., May 9, 2022.

use to the performer.[344] This occurs in the next solo piece for contraforte that is discussed, Lim's *Nautilus* (2022). Her piece also explores the sweeping layering of overblowing, underblowing and glissandi, but from a different perspective than Posadas or Muir.

3.5 Liza Lim: *Nautilus* (2022)[345]

Given that I was impressed after playing Lim's agile opening for the contrabassoon in the recording of *Alchemical Wedding* (1999)[346] and the extreme subaquatic contraforte ending in her *Extinction Events and Dawn Chorus* (2018),[347] I was curious to see Lim's compositional diversity when writing a solo piece for contraforte. Shortly before we commenced our collaboration, Lim requested information about the contraforte. I sent the music and recording of Aperghis's *Tag ohne Nacht,* a work which is part of this research, as well as sound bites that highlighted a range of different timbres from the contraforte:

1. An excerpt to show the agility of the contraforte from Posadas's 'Umbrales evanescentes'

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[344] Georg Friedrich Haas, *Was mir Beethoven Erzählt* (2020): *Concertante symphonic poem for violin, contraforte and orchestra* (Berlin: Ricordi, 2020). In this piece is an example of a contraforte multiphonic sequence left to the performer to compose, which accompanies the violin solo. I used a sequence of multiphonics and roll tones that are connected to finger and embouchure compatibility.

[345] The score for Lim's piece can be viewed via the link: https://phaidra.kug.ac.at/o:134692. See Appendix C for all links to scores.

346 Elision Ensemble, "Alchemical Wedding," YouTube, August 31, 2021, video, 17:57, https://youtu.be/N12GkxRFLtM?si=cdomNlsPadTUTHsI.

[347] Sophie Schlafleitner, "Extinction Events and Dawn Chorus," YouTube, November 18, 2024, video, 12:46, https://youtu.be/ZvJW83rfmYU?si=AE30pno09vsGYQwt&t=627.

2. A progression on F2 and G3 that transitions from an appoggiatura to a roll tone, a multiphonic then a glissando to a monophonic note.
3. Air effects mixed with monophonic sounds
4. Overblowing the E2 fundamental while trilling alternate fingers in the left and right hand with embouchure manipulation
5. Overblowing the B1 fundamental using the same physical actions described for overblowing E2

The sound bites did not include explanations, charts, or notation, to allow Lim to experience the contraforte's sound and not be distracted by the visual notation of the sound.

Our collaborative process on the piece lasted five weeks and, because of Covid-19 was restricted to Zoom sessions and e-mails. In our first Zoom meeting, Lim expressed her interest in exploring musical gestures beyond multiphonics, emphasising a desire to focus on innovative sonic techniques. [348] Specifically, she was drawn to concepts such as 'blurring of timbre areas,' 'sculpturing of sounds,' and 'fluid movement,' which aligned with the sound bites I provided of E2 and B1 overblowing. [349] After sharing my recordings, Lim sent a sketch of her interpretation of the B1 overblowing sound bite for discussion (Fig. 3.49).

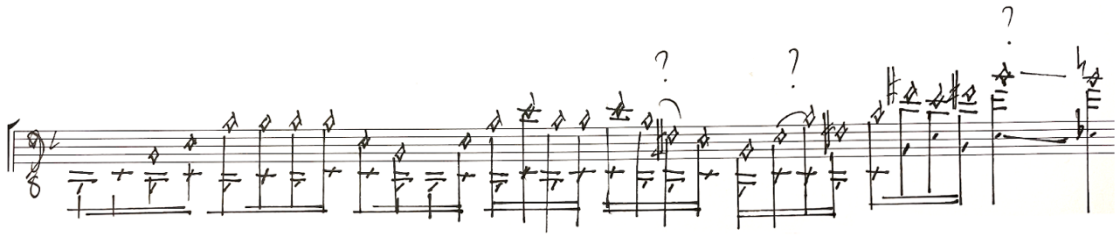

Figure 3. 49: Lim's interpretation of the soundbite of contraforte overblowing B1 with alternating fingerings and embouchure manipulation.

[348] Liza Lim, interview by Lorelei Dowling, January 20, 2022, transcribed interview, Appendix E. This reference is found in the Zoom transcription LIM1 17:54. All future references to this interview provide the Zoom reference number (LIM 1–4) and a timecode, so the reader can easily orient themselves within the interview.

[349] Lim, transcribed interview, Appendix E, LIM2 09:14 and LIM3 01:56.

The resemblance of her sketch to bass clarinet methods was unexpected,[350] yet it reflected the impression of what she heard. [351] Lim remarked on the similarities in the contraforte effect to the flute technique of multiphonic trills and cello bowing on strings, an effect which builds up a feedback system of harmonic layering. Her reflective process led her to conclude that this was something she wished to explore on the contraforte.[352] Enjoying the repetition of the harmonic trilling, she observed that it produced a rhythmic pattern. Verbalising the effect as 'burbling, rippling partials,' she questioned whether it needed time to sound and was curious if the effect was difficult to execute.[353] To advance our exploration, I e-mailed a chart with a recording of what I termed 'harmonic trilling while overblowing in the lowest register of the contraforte' (Fig. 3.50).

[350] Ibid., LIM1, 00:41.

[351] Examples of notating for bass clarinet can be found in *Inferno* (2000) and *Ciacco* from the Australian composer, John Rodgers. Naturally 'bass clarinets cannot isolate harmonics [as indicated in the example] because of their stopped pipe cylindrical bore.' Carl Rasman, WhatsApp messenger to the author, March 14, 2024.

[352] Lim, transcribed interview, Appendix E, LIM1, 03:22.

[353] Ibid., LIM2, 01:25.

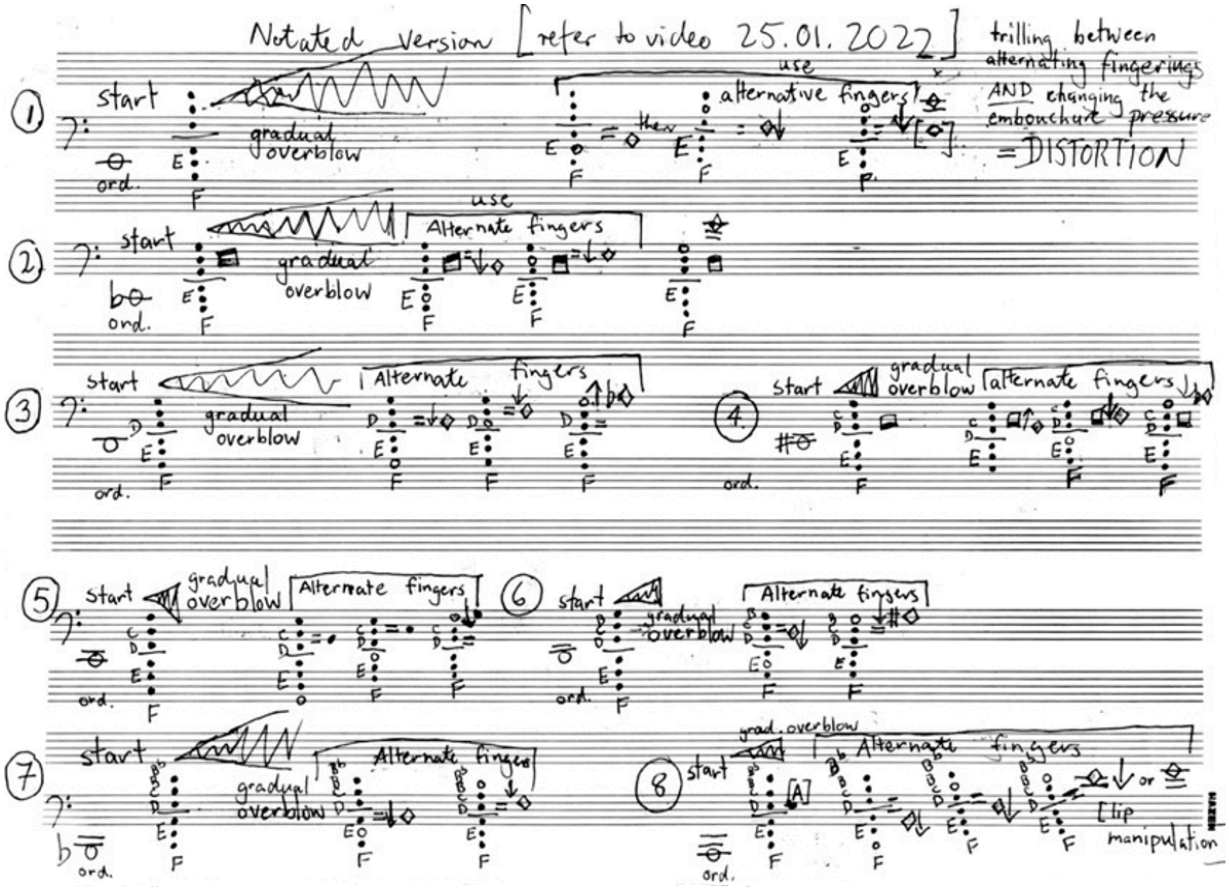

Figure 3.50: Dowling: chart for overblowing and trilling alternate fingerings.

Viewing the video without referring to the chart, Lim was surprised that the effect did not create arpeggios— as initially perceived in notation; rather, it engaged with a gradual morphing of sound. She described this process as 'stepping through a distorted overtone series,' [354] producing a characteristic and fluid movement associated with the contraforte. The appeal to her was the morphing of overtones which created a rich and textured sonic environment. Observing the video, Lim commented that the combination of alternating finger trills with embouchure contributed to the 'randomised upward patterns,' something for us to explore.[355] The question for her was how to notate the harmonic trilling, which yielded three results: a rhythmic pattern, the isolation of harmonics, and the development of either a rich or thin texture. In the end, we concluded that

[354] Ibid., LIM3, 01:56.

[355] Ibid., LIM2, 08:01.

graphic notation was not necessary. By using prescriptive notation, the speed of trilling and the isolation of partials are indicated. The texture relies on the dynamic—the louder it is, the more harmonic layering is present, making the texture richer. Overblowing with finger trilling became the focus of *Nautilus* and developed four ways (Fig. 3.51).

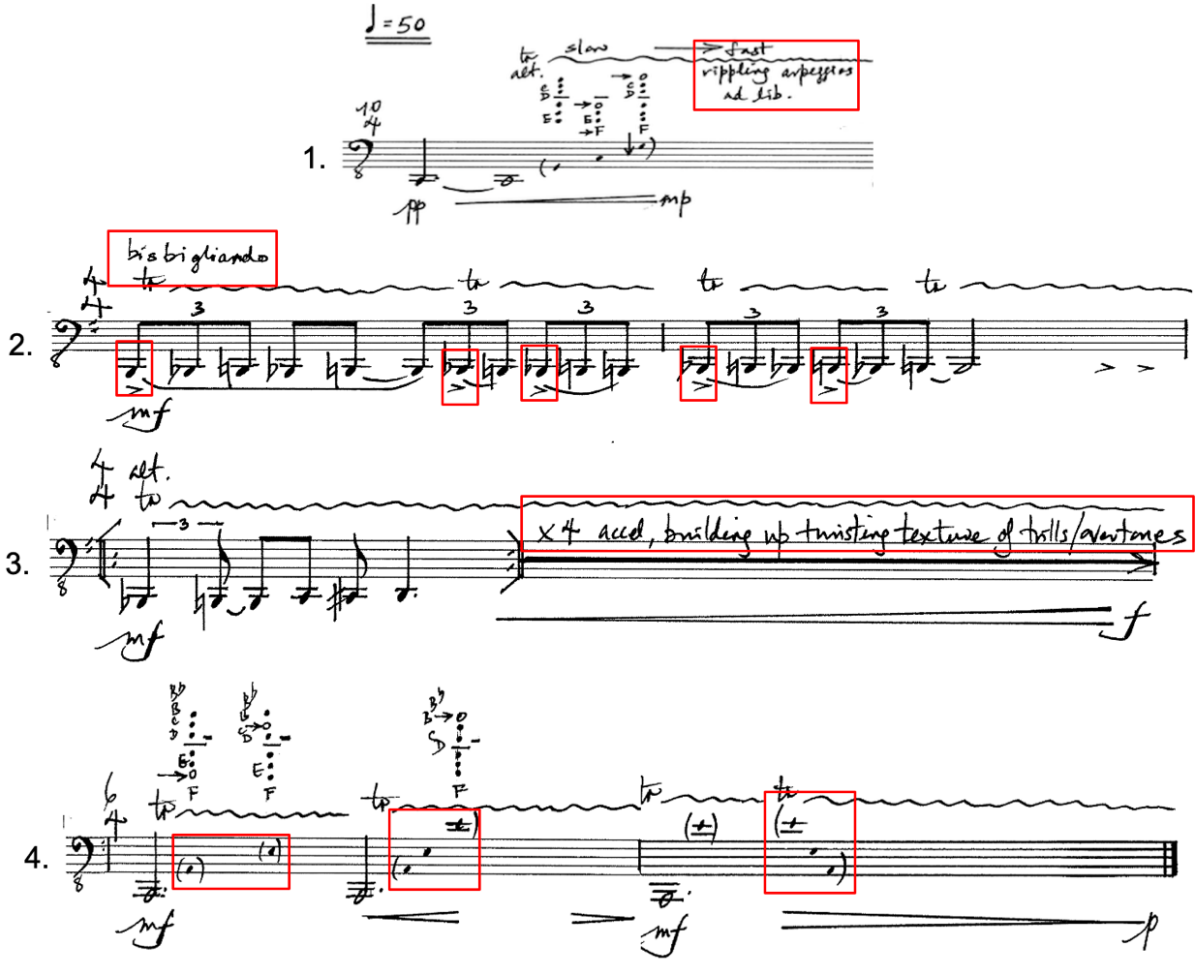

Figure 3.51: Lim, *Nautilus*, bb. 1–2 (1.), bb. 50–52 (2.), bb. 54–58 (3.) and bb. 62–64 (4.): examples of four variations of overblowing.

The piece begins with the slow trilling of alternative fingers on C2, creating a 'rippling' effect. Increasing the trill's speed and dynamic results in an overblown C2 (1.).[356] Playing accented triplets and duplets on B1 and Bb1 with bisbigliando instead of trilling

[356] Audio example: Liza Lim, *Nautilus*, performer Lorelei Dowling, 2022.

alternating fingers results in overblowing (2.).[357] Lim indicates four variations of 'building up, twisting texture of trills [and] overtones' on the fundamentals B♭1, B1, C2, C#2 and D2 (3.).[358] The variations were left to my interpretation.[359] The finale example (4.)[360] is executed on the lowest note of the contraforte A1, played at a fast tempo with alternating finger trilling. By manipulating my embouchure, the desired harmonics sound. Lim concluded that this approach to overblowing on the contraforte is a new way of rethinking the established overtone sounds produced by clarinet overblowing.[361] In our collaboration we also examined underblowing. Lim commented that, akin to its functionality on the bassoon, the appeal lies in its simplicity of not necessitating additional fingerings. For her, underblowing is idiomatic to instruments owing to the ease with which the technique is executed. From a compositional viewpoint, it is appeals to her because it can be positioned into a melodic figure or isolated as a focus point.[362] I found this interesting as I had initially found underblowing on the contraforte unsuccessful. I decided to approach it again by using a new performance practice: smiling while playing. Using this embouchure triggered the multiphonic result of underblowing. I provided Lim with a chart and recordings of underblown notes from C4 to C6. While recording these, I observed that A5 and F#5 had a rich sound. This I deduced was owing to the serendipitous aspect of the instrument: two flageolet keys are opened for the standard fingerings of these notes (Fig. 3.52).

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[357] Ibid.

[358] Ibid.

[359] Lim, transcribed interview, Appendix E, LIM4, 05:04. I describe how I start two octaves above, use distortion throughout, and move through the octaves using different embouchure pressure.

[360] Audio example: Liza Lim, *Nautilus*, performer Lorelei Dowling, 2022.

[361] Lim, transcribed interview, Appendix E, LIM3, 03:07.

[362] Ibid., LIM1, 26:07.

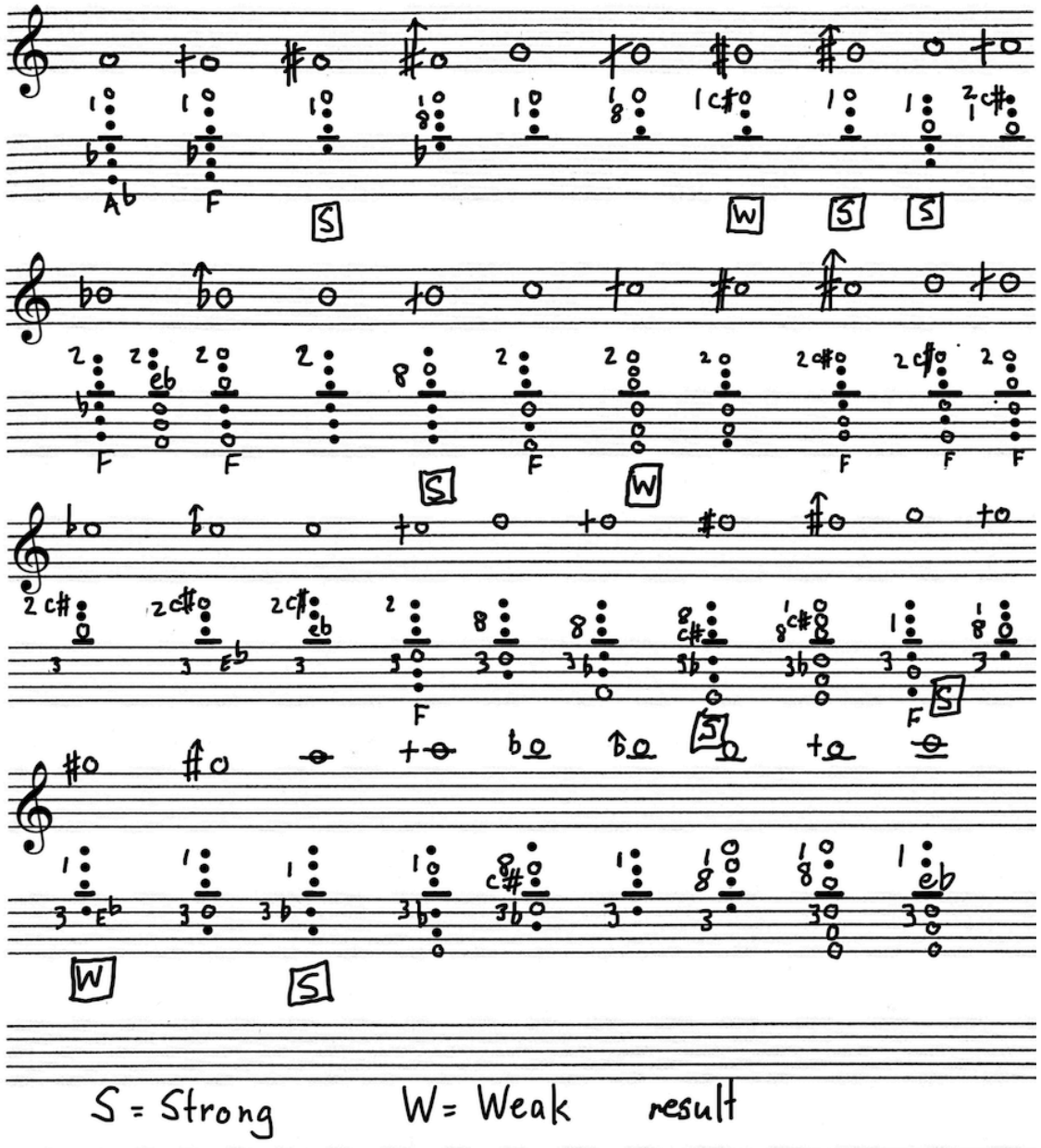


Figure 3.52: Dowling: sketch of underblowing contraforte chart with fingerings.

Shortly after sending the underblowing examples to Lim, sketches of the piece arrived, incorporating underblowing within melodic material. Lim employs an underblown A5 as a highlight in *Nautilus*, finding it rich in quality and in keeping within her tone centre of F. She hears the outcome of the underblown A5 as an F chord.[363] Lim doesn't notate

[363] Ibid., Appendix E, LIM2, 01:57.

the F chord in the score but employs a ‘u’ above the note to indicate underblowing. Lim does not use the F#5 but instead utilises an underblown F#4 several times (Fig. 3.53).

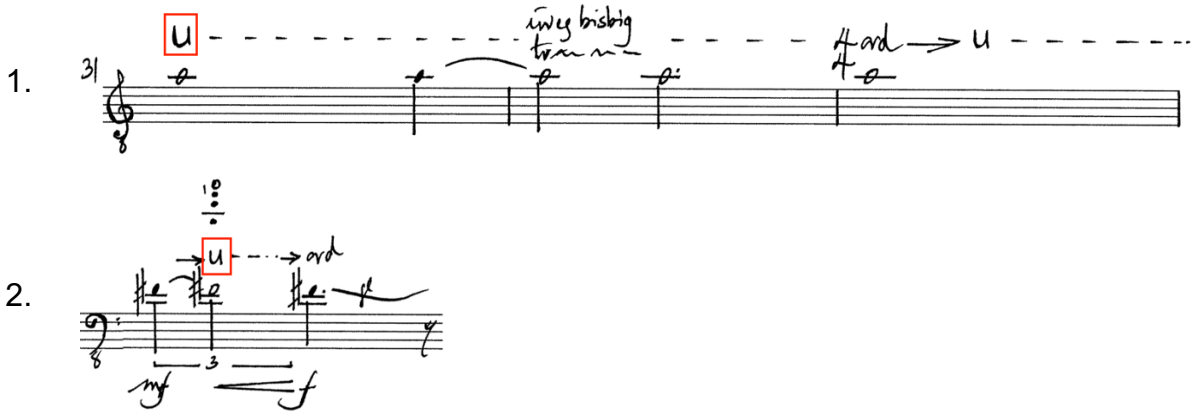


Figure 3.53: Lim, *Nautilus*, bb. 31–34 (1.) and bb. 41–42: examples of underblowing A5 (1.) and F#4 (2.).[364]

An underblown F4 is also used but not technically produced from this technique. Lim wished to connect the tenor F and the bottom fundamental B♭1, even though it is based on the ‘clarinet technique of overblowing the B♭1 fundamental and isolating the F4.’[365] Her other uses of underblowing—quarter-tone G#4 and A4—are as passing embellishments between notes (Fig. 3.54).

[364] Audio examples: Liza Lim, *Nautilus*, performer Lorelei Dowling, 2022.

[365] Lim, transcribed interview, Appendix E, LIM2, 05:06.

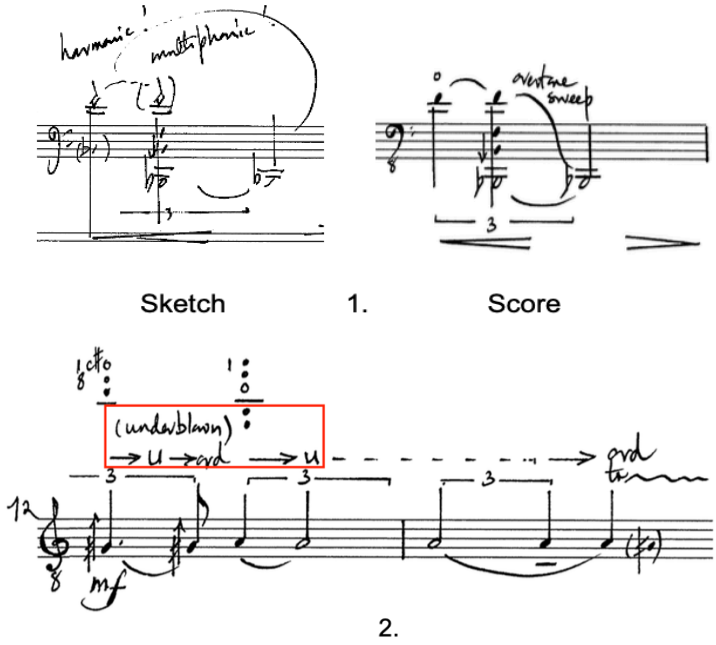


Figure 3.54: Lim, *Nautilus*, bb. 60–61(1.) and bb. 12–14 (2.): example of an unconventional way of underblowing (1.) and an underblown G #4↑ and A4 (2.) used as passing embellishments.[366]

From observing the fingering chart of underblown notes (See Figure 3.52), Lim saw the fingering relationship to each note. She consequently chose specific tone centres to incorporate lip bends and glissandi based on this.[367] We discussed her choice of a problematic finger combination glissandi descending and ascending from B♭4 to A♭4. Instead of her practical suggestion of pitching an A♭4 high and lip bending, I decided on non-standard fingerings to achieve this. In the context of a collaboration scenario, I had not anticipated learning a new alternative approach to a playing technique. Lim uses lip bends in *Nautilus* as short embellishments between underblowing and melodic lines. She uses the glissando between B♭4 and A♭4 as a focus point (Fig.3.55).

[366] Audio examples: Liza Lim, *Nautilus*, performer Lorelei Dowling, 2022.

[367] Liza Lim, e-mail message to the author, January 27, 2022.

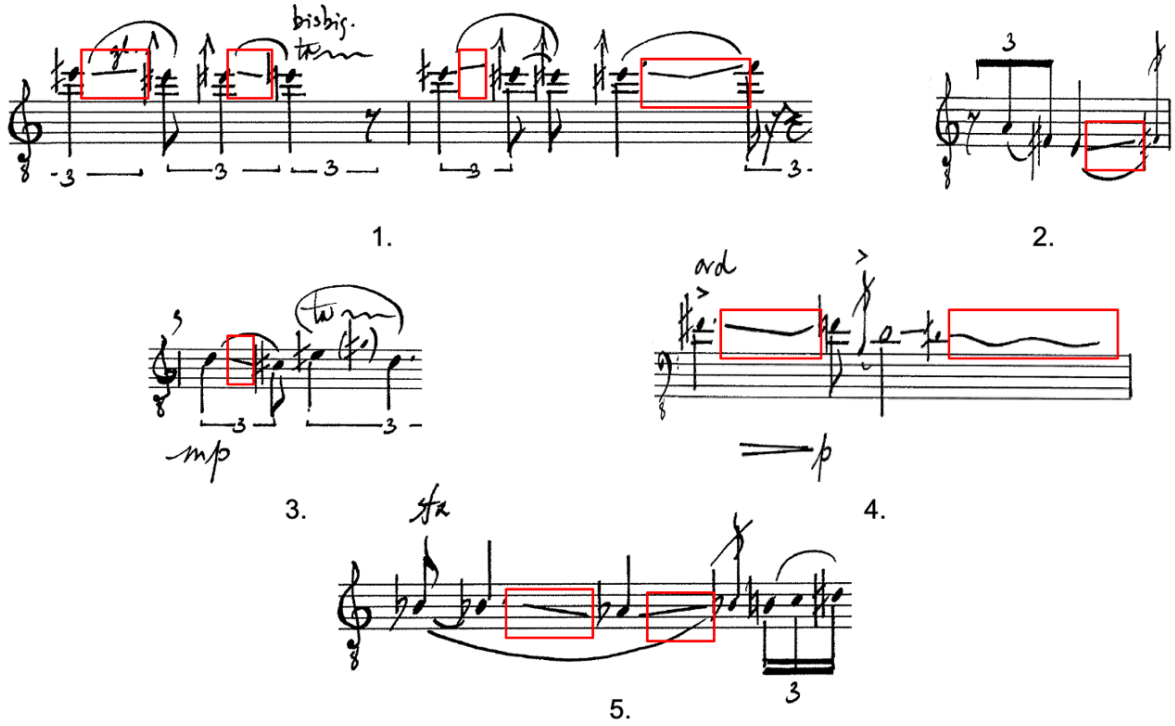


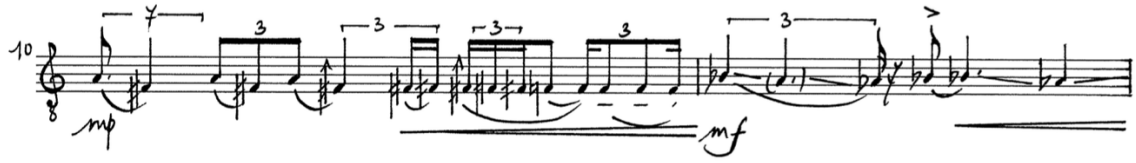
Figure 3.55: Lim, *Nautilus*, bb. 8–10 (1.), bb. 11–12 (2.), bb. 26–27 (3.), bb. 47–48 (4.) and bb. 21–22 (5.): example of lip bends and the featured glissando.[368]

Having listened to Aperghis's *Tag ohne Nacht* for solo contraforte, Lim commented on how striking the agility of the instrument was while still maintaining a defined and articulate quarter-tone melodic line.[369] Consequently, Lim mirrors this agility in her quarter-tone melodic lines, which are often used as introductions leading to underblowing (Fig. 3.56).

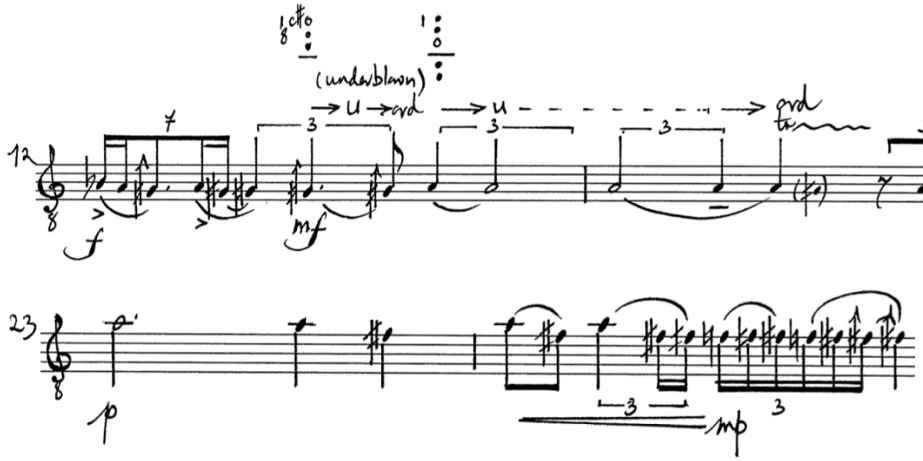
[368] Audio example: Liza Lim, *Nautilus*, performer Lorelei Dowling, 2022.

[369] Lim, transcribed interview, Appendix E, LIM1, 19:45.

1.



2.



3.

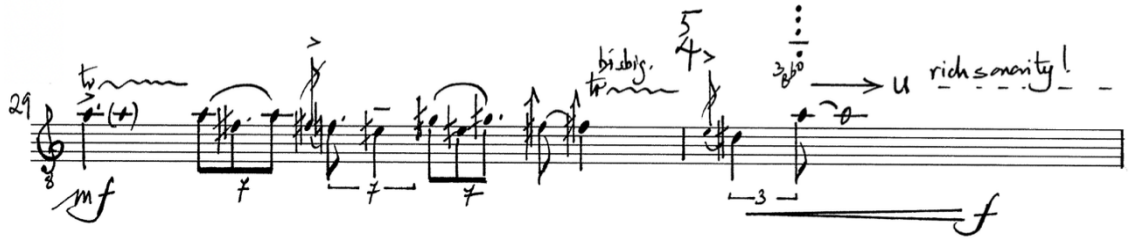


Figure 3.56: Lim, *Nautilus*, bb. 10–12 (1.), bb. 23–25 (2.) and bb. 29–30 (3.): examples of quarter-tone melodic lines.[370]

One aspect of her melodic lines that prompted discussion was her use of arrows for notation. This raised questions about her intentions regarding quarter-tones versus micro-tones. Lim suggested I could interpret the tuning as I wished.[371] I was also curious why Lim used the treble clef instead of the tenor clef: the standard clef when composing in the tenor register for the bassoon and contrabassoon. Unfortunately, over the years I have never questioned composers who use the treble clef all the time, so this has now become the standard practice, instead of the tenor clef. The issue is that

[370] Audio examples: Liza Lim, *Nautilus*, performer Lorelei Dowling, 2022.

[371] Lim, transcribed interview, Appendix E, LIM2, 03:42.

many young bassoonists are uncomfortable reading in treble clef, which further discourages their engagement with contemporary music.[372] As one of my bassoon colleagues explains: 'When composers use a treble clef for a melodic line for the bassoon, they have no concept of how high and difficult it is.'[373] In the end we agreed to keep the treble clef.

During our collaboration, I provided Lim with an additional sound bite, assuming she would fine the sound of a D2 roll tone interesting. Through embouchure manipulation, the effect morphs into different sound distortions. She enquired about its functionality and was pleased that it aligned with her knowledge of bassoon ergonomics.[374] Specifically, it resulted from a simple fingering where lifting one finger causes a disruption in the air column, and the effect sounds.[375] Consequently, as the roll tone aligned with the pitch in Lim's second section, she incorporated it as a feature (Fig. 3.57).[376]

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[372] Ibid., LIM2, 09:51.

[373] Christoph Wichert, Messenger correspondence with the author, January 10, 2024. Wichert is an orchestral bassoonist keenly interested in new music.

[374] Lim, transcribed interview, Appendix E, LIM3, 09:32.

[375] Lim's piece, *Axis Mundi* (2012–13) for unaccompanied bassoon, is a piece which demonstrates her working knowledge of bassoon fingerings. She consciously avoids complicated fingering patterns.

[376] Lim, transcribed interview, Appendix E, LIM3, 00:43.

1.

2.

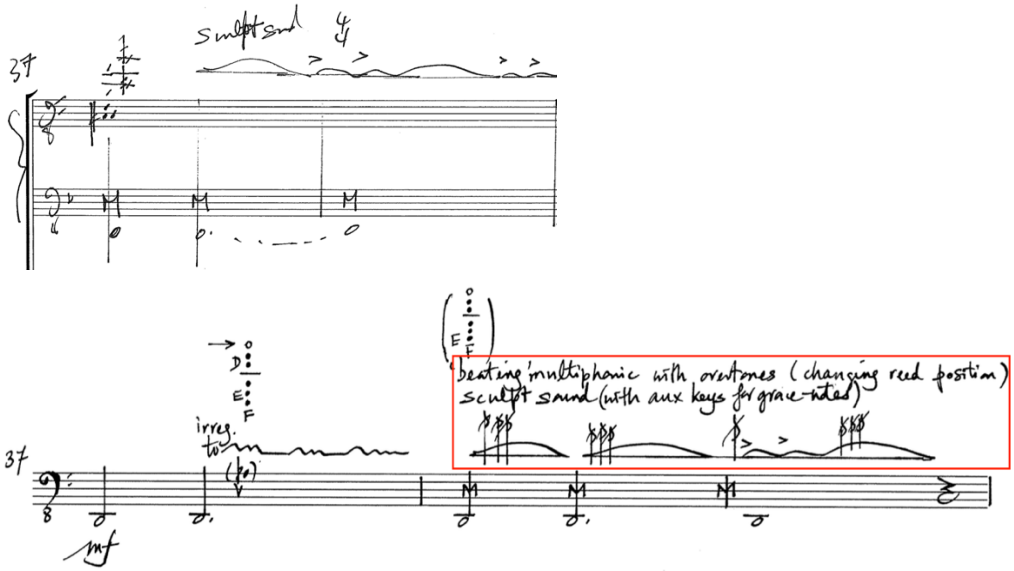

Figure 3.57: Lim, Nautilus, bb. 37–39 (2.): D2 roll tone in the original sketch (1.) and in the final draft (2.).[377]

To indicate embouchure movement for eliciting various timbres when playing the roll tone, we decided upon a new graphic notation with written instructions.[378] Similar to her written explanations for overblowing on the contraforte in *Nautilus*, Lim uses words to indicate the textures she desires: rippling, twisting, fluid, and burbling. These also allude to water movement, relating to her aquatic choice of title, *Nautilus.* Originally, Lim had chosen the title, 'whorled ear's listening', a line from Sylvia Plath's poem, *Lorelei* (1959). To Lim, this metaphorically conjured up the image of an enormous instrument—the contraforte—as the ear of the Lorelei. Later, finding the title too long, Lim opted for *Nautilus.*[379] In our last Zoom meeting, Lim presented a perspective on the piece, aligning with my desire to raise the profile of the contraforte:

> It's not a massively long piece, but it's reasonably compact. That's how we can treat it. I plan to use these worlds of sounds in ensemble pieces because they are so rich and amazing. So, if we can understand the piece as a first step, that's great.[380]

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[377] Audio example: Liza Lim, *Nautilus*, performer Lorelei Dowling, 2022.

[378] Lim, transcribed interview, Appendix E, LIM3, 09:48.

[379] Ibid., LIM2A, 09:16.

[380] Ibid., LIM3, 04:49.

The duration of the piece is only seven minutes, and according to Lim, if the piece were longer that would mean the beginning of a new composition.[381] In *Nautilus*, Lim breaks a tradition of using the bottom register of the contraforte statically. [382] Instead, she evokes movement through her exploration of the 'sculpting of sound'. Developing soundscapes was the priority in our collaboration rather than the result: the piece. In her reflections on collaborations, Fraser also observes this form of partnership working with composer Cassandra Miller: 'I'm prioritising the process of *making* something above working toward the end result.'[383]

Lim's constant movement inspired me, and the juxtaposition of the high register with the low register influenced my second movement of *Travelling Suite*, 'Italian Coast Road'. Additionally, her concept of 'sculpting of sound' influenced the cadenza in my fourth movement, 'Between Worlds'. I discuss my composition in the next section.

3.6 Lorelei Dowling: *Travelling Suite* (2023)[384]

This piece is the final composition included in the thesis. I created this composition for solo contraforte after gathering a variety of sounds on the instrument. *Travelling Suite* for solo contraforte was originally a mapped-out improvisation before becoming the final four movements it is now. Even in its nascent structure, the music retained the

[381] Ibid. LIM3, 21:03.

[382] By describing the use of the lowest register as 'static', I refer to the traditional role of the contrabassoon/contraforte in supporting loud chords in ensemble pieces, as exemplified in Helmut Lachenmann's *...zwei Gefühle…* (1992) and Wolfgang Rihm's Verborgene Formen (1995–97).

[383] Juliet Fraser, "The Voice that Calls the Hand to Write: Exploring the Adventure of Agency and Authorship within Collaborative Partnerships" (online paper, Harley Residency, Southampton University, 2019), 10.

[384] The score for the author's piece can be viewed via the link: https://phaidra.kug.ac.at/o:134693.See Appendix C for all links to scores.

same foundation and influences it embodies in the *Suite* form. The piece is partly influenced by a 2019 Klangforum tour to Perm, Russia. While there, I met Haas to discuss his piece for the contraforte and visited the Perm Regional Museum which led to discovering an old folk melody. The simplicity of this piece was a significant motivator for its incorporation as melodic material within my composition (Fig. 3.58).

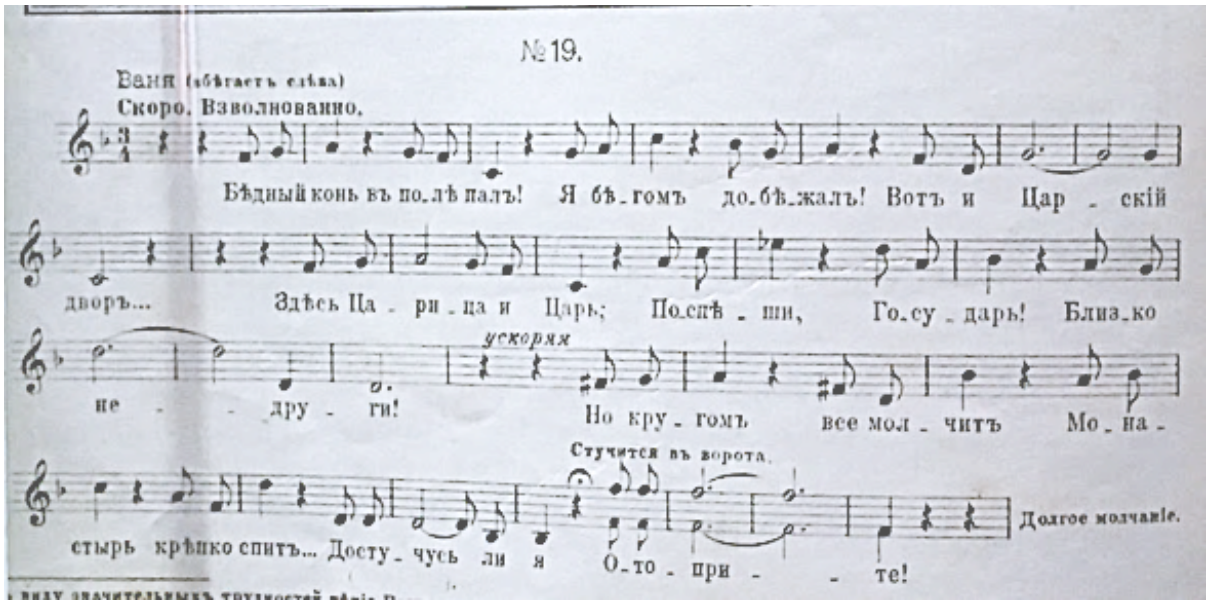

Figure 3.58: Rustic melody from Perm Regional Museum used as the thread in my mapped-out improvised pieces for contraforte

As I mentioned, the initial attempts consisted of a series of organised improvisations with the goal of selecting one as my definitive piece. I used this form of improvisation as I wanted the freedom of improvising but within perimeters of mapped-out ideas. I recorded many of these improvisation sessions so I could listen back objectively. The sessions worked as a sound diary. Each improvisation began with an air and key clicks section, rhythmically inspired by Igor Stravinsky's *Rite of Spring* (1913). I divided the contemporary effects into boxes: a fast multiphonic riff, dyads, tremolos, and an effect I term 'electric guitar riff'. I threaded them together with the reconstructed thematic material from Fig. 3.57 as well as classical composed motifs. While not entirely engaging, the recorded results of my improvisations had moments of musical interest. I decided to extract the more convincing musical moments and compose short pieces based on these. The four pieces in the *Travelling Suite* blend classical motifs as well as contemporary techniques and portray a whimsical, light-hearted character. Despite

being notated, these movements allow for minor deviations based on the player's preference adding a touch of individuality to each performance. In the following analysis of the four pieces, I explain the significance of the title, the structure of the piece, and the fusion of classical and contemporary techniques.

3.6.1 I. 'Slipstream'[385]

The title 'Slipstream' emerged after considering the terms 'airstream' and 'jet stream', which initially seemed fitting due to their association with air and travel. 'Airstream' and 'jet stream' convey a sense of forceful and loud air movement, which does not align with the subtle use of air and syllables in the piece. Instead, I chose 'slipstream' as it subtly describes the flow of air created by a moving object as it travels through the surrounding atmosphere.[386] For me, the noun reflects the nuanced interplay between air and words in my composition. This movement has an ABA structure.

Section A consists of effects without a reed, contrasting Section B, which comprises musical material played with a reed. The return of Section A to conclude the piece includes percussive sounds produced by hitting the instrument before air sounds. "The Augurs of Spring and Dances of the Young Girls" from Stravinsky's *The Rite of Spring* inspire the rhythmic drive in the piece. The rhythm complements the air and key sounds. The contraforte contemporary techniques used are as follows:

1. Section A: Effects played without the reed on the contraforte.
2. The air effects employed are the syllables 'ft', 'ta', and 'choo.' 'Ft' has a sudden air release and is a percussive, high, short sound. 'Ta' involves a clear and distinct articulation and is a percussive, high, short sound. 'Choo' begins with a plosive consonant produced by a sudden release of air. This effect produces a long, low sound.
3. Resonating sounds come from playing both conventional fingerings and individual keys with pads. The range used is A1–E3.

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[385] Audio example: Lorelei Dowling, *Travelling suite*, performer Lorelei Dowling, 2024.

386 *Cambridge Dictionary*, s.v. "Slipstream," accessed August 3, 2024, https://dictionary.cambridge.org/dictionary/english/slipstream.

4. Flutter tonguing is played on the bocal with all keys on the contraforte closed, then opened.
5. The keys' opening and closing are used in a slower rhythmic pattern accompanying the 'choo' sound.
6. Slap tonguing
7. Key clicks
8. Section B: Effects played with the reed on the instrument:
9. Slap tongue with barely an audible sound
10. Starting with air, then the note
11. Overblowing A1 while simultaneously trilling the left-hand index finger and relaxing and tightening the embouchure
12. Improvised contraforte percussive section on the body of the instrument

3.6.2 II. 'Italian Coast Road'[387]

In conceptualising this movement, two distinct images served as primary sources of inspiration: baroque music—specifically Antonio Vivaldi and his bassoon concertos—and the winding road of the Amalfi coast. Both are associated with Italy. The Amalfi coast road is fifty kilometres long; it is narrow with sharp hairpin bends, causing many accidents. Drivers need to continually negotiate the sharp bends and traffic jams are often a problem. The vignette starts and concludes with a baroque-style motif, which intertwines with the contemporary techniques. The contemporary effects not only contrast the baroque motifs, but also represent the mindset of a driver who must either slow down to navigate the bends in the Amalfi coast road or sit in traffic jams. G is the tonal centre. The contraforte contemporary techniques used are as follows:

1. Tremolo
2. Multiphonics
3. Roll tones
4. Underblowing
5. Lip roll on D5 and D2
6. Ghosting: a term, in this case, used for playing fast and overblowing

[387] Audio example: Lorelei Dowling, *Travelling suite*, performer Lorelei Dowling, 2024.

7. Dyads: four are used based on a high-pitched C5
8. Trilled high airy sounds on the pitches A5, F#5, D5

3.6.3 III. 'Ode to a Cleaner in Perm'[388]

The title of this composition is emblematic of its thematic content, drawing upon the folk song found in Perm Regional Museum (Figure 3.58), and a rhythmic quotation from Paul Dukas's *Sorcerer's Apprentice* (1867), famously popularised by Disney. In the iconic Disney rendition, the protagonist, Mickey Mouse, assumes the role of an apprentice to a sorcerer. During a cleaning task, he inadvertently employs the sorcerer's hat to enchant a broom, resulting in chaotic consequences. Hence, the word 'Cleaner' in the title alludes to Dukas's music. Additionally, the term 'Ode' reflects the usage of vocals in the piece, which include a grunt and improvised singing while playing a sustained note. This movement has an ABA structure.

Section A—an inversion of the folk melody from Perm—opens and closes the piece. Section B is a rendition of Paul Dukas's *Sorcerer's Apprentice*, a composition that features prominent parts played by bassoons and a contrabassoon.[389] 'Ode to a Cleaner in Perm' uses Dukas's rhythmic figure and character namely staccato notes in a lively six-eight feel. C is the tonal centre. The contraforte contemporary techniques used are as follows:

1. Multiphonics
2. Keyed Tremolo
3. Overblowing timbre resultant from non–standard fingerings
4. Interruptions of conventional notes through key and flageolet openings
5. Singing an improvised melody while playing
6. Roll tone with bisbigliando

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[388] Ibid.

[389] Paul Dukas composed his symphonic poem in 1867. Initially, the instrumentation was for either the contrabass sarrusophone or contrabassoon. Now, the contrabassoon or contraforte play the part.

3.6.4 IV. 'Between Worlds'[390]

The title 'Between Worlds' has several meanings. I live in two worlds: Austria and Australia, I live in two worlds of music: contemporary and classical. The thematic material is based on two themes'—contrabassoon music from Erwin Schulhoff and a waltz.[391] A waltz symbolises Vienna, and Erwin Schulhoff is used to reference the experience of an artist that has travelled away from their homeland. This movement has an ABA-BCA structure.

Section A consists of fast semiquavers based on intervals of 7ths and 2nds, with a slow transition leading to Section B. Section B is a waltz consisting of inversions of the motif and fermatas that explore glissandi. Section C is an improvised cadenza comprising material from Sections A and B, but it is played on the contraforte that has a bassoon reed inside a trumpet mouthpiece. When Section A appears for the last time, a palindrome is used based on the opening bars. D is the tonal centre. The contraforte contemporary techniques used are as follows:

1. Descending quarter-and-eighth tone scale that merges into a lip and key glissando
2. Ascending lip and key glissando
3. Trilled airy sounds on a B4 quarter-tone
4. A concept of 'talking' while playing the trumpet mouthpiece with a bassoon reed on the contraforte[392]

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[390] Audio example: Lorelei Dowling, *Travelling suite*, performer Lorelei Dowling, 2024.

[391] Erwin Schulhoff (1894-1942) was an Austrian-Czech composer who composed the first solo piece for contrabassoon, *Bass Nightingale* (*Bassnachtigall*) (1922). *Between Worlds* draws inspiration from the second movement of *Bass Nightingale*, *Perpetual Mobile*, which consists of unmetered semiquavers.

[392] The concept of a 'talking contraforte' originates from the Greek-French composer Georges Aperghis. Examples of this technique, wherein the instrument emulates vocal expression, are present in his solo instrumental compositions: *Parlando* (2007) for double bass, *Deux cents quatre-vingt measures* (1979) for clarinet, and *Tag ohne Nacht* (2020) for contraforte.

In *Travelling Suite* I employed a form of compromised standard notation as a pragmatic necessity, prompted by the logistical challenge of holding the contraforte while notating. Moreover, I am actively developing notations tailored to specific sounds; this is an ongoing area of experimentation within my research (Fig. 3.59). Additionally, the use of classical performance practice and contemporary techniques in *Travelling Suite* can be seen below (see Table 3.4).

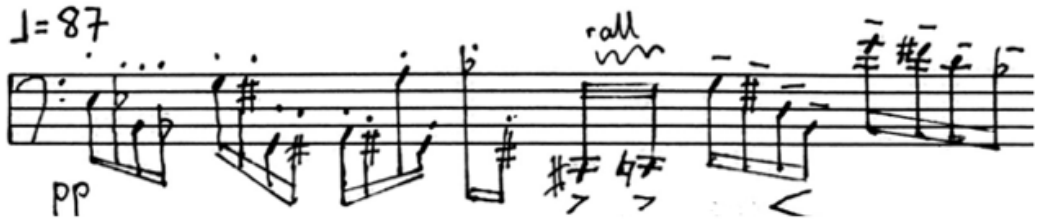

Figure 3.59: Dowling, *Travelling Suite*, iv, bb. 1–2: example of alternative notation

Movement	**Classical Performance Practice**	**Contemporary Techniques**
I. ***Slipstream***	Strong rhythmic patterns inspired by Stravinsky *Rite of Spring* Short musical motifs	Air sounds Key resonances Key clicks Slap tonguing Flutter tone Overblowing with finger trilling and embouchure manipulation Bisbigliando
II. ***Italian coast road***	Baroque motifs	Keyed Tremolo Multiphonics Roll tones Underblowing Lip roll Ghosting Dyads Trilled high airy sounds
III. ***Ode to a Cleaner in Perm***	Reworked Russian folksong Rhythm and character from Dukas's *Sorcerer's Apprentice*	Multiphonics Overblowing 'Electric guitar' effect Opening of key and flageolet keys on standard note Singing

IV. ***Between Worlds***	Motifs based on Erwin Schulhoff's *Bass Nightingale* (1922) Waltz motif	Descending quarter- and eighth tones merging into a glissando Ascending glissandi Lip roll A bassoon reed in a trumpet mouthpiece played on the contraforte Key clicks

Table 3.4: Classical and contemporary techniques in *Travelling Suite*

The inclusion of the *Travelling Suite* holds significance within the compilation of pieces for this thesis, as it manifests my personality and communicates my creative vision as well as my approach to contraforte playing. My objective was to amalgamate extended techniques with classical motifs. This composition is not intended for other performers to perform but aims to inspire them to embark on their own compositional journeys.

3.7 Conclusion

The five pieces which were part of my artistic research project were products of collaboration. I did not choose composers who were bassoonists or active instrumentalists; I chose composers I knew professionally and personally. The collaborations followed a definite category of collaboration, which I had decided upon before asking the involved composers, namely that of a commissioned composer composing for a contraforte. As Juliet Fraser states '[c]ommissioning someone to write for you does not *per se* make the arrangement a collaboration'.[393] While this is true, my five collaborations did involve questions and an exchange of information. Knowing these composers personally meant that trust and respect were already in the equation. We also had one thing in common: the contraforte.

All five composers had either worked with me on contraforte parts for their previous ensemble pieces (Muir, Aperghis, and Posadas) or composed an interesting part with-

[393] Juliet Fraser, "The Voice that Calls the Hand to Write: Exploring the Adventure of Agency and Authorship within Collaborative Partnerships" (online paper, Harley Residency, Southampton University, 2019), 6.

out hearing the instrument beforehand (Haas and Lim). This was an advantage because they already had an understanding of the instrument. When I write that they had worked with me, I should really be saying they had composed something and wanted me to try it out to know if it worked. I would play their sketch while adding a few different approaches (i.e. different dynamic, attack, or register), and they would document it with either a video camera or audio equipment. Then we would go for a coffee. When I started this project, meeting for a coffee as part of the collaboration process was not an option due to the lockdowns during the pandemic era.

The pandemic significantly impacted both the outcomes of the collaborative efforts, including the scheduled performances of the compositions, and the collaboration process itself. Using only Zoom, e-mails and recordings to communicate does not replace one-to-one contact. The exchange of dialogue was hampered by bad internet connections or talking over one another. I recorded the Zoom sessions but some of the audio material is distorted (I did not notice this at the time) and I could not understand what was said when transcribing it. Posadas heard things in follow-up recordings which I did not. When it came to spectrum analysis of a multiphonic to be used in his piece, Posadas and I had different opinions on the frequencies in the multiphonic. The frequencies I heard and those that Posadas heard were not even close. We would have agreed on a solution if we had had the option of being in the same room together, using the same recording equipment. Playing the contraforte over a Zoom session was not an option, as the pitch differed over Zoom. E-mails were also problematic. I found this message to myself about the e-mail correspondence: ‘October 27, 2022: everything rather lost in translation via e-mail.’ These conditions did not cause a conflict between myself and the composers, but rather frustration for me. I did not hear the contrary feedback from them. Even with these confinements, I did manage to meet one composer in this period, namely Haas in Russia.

I was very excited that finally, I would meet a composer face-to-face. When we met, Haas asked me to find a sound that could be interpreted as tinnitus; this was something new and meant I had to create an effect on the contraforte. However, this sound is not used in his composition. I write about the collaboration process during the pandemic because there is relatively little research on collaboration that is undertaken in limiting

conditions. These were the negative sides. The positive side was that there was still a structure and a working ethos in our collaborations.

3.7.1 Structure of the Collaborations

Muir, the first composer, prepared a framework for exploring the contraforte before we started. She had a specific tonal centre in mind and wanted to experiment with overblowing, glissandi and multiphonics based on her tone centre. She was also interested in finding ways to distort the sound, such as growling and using teeth on the reed while playing. Her first sketch arrived six weeks after an intense exchange of sound files and e-mailing.

Aperghis did not have a predetermined structure before we began our e-mail exchange; instead, he had a few general questions about the instrument, such as its range, the range of quarter-tones, and the speed they can be executed. We did not experiment together; rather I experimented with his ideas on my own because I did not fully understand them, and then sent him recordings for feedback. Two weeks after our correspondence began, the first sketch of his piece arrived.

Haas, similar to Aperghis, began our e-mail correspondence—four months after our meeting—by asking questions. Much like Aperghis's, his inquiries focused on the instrument's range, the range of quarter-tones and the feasibility of circular breathing. A month after our first e-mail exchange, Haas's sketches arrived, highlighting a feature of the contraforte: its high register.

Posadas began our collaboration with a framework of ten contemporary effects to experiment with, including my research of whistle tones and overblowing. He was interested in the instrument's ergonomics and had analysed the contraforte fingering diagram beforehand to understand the mechanical relationships and the pitches. He also found resources online via the *Sound Library* for contraforte multiphonics.[394] We spent approximately four intense months exchanging information and exploring effects before his first sketch arrived.

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[394] Sound Library Online "Fagott Klangarchiv," Johannes Schwarz, accessed August 3, 2024, https://www.soundlibrary.online.

Lim did not start with a predefined structure. Our first Zoom meeting began with her inquiring about my artistic research and what I wished to explore. She discussed her aesthetic—musical gestures, sculpting sounds through morphing and blurring of lines—and how she develops these concepts with the performer. Her process began with a conversation to outline our mutual goals before deciding on the next steps together. She wanted significant input from the performer before deciding what to experiment with. Her sketch arrived after four weeks.

Except for Haas, the other four composers focused on overblowing in their solo pieces. Posadas and Lim incorporated my artistic reach on overblowing into their pieces. Muir and Posadas used examples from the initial soundbite I sent them in their pieces. Posadas's and Lim's piece used the additional soundbite I sent with roll tones and multiphonics.

I divided the pieces into two categories of playability based on my initial impressions: complex but playable and complex with risks. I am more familiar with Aperghis's, Haas's, and Lim's work, having spent more time playing their ensemble pieces, so I knew what to expect from them. Their pieces fell into the 'complex but playable' category. In contrast, Muir's and Posadas's pieces were in the 'complex with risks' category, likely because these were among my earliest collaborations and my contemporary techniques on the contraforte were less developed as a result. These collaborations were the most intensive, lasted the longest, were structured by the composers, and involved a significant amount of time spent experimenting on many different effects. Each composer had a different approach to working with the contraforte.

Muir did not assume the contraforte was like a contrabass clarinet or bass clarinet. Instead, she sought to discover its voice by comparing it to the contrabassoon. This was a logical approach, though I did not have a contrabassoon available for comparison. Aperghis did not ask any comparative questions on the functioning of the contraforte but was curious to know if it produced the same effect bisbigliandi effect as the contrabass clarinet. He did not assume the instrument sounded like a contrabass clarinet but considered that it might function similarly. Posadas assumed the instrument could achieve the same results as a bass clarinet (e.g. bichromatic trills and underblow-

ing). Haas appreciated the contraforte for what it is, considering it superior to a contrabassoon.[395] Lim, whose focus is on soundscapes, was open to sounds, so she did not assume anything about the contraforte. She was the only composer to talk of using the instrument in future ensemble pieces, indicating that her piece was only the beginning of her understanding of the contraforte.[396] None of the five composers spoke in terms of the instrument's limitations.

3.7.2 How the Collaborations Affected My Performance Techniques

Through the significant collaborations with Muir, Aperghis, Haas, Posadas and Lim, my playing and understanding of the instrument has evolved in important ways. These collaborations have not only expanded my technical skills but also deepened my musical expression.

Working with Muir meant I had to find many variations of glissandi fingerings. I discovered that using this technique on the contraforte is more complex than on the bassoon. Initially, I used a very complex fingering system; now, my approach to this technique is to find the simplest solution possible. Experimenting with distortion on single notes (using teeth) was something I needed to investigate as it was a new technique for me. Due to this collaboration, I found solutions how to execute this. Aperghis's desire to have a glissandi effect while overblowing on weak fundamental required me to find an unusual solution, which I would not have discovered without working with him. I found that I could achieve this effect by using the flageolets keys. I now realise I could investigate this technical side of the contraforte more. Additionally, I experimented on the contraforte to find solutions for his use of language to evoke musical expression. As a result of this, I now think less about the technical side of the instrument when playing and more about how I can play expressively. Haas's question about the quality of the note (F#) on the contraforte for the opening of his work increased my awareness of the individual timbres of notes on the contraforte. Working with Posadas, I thoroughly investigated other areas of the contraforte. Posadas introduced me to think more about

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[395] Haas, e-mail message to the author, January 24, 2024.

[396] Lim, transcribed interview, Appendix E, LIM3, 04:49.

finger and embouchure compatibility when searching for technique solutions. Now I apply this philosophy when a composer asks to provide multiphonics for a passage. Previously, I would have provided a solution based on a mixture of high and low multiphonics, regardless of the finger's and embouchure's compatibility.

Working on overblowing with Posadas has advanced my skills in this technique, and now I better understand how to control it. Additionally, Posadas introduced me to the new idea of bichromatic trills, something I had not encountered before. This led to my investigation of this technique, which I included in my piece, *Travelling Suite*. His definition of a velvet sound (starting a note with no sound to grow into a filtered sound) differs from mine (playing at a barely audible level). This is an area for more consideration in my playing.

Investigating overblowing with finger trilling with Lim was a journey of discovery. Her curiosity added another dimension to my understanding of this technique. Now I think of this effect as a carpet of sound that emerges, a new perspective that continues to interest me. I have readdressed my ideas about underblowing on the instrument, as initially I thought the contraforte could not execute this very well. Her idea that underblowing is idiosyncratic to the instrument, and a useful technique, was a revelation. Working with her on this, improved my understanding of how to achieve this effect and opened my mind to explore more techniques on the contraforte.

3.7.3 How the Pieces Affected My Performance Techniques

The new pieces have increased my familiarity and technical proficiency in contemporary techniques. When I started, I was not well acquainted with the top register of the contraforte, and as each piece uses this register in some way, my proficiency in this area improved. The most significant work that contributed to this was Haas's *Was mir Beethoven erzählt* where I developed the performance practice of smiling when playing. This not only rounds the colour of the sound, but I have found I can use this technique to adjust intonation problems and control the attack of a note. Learning and performing Aperghis's T*ag ohne Nacht* increased my knowledge of standard and non-standard fingerings. I now use this knowledge to address tuning problems using alternative fingerings and have an array of dampening fingerings to utilise when I need a darker timbre. Playing Hass's *Was mir Beethoven erzählt* piece has not only changed

the way I approach quarter-tones but increased my proficiency in playing them. Haas employed quarter-tones in melodic lines, and I now view the playing of quarter-tones as a form of expression and not just a technique. Haas's work has challenged me to think more about breathing naturally than circular breathing. Haas used circular breathing in two places for pedal points, but playing with the violin, I needed to think of the best places to breathe.

Through learning Posadas *Ga*, I now understand how I can control the layering of harmonics by changing the position of my embouchure. Before I had only approached overblowing as a block sound. From playing his piece and Muir's *Pigeonholed*, I learned that the contraforte needs more time to sound. This was clear from such techniques as biting on notes and playing fast, wide intervals.

Through the process of approaching and finding solutions to the technical demands in these new pieces, I now have more control over contemporary techniques and I can concentrate on musical expression. A prominent example is when I learned and performed Aperghis's *Tag ohne Nacht*. His piece and Lim's *Nautilus* are pieces where musical expression is more important than the effects. Because of these two pieces, I now view effects as elements of expression rather than technical embellishments

3.7.4 Ideal Collaboration

The ideal collaboration for me was the concise and focused approach, akin to a variation of the 'composer composes and performer performs' model.[397]. I experienced this with Aperghis and Haas, perhaps because they are established composers with well-defined aesthetics. As I was familiar with their sound territory, I knew what to expect compositionally, saving time typically spent on analysing effects and experimenting. Interaction with both composers was brief, via e-mail, and focused on their inquiries, with an occasional audio file sent by me. I had some creative input in each piece, interpreting Aperghis's musical indications and selecting multiphonics to accompany the violin in Haas's composition. I did so unexpectedly while not anticipating learning

[397] Juliet Fraser, "The Voice that Calls the Hand to Write: Exploring the Adventure of Agency and Authorship within Collaborative Partnerships" (online paper, Harley Residency, Southampton University, 2019), 4.

or developing a new effect. However, even though these two collaborations did not have an experimentation process, I was still challenged. Haas introduced challenging high quarter-tone melodic lines, some in unison with the violin. Aperghis's use of glissandi on the overtones pushed my boundaries.

3.7.5 Pieces as Resources

I had anticipated five new works that would incorporate some of my research in a musical framework to serve not only as a repertoire piece but as a resource. This is what resulted. Aperghis's piece, which I recorded three months after receiving it, was utilised by Lim as a resource. She found it useful to gain insight into the instrument's agility and timbres such as singing, bisbigliandi, half-air sounds, glissandi and quarter-tones in the tenor register. Additionally, she realised how a performer's imagination can interpret the piece.[398] Her aesthetic was not changed by listening to Aperghis's piece.

[398] Lim, transcribed interview, Appendix E, LIM1, 05:50.

Chapter 4 Summary, Reflections and the Future

This concluding chapter recapitulates why I pursued artistic research on the contraforte and what my aim was. I summarise the research and reflect upon my development as a player and the significance of my investigation into the contraforte. I outline how my research is communicable to players and composers. In closing, I review how the contraforte has evolved in ensemble composition since the project's start, and I examine areas for future research. Finally, I ponder the question: Will the contraforte, a niche instrument, be used in the future instead of the contrabassoon?

This artistic research was motivated by my curiosity about an instrument that I play in a contemporary ensemble and for which I could not find any resources. Propelled by the lack of information, I embarked on investigating the contraforte and its acoustic construction, its reeds, its fingering system and extended techniques. Providing accessible information about the contraforte developed by a player for players will encourage composers to incorporate the instrument into their composition. This, in turn, will create more opportunities for bassoonists. My goal was to provide a foundation—which can be updated and expanded upon—of accessible contemporary techniques for the contraforte and pieces that use these techniques. Both can be utilised as resources.

4.1 Summary

In chapter one, I conducted a critical analysis of selected volumes from the Bärenreiter series, “Contemporary Instrumental and Vocal Techniques,”[399] focusing on the woodwind and brass compilations, supplemented with data from instrumentalists’ websites. I concluded that presenting my contraforte research on an accessible and updated online platform is the most effective approach.

A qualitative and quantitative comparison between the contrabassoon and the contraforte illustrate their differences. An examination of the contraforte’s acoustics answered my specific questions regarding the intonation of monophonic and quarter-tone

[399] Bärenreiter, “Contemporary Instrumental and Vocal Technique,” The Musicians’ Choice, accessed August 3, 2024. https://www.baerenreiter.com/en/catalogue/books/musical-practice.

pitches. Discovering that the contraforte has sixty-seven million fingering combinations possibilities provides for an astonishing range of potential timbres.

Chapter two focuses on exploring different forms of contraforte reeds and assembling a topography of contraforte sounds. I investigated and developed eighth and quarter-tones, multiphonics, overblowing, underblowing, roll and lip tones, dyads, glissandi, tremolos, and experimental sounds. To understand and develop each effect, I followed these criteria: defining the technique in relation to individual wind instruments; examining resources on the bassoon, contrabassoon, and contraforte, for the specific technique; discussing the employment of the technique in the repertoire, its usage by wind instruments, and providing examples of notation illustrating the technique.

Chapter three examines five compositions for contraforte that were created for this project by established composers. To destabilise any preconceptions that the contraforte should remain limited to the basso range, I sent each composer a sound bite of high-pitched contraforte techniques. The collaborative process, how the pieces contribute to my playing, performance practices, and the approach to the new instrument—the contraforte—by each composer is examined. Choosing up to six contraforte extended techniques in each piece, I explained how they are developed and employed in the compositions. The inclusion of my composition illustrates how I perceive the contraforte and wish others to perceive it.

4.2 Reflections

4.2.1 Assembling Categories of Extended Techniques

Starting this project was a challenge because I needed a structure with which to categorise contemporary techniques on the contraforte, many of which tend to overlap. There was no model of how to put the information I assembled into categories and charts and how best to present it. Analysing how other wind instruments performed techniques helped illustrate how the contraforte executed them differently. Trombones produce a multiphonic by singing whilst playing, which a contraforte cannot accomplish. The definition and result of a lip tone on an oboe is different to that of a contraforte. I began with seven manuscript books filled with notes about my research which

I later organised into categories. Additionally, writing up the results of my artistic research was far more challenging than experimenting, developing and performing them on the contraforte.

Ultimately, I view my categories of contraforte extended technique as a foundation that can be built upon. I covered standard contemporary topics—quarter-tones, multiphonics, and overblowing—as well as unusual techniques—dyads, whistle tones, and lip rolls. This was to illustrate how differently the effects sound on contraforte compared to the other woodwind instruments composers are more familiar with.

4.2.2 Contribution of the Pieces to My Performance Experiences

The inclusion of the new pieces from my research into both programmed and casual concerts allowed me to introduce the contraforte, an unfamiliar instrument, to a wide range of audiences in various settings. I performed these pieces in diverse environments, from traditional concert halls to unconventional spaces. For example, I played Aperghis's piece in a concert hall in Tokyo and in the courtyards of houses in Graz, while Haas's piece was performed in concert halls in Basel and Bern, as well as outdoors in a field. Posadas's piece was presented in a gymnasium in Cologne, and Lim's and Muir's compositions were featured in private house concerts in Vienna. My own piece, *Traveling Suite,* was performed in several church venues in Vienna. These performances reached a cross-section of the community, creating varied performance experiences. Audience members often approached me after the concert to ask about the contraforte techniques.

Each piece contributed distinctively to my performance experiences. In Muir's *Pigeonholed*, I encountered two significant challenges. The first was playing notes with a distorted effect by biting the reed without strangling the sound. The second was speaking text in precise rhythm before immediately playing the contraforte, a new experience for me. Ensuring that my voice was clearly heard and understood during performance was an important aspect of the piece as it connected the musical ideas.

Performing Aperghis's *Tag ohne Nacht* demanded an in-depth familiarity with the piece, almost to the point of memorisation, to focus on the musical expression it required. The piece's nuances and subtleties were unlike anything I had previously encountered on the contraforte, and the stamina needed to perform it pushed me beyond

my previous limits. Similarly, Posadas's *Ga* required significant stamina due to its wide-ranging demands from whistle tones to overblowing, underblowing, roll tones, and multiphonics. To meet these demands, I had to strengthen my embouchure and to make special reeds that could accommodate all these effects. Given the length of the piece and the minimal breaks, I performed it for different audiences in various acoustic settings before the final performance. This practice allowed me to understand how the effects resonated in different spaces. I learned that in some settings, the effects were too soft or brief to be fully appreciated by the audience. As a result, I adjusted my performance, playing the effects more slowly to ensure they were clearly heard. Haas's *Was mit Beethoven erzählt* was my first experience playing the contraforte as a soloist alongside a violinist. This required me to focus on blending with the violin and matching the timbre of the violin's quarter-tones. The piece also heightened my awareness of when to breathe when playing in unison with a string player. In Lim's *Nautilus*, my performance centred on conveying two distinct voices: a melodic line and the layering of sounds through the technique of overblowing. My own piece, *Travelling Suite*, contributed to my understanding of how different effects can work sequentially. A particular challenge was the preparation of playing with a trumpet mouthpiece with a bassoon reed inside it.

4.2.3 Recommended Starting Points from the Pieces for Performers and Composers

From these pieces, there are several aspects that I would recommend as starting points for performers and future composers. First, the various methods of overblowing on the contraforte. Overblowing, a relatively simple effect to execute, is utilised by Muir's *Pigeonholed* in combination with bisbigliandi, presenting an opportunity for composers to experiment together with a player with a goal of discovering new sound textures. Aperghis employs overblowing while speaking and singing in his *Tag ohne Nacht* which would be another area of experiment for both a performer and composer. His piece also demonstrates the use of auxiliary keys to achieve a glissando effect on a weak fundamental to execute overblowing. Posadas also utilises weak fundamentals for overblowing. A starting point could be to experiment in finding different ways of adding colours to these weak fundamentals. Additionally, Posadas's *Ga* focuses on

beginning a low fundamental and progressively increasing the harmonic layering through overblowing. For a performer, this is a good introduction to overblowing. Lim's *Nautilus* incorporates overblowing with finger trilling, an effect that is also easy to execute but has many possibilities. I would also recommend for a performer and a future composer, the exploration of quarter-tones on the contraforte. Aperghis employs quarter-tones with agility, while Haas integrates them into slower melodic lines, sometimes in conjunction with another instrument. In Lim's *Nautilus*, quarter-tones are used as passing notes. For a performer, learning quarter-tones could lead to broader experimentation with other microtonalities, which could be effectively utilised in slow melodic lines and alternative fingerings by a composer. Air and key sounds represent another area for further exploration, as these effects are relatively simple to execute. Muir concludes her piece, *Pigeonholed*, with air sounds and bisbigliandi on the lowest note, while Aperghis also ends *Tag ohne Nach*t with air and key effects. The sound in his piece fades out until the sound of only key clicks remain. Another example of this effect is in my composition, *Travelling Suite*, which begins with a combination of air sounds and key clicks. Glissandi also warrants consideration as a technique for the contraforte. Muir employs passages of glissandi in the middle and high registers of her piece, while Aperghis focuses on extended glissandi in the lowest register. Lim's use of lip glissandi in her piece presents another area for potential experimentation. The concept of vibrato is another technique I would recommend for composers and performers to explore. Muir's *Pigeonholed* features various vibrato techniques and controls across both the low and high registers. Lastly, roll tones, like overblowing, are effects that are relatively easy to execute. Examples of these are heard in Posadas's *Ga* and Lim's *Nautilus.* Posadas employs roll tones in sequences with varying bisbigliandi speeds, while Lim focuses on a specific example based on written D1, which evolves in sound through lip manipulation and bisbigliandi.

4.3 How My Research is Communicable to Players and Composers

As a practitioner, having a foundation of contemporary techniques for the contraforte to refer to is crucial. It makes me a more versatile performer and allows me to demonstrate the instrument's capabilities. By doing so, I aim to pass on my approaches to how I acquired this knowledge to other players and composers. My artistic research

on contemporary contraforte techniques with pieces that employ contraforte effects serves as a valuable resource, accessible online for players and composers to utilise. The research demystifies the contraforte and dispels assumptions such as the question addressed in chapter two: 'Can the contraforte play multiphonics?' With the insights gained from this project, I can provide more precise information to composers, such as specific tone centres of effects. I take every opportunity to demonstrate the contraforte to composers. As a result, composers are writing more challenging parts in their ensemble pieces, as listed below.

4.4 Presence of the Contraforte in Compositions

Since beginning my artistic research project, the inclusion of the contraforte in ensemble pieces has risen; some pieces are a direct outcome of demonstrating the instrument to the composer. Examples of these pieces as well as ones that I have played where the contraforte has a more challenging part than sustained notes include Liza Lim, *Extinction Events and Dawn Chorus* (2018); Gerald Preinfalk, *Fleisch für Klangforum* (2019); Johannes Kalitzke, *Werckmeister Harmonies* (2020/22); Brian Howard, *Sentinel* (2020); Eloain Lovis Hübner *Masse und Bewegung 3* (2021); NIMIKRY (Alessandro Baticci & Rafal Zalech), *Bird of Paradise* (2021) and *Rhizomatic Studies* (2023); Bernhard Lang, *A Song for Rachela* (2022) George Lewis, *Disputatio* (2023), and most recently Feliz Anne Reyes Macahis, *tínig* (2024). The contraforte has been used in chamber music and electronic pieces, both during my research period and because of my collaborations with composers. Examples include Brian Howard's *Carlotta's Memoirs* (2021) for alto flute, bass clarinet and contraforte, Ville Raasakka's *A black carbon haze* (2024) for alto saxophone, viola and contraforte and Helen Bledsoe's *Time Bomb* (2022), a collaborative piece for electronics and contraforte.[400]

4.5 Future Areas to be Developed

While this artistic research has yielded significant insights into the contraforte, numerous avenues remain open for future exploration. The sound I heard when playing the

[400] Audio example: Helen Bledsoe, *Time Bomb*, performer Lorelei Dowling, 2022.

contraforte in recording sessions was different from the recorded sound that was produced. This phenomenon is common, and I would like more experience in recording the contraforte. I would specifically like to acquire the knowledge of which acoustic setting suits the instrument and which microphones are appropriate. For my artistic research project, I recorded in four different venues: a concert hall, a church, a small studio and a large rehearsal room. From these recordings, I concluded that the contraforte sound needed both acoustic enhancement from the room and added reverberations in post-production. However, I still need more recording experience to decide on the microphone set-up and the ideal sound of the recorded contraforte.

In addition to raising the contraforte's profile in ensemble pieces, including this unfamiliar instrument in chamber music would be a welcomed change. This inclusion would offer new playing opportunities for players and serve as a further resource for composers. Exploring the combination of electronics with the contraforte is another area that should be considered a viable compositional option for the future.

I am keen to explore the 3D printing of reeds and to further investigate the construction of fibreglass reeds. The development of more unconventional sounds for the contraforte will undoubtedly occur. Additionally, further research into a catalogue of not only multiphonics but also other techniques that utilise the same fingerings on both contraforte and contrabassoon would be an appreciated resource for players and composers. It will be interesting to determine which contraforte effects could be replicated on the contrabassoon and if comparable outcomes could be achieved.

4.5.1 A Question for the Future

The developers of the contraforte, Guntrum Wolf and Bendickt Eppelsheim, were passionate about the instrument. Their enthusiasm and knowledge helped to promote it, but, sadly, both have died. Although the Wolf company continues to produce the contraforte, the original enthusiasm and drive have diminished, raising concerns about the instrument's future. Owing to this, one might worry if the contraforte will survive. Will it follow the same path as the contrabassophone when it was introduced in 1847 to rival

the existence of the contrabassoon? With its large bore (like the contraforte), the contrabassophone was so loud and powerful that it failed to gain popularity.[401] A renowned contrabassoon player's response to this question gave me a sense of reassurance. When the now former contrabassoonist of the New York Philharmonic, Arlen Fast, was asked if the contraforte would challenge the existence of the contrabassoon, he replied:

> I can't predict that. Only time will tell. The parallel is with the bass oboe and the Heckelphone. Both are built, and sometimes people will cross over and play a bass oboe part on the Heckelphone, or other way round. They are two different instruments, and I don't think one will make the other disappear.[402]

Despite its unfamiliar, niche status and the limited sales of approximately eighty instruments by its sole producer, Wolf, I believe the contraforte will survive.[403] I have previously stated the astounding discovery that the contraforte has sixty-seven million fingering variations. The importance of this cannot be overemphasised. This dispels any notion that the contraforte is an instrument only designed to play in a basso continuo role.

In conclusion, it is my aspiration that the findings of my artistic research will serve as valuable resources for both composers and players. This will enable composers to write both solo and ensemble compositions that incorporate the contraforte as not merely an instrument confined to a diminutive role, but as a versatile and integral component of contemporary music. For players, my research provides a foundation on how to play extended contraforte techniques. By broadening the understanding and application of the contraforte, my research aims to foster greater recognition and the innovative use of the instrument within the musical community.

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[401] Tom Dibley, "A Contrabassophone by Alfred Morton." *The Galpin Society Journal* 53 (2000): 60. https://doi.org/10.2307/842317.

[402] Nora Post, "Redesigning the Contrabassoon: an interview with Arlen Fast," *The Double Reed* 40, no.5 (2016): 78.

[403] Firm Wolf, e-mail message to the author, June 14, 2024.

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Appendices

Appendix A

Questionnaire to Benedikt Eppelsheim

A questionnaire in German (with the English translation following) on the contraforte was sent to Benedikt Eppelsheim, the surviving maker of the instrument, on June 13, 2022. Please note that the spelling and wording used by the interviewee has not been modified.

1. Warum haben Sie sich für den Bau des Kontraforte entschieden?

Eine modernere Alternative zur traditionellen Konzeption des Kontrafagotts, welche ins 19. Jahrhundert zurückreicht, schien uns sehr interessant und möglich zu sein.

2. Basiert es auf dem Konzept (grössere Bohrung/grössere Tonlöcher) eines Kontrabassophons?

Nein!! Ein Kontrabassophon habe ich schon einmal angeblasen; es stimmt sehr schlecht, Oktaven um “mehrere Meter” zu tief, daran hätten wir uns nicht anlehnen wollen.

3. Warum erhielt das Instrument den Namen ‚Kontra...forte‘? Hat es einen Bezug zu dem Wort ‚Kontrabassophon‘?

Es ging eher um den größeren Dynamikbereich als zuvor, wie beim Pianoforte, und das eben in der Kontrabaß-Lage.

4. Haben Sie zuerst die Konstruktion/akustischen Eigenschaften des Kontrafagotts (oder Kontrabassophons oder Fagotts) analysiert, bevor Sie mit dem Bau des Kontraforte begonnen haben?

Ja. Gerade die Töne und Griffe der “dritten Oktave” sind beim Heckel-Konzept problematisch.

5. Haben Sie ein Computerprogramm verwendet, um das Kontraforte akustisch zu konstruieren? Haben Sie dasselbe Programm für das Tubax (E♭/B♭) und/oder das Lupophon verwendet?

Ja - Computerprogramm ist ein großes Wort - es ist nur ein kleines Programm, welches ich zuerst in Basic geschrieben hatte, aber jetzt als Excel-Tabelle läuft. Es basiert auf Formeln aus Cornelis J. Nederveen's Acoustical Aspects of Woodwind Instruments.

6. Gibt es ähnliche akustische Eigenschaften zwischen dem Tubax, dem Lupophon und dem Kontraforte? Ist die Bohrung zwischen den Instrumenten ähnlich?

Alle drei sind konisch, weiter geht die Ähnlichkeit nicht.

7. Haben Sie während des Bauprozesses einen professionellen Kontrafagottisten zu Rate gezogen?

Natürlich – Stefan Pantzier und viele andere.

8. Warum haben Sie ein Instrument konstruiert, das von den Spielern nicht auseinandergenommen werden kann, um einfache Reinigungsvorgänge durchzuführen?

Wenn das Instrument auseinandergenommen werden kann, wird so eine komplexe Mechanik dabei immer verbogen und dereguliert; das beste Beispiel dafür ist (Kontra-) Baßklarinetten. Selbst zerlegen sollte man sinnvollerweise nur Instrumente mit wesentlich einfacherer Mechanik. Sie können aber relativ leicht die Bögen abnehmen, um die geraden Partien reinigen zu können, wenngleich nicht ganz ohne Werkzeug.

9. Das Klappenwerk ist sehr schwer und groß. Haben Sie es nur für große Hände konstruiert?

Es ist für durchschnittliche Hände konzipiert. Dabei kann man nicht vermeiden, daß es für manche Hände dennoch nicht paßt.

10. Würden Sie in Erwägung ziehen, die Form zu ändern und/oder das Klappenwerk zu reduzieren?

Nein – höchstens im Sinne einer persönlichen Anpassung für kleine Hände.

Einfacher kann Mechanik für die gewünschten Funktionen sicher nicht werden.

Würden Sie in Betracht ziehen, das Material der Klappen zu ändern, um das Gewicht des Instruments zu verringern?

Das ist kaum möglich; Titan ist etwas leichter als Messing und handwerklich sehr schwer zu verarbeiten; Aluminium ist zwar sehr leicht, aber kaum zu löten und sehr anfällig für Korrosion. Übrigens hätten leichtere Klappen einen großen Einfluß auf die

Ansprache der Töne, denn es ist die Massenträgheit der Klappen, die den Schalldruck ‚gegenhalten'; leichte Klappen würden mehr mitschwingen und der Luftschwingung Energie entziehen; akustisch wäre das Instrument dann schwächer und klanglich matt.

11. Warum haben Sie sich entschieden, die Kontraforte mit einem Doppelrohrblatt, statt mit einem Einzelrohrblatt-Mundstück zu spielen?

Es sollte doch ein Fagott werden und auch so klingen... probieren Sie das Kontraforte mal mit einem Sopransaxophonmundstück mit Adapter - klingt wirklich ordinär!

Wer hat das Rohrblatt dafür entworfen? Wie haben sie es entworfen? Haben sie eine Gleichung verwendet?

Nein, es ist empirisch entwickelt und ähnelt Rohren für Kontrabaß-Sarrusophon.

12. Warum gibt es eine Option für ein Kontrafagott Rohr, wenn es nicht zum Spielen eines c"" verwendet werden kann?

Die Option ist für Spieler gedacht, die sich partout nicht auf andere Rohre einlassen wollen; es ist immer ein Kompromiß, wenn das Rohr zu klein ist.

13. Warum haben Sie eine dritte Oktavtaste hinzugefügt, nachdem Sie das Instrument auf den Markt gebracht hatten?

Die Oktavmechanik hat nur zwei Drücker (einer für c#, weil man sonst nicht beide Drücker zugleich erreicht) – welchen dritten meinen Sie? Natürlich versuchen wir, das Kontraforte kontinuierlich weiter zu verbessern, auch nach Einführung.

14. Wollten Sie mit der Einführung der dritten Flageolett Klappe das Instrument zu einem ‚zeitgenössischen Musikinstrument' entwickeln, im Gegensatz zu einem Instrument, das die Rolle eines Kontrafagotts für Orchester spielt?

Nicht im Gegensatz – es spricht einfach nichts dafür, diese technisch sehr einfache Möglichkeit wegzulassen. Man kann dennoch ‚klassisch' oder ‚konzertant' darauf spielen, ob mit oder ohne Flageolett-Klappen.

15. Wer hat die Grifftabelle für das geschriebene c" bis c"" dafür entwickelt? Welche Untersuchungen wurden dafür durchgeführt?

Bitte richten Sie diese Frage an Guntram Wolf GmbH. Ich habe das grundlegende Konzept gemacht, Detailentwicklung und Tabellen Firma Wolf.

16. Warum haben Sie sowohl ein Wasserventil als auch einen Abfluß? Ist das Wasserventil für musikalische Zwecke angebracht oder bemessen? (D.h. das Wasserventil des Kontrafagotts kann als Ergänzungsklappe verwendet werden, um den Tonumfang auf das geschriebene e", f ' zu erweitern) Warum Muß der Filz im Wasserloch gewechselt werden? Welche Auswirkungen hat dies?

Wenn man den Filz nie wechselt, verschimmelt er und wird dicht; dann kann man das Wasser mit der Klappe immer noch ablassen. Musikalisch war die Wasserklappe nicht gedacht.

17. Warum haben bestimmte Töne mehr Widerstand als andere?

Um ganz gleichmäßig zu spielen, müßte das Instrument gerade sein, 6 m lang ohne Bögen; alle Tonlöcher müßten offenstehen, und jeder Ton müßte ein eigenes Oktavloch haben – praktisch alles ganz unmöglich.

Jede Abweichung von diesem ‚Ideal' bringt Kompromisse und Nachteile mit sich.

Bohrung: Warum konisch? Dadurch wird viel mehr Luft benötigt.

Diese Frage verstehe ich nicht – die andere mögliche Bohrungsform wäre zylindrisch – dann wäre es ja eine Kontrabaßklarinette, klingt ganz anders und überbläst in die Duodezime - ? Eine Kontrabaßklarinette bauen wir auch.

18. Warum haben Sie Ahorn gewählt? Wie haben Sie das Ahornholz behandelt?

Es ist das üblichste Fagott Holz, und ist zudem wesentlich leichter als etwa Grenadille oder Palisander.

Mir ist aufgefallen, dass einige Teile des Instruments aus Ahorn und einige aus Kunststoff gefertigt sind. Würden Sie in Erwägung ziehen, das ganze Instrument aus Kunststoff herzustellen?

Aus Kunststoff ist nur der erste Bogen, und die inneren Wandungen der ersten Bohrungen, wegen der Feuchtigkeit. Ganz aus Kunststoff gefertigt, wäre der Klang wesentlich schwächer; es wäre schwerer und kaum ein Musiker würde das Akzeptieren – also warum Kunststoff?

19. Wurde bei der Konstruktion und den verwendeten Materialien (Silberklappen) der Transport des Instruments berücksichtigt?

Messing versilbert – massiv Silber wäre noch schwerer und schlecht zu verarbeiten.

Erste Priorität waren aber musikalische Eigenschaften; der Transport steht erst an zweiter Stelle, anders als beim ‚Kronwalt'-Kontrafagott.

20. Hohes Register: Warum ist es leicht, das geschriebene f" um eine Terz zu überblasen, das g" um eine Terz zu überblasen und das A" zu unterblasen (nach meinen Recherchen liegt es daran, dass zwei Flageolett Klappen gleichzeitig geöffnet sind, und es daher für den Spieler leichter ist, die Tonhöhe zu verfehlen). Kann dies geändert werden, um das Risiko eines solchen Vorfalls zu minimieren?

Ich bin kein Fagottist und kann die Frage nicht beantworten; bitte fragen Sie bei Wolf.

Warum haben Sie das Instrument mit sechs Flageolett-Klappen gebaut?

Das ist mir nicht bekannt. Oder meinen Sie Flageolett- und Oktavklappen zusammen? - dann wären es fünf.

21. Ist das Instrument zwischen 440hz und 441hz gestimmt?

Durchaus auch bis 443 oder 444 Hz.

22. Warum sind die untere Oktave und die oberen Oktaven tief gestimmt?

Bitte erklären Sie die Frage genauer.

23. Meinen Sie, dass das Kontraforte verbessert werden muss?

Prinzipiell kann jedes Instrument verbessert werden, immer!

24. Warum wird das Kontraforte nicht in Asien oder England verwendet?

Das kann nur Zufall sein, wenn es so ist; wer es wem weiterempfiehlt usw...

25. Sehen Sie das Instrument als ein Orchesterinstrument oder eher als ein zeitgenössisches Instrument, das in Ensembles wie dem Ensemble Modern Musikfabrik, Proton, Ensemble Phoenix und dem Klangforum Wien verwendet wird?

Als Instrumentenbauer wird man sicher keine Empfehlungen aussprechen, wer es spielen sollte oder wer nicht – wir würden ja nur den ohnehin begrenzten Markt noch weiter einschränken und unsere Kompetenzen maßlos überschreiten.

Also soll es jeder spielen, der möchte, vom Genre ganz unabhängig.

English version:

1. Why did you decide to build the contraforte?

A more modern alternative to the traditional concept of the contrabassoon, which dates back to the 19th century,[which] seemed very interesting and feasible to us.

2. Is it based on the concept (larger bore/larger tone holes) of a contrabassophone?

No!! I have tried a contrabassophone before; it is very badly tuned, and the octaves are way too flat. We did not want to rely on that.

3. Why was the instrument named name contraforte? Does it relate to the word contrabassophone?

It was more about the wider dynamic range than before, like the pianoforte, and [the fact] that it's in the contrabass register.

4. Did you first analyse the construction/acoustic properties of the contrabassoon (or contrabassophone or bassoon) before you started building the contraforte?

Yes. Especially the notes and fingerings of the problematic third octave with the Heckel concept.

5. Did you use a computer program to construct the contraforte acoustically? Did you use the same program for the tubax (Eb/Bb) and/or the lupophone?

Yes, a computer program is a big word. It's just a small program I wrote in Basic, but now it runs as an Excel spreadsheet. It is based on formulas from Cornelis J. Nederveen's Acoustical Aspects of Woodwind Instruments.

6. Are there similar acoustic properties between the tubax, the lupophone and the contraforte? Is the bore similar between the instruments?

All three are conical, that's as far as the similarity goes.

7. Did you consult a professional contrabassoonist during the building process?

Of course. Stefan Pantzier and many others.

8. Why did you design an instrument players cannot take apart to perform simple cleaning procedures?

If the instrument can be taken apart, such a complex mechanism will always be bent and deregulated in the process; the best example of this is (contra) bass clarinets. It makes sense to disassemble only instruments with much simpler mechanics.

However, it is relatively easy to remove the bocal in order to clean the straight parts, although not entirely without tools.

9. The keywork is very heavy and large. Did you design it only for large hands?

It is designed for average hands. However, you can't avoid the fact that it still doesn't fit some hands.

Would you consider changing the shape and/or reducing the size of the keywork?

No, but some adjustments can be made for small hands.

The mechanics certainly can't get any simpler for the desired functions.

10. Would you consider changing the keywork material to reduce the weight of the instrument?

That's hardly possible; titanium is somewhat lighter than brass and very difficult to work with; aluminium, while very light, is almost impossible to solder and very susceptible to corrosion.

Incidentally, lighter keys would have a great effect on the response of the notes, because it is the mass inertia of the keys that ‘counteracts’ the sound pressure; lighter keys would vibrate more and withdraw energy from the air vibration; acoustically, the instrument would then be weaker and tonally dull.

11. Why did you decide to play the contraforte with a double reed instead of a single reed mouthpiece?

It was supposed to be a bassoon and sound like one... try the contraforte with a soprano saxophone mouthpiece with adapter - sounds really coarse!

Who designed the reed for it? How did they design it? Did they use an equation?

No, it was developed empirically and resembles reeds for contra bass sarrusophone.

12. Why is there an option for a contrabassoon reed if it cannot be used to play a written C6?

The option is for players who absolutely do not want to switch to other reeds; it is always a compromise when the reed is too small.

13. Why did you add a third-octave key after you launched the instrument?

The octave mechanism has only two pushers (one for C#, because otherwise you can't reach both pushers at the same time) - which third do you mean?

Of course, we are trying to continuously improve the contraforte, even after its introduction.

14. With the introduction of the third flageolet key, did you intend to develop the instrument into a contemporary musical instrument, as opposed to an instrument that plays the role of a contrabassoon in an orchestra?

No in contrast - there is simply no reason for omitting this technically very simple possibility. One can still play classical or contemporary music on it, with or without harmonics keys.

15. Who developed the fingering chart for the written C5 to C6 for this? What research has been done for it?

Please address this question to Guntram Wolf GmbH:

I made the basic concept. The detail development and tables were done by company Wolf.

16. Why do you have both a water valve and a drain? Is the water valve appropriate or sized for musical purposes? (I.e. the water valve of the contrabassoon can be used as a supplementary key to extend the range to the written E5 and F5).Why does the felt in the water hole need to be changed? What effect does this have?

If you never change the felt, it will get mouldy and becomes dense. You can still drain the water with the water valve. The water valve was not intended for musical purposes.

17. Why do certain notes have more resistance than others?

To play completely evenly, the instrument would have to be straight, 6 metres long without curves. All tone holes would have to be open, and each tone would have to have its own octave hole - practically all quite impossible. Any deviation from this "ideal" brings compromises and disadvantages.

Why is the bore conical? This requires much more air.

I don't understand this question - the other possible bore shape would be cylindrical - then it would be a contrabass clarinet, sounds quite different and overblows at the twelfth. We also build a contrabass clarinet.

18. Why did you choose maple? How did you treat the maple wood?

It is the most common bassoon wood and is also much lighter than, say, grenadilla or rosewood.

I noticed that some parts of the instrument are made of maple and some are made of plastic. Would you consider making the whole instrument out of plastic?

Only the first curve and the inner linings of the first bores are made of plastic due to moisture. If it were made entirely of plastic, the sound would be significantly weaker. It would be heavier, and hardly any musician would accept that—so why plastic?

19. Was the transport of the instrument considered in the construction and materials used (silver keys) ?

Brass silver plated - solid silver would be even heavier and poor to work with. First priority was musical properties; transport is only second, unlike the Kronwalt contra-bassoon.

20. Why is it easy to overblow the written F5 and G5 by a third, and underblow the A5 (according to my research, it is because two harmonics are open at the same time, making it easier for the player to miss the pitch). Can this be changed to minimize the risk of such an incident?

I am not a bassoonist and cannot answer the question; please ask Wolf.

Why did you build the instrument with six flageolet keys?

I am not aware of that. Or do you mean harmonics and octave keys together? - Then there would be five.

21. Is the instrument tuned between 440hz and 441hz?

Quite possibly up to 443 or 444 Hz.

22. Why are the lower octave and the upper octaves tuned on the low side?

Please explain the question in more detail.

23. Do you think that the contraforte needs to be improved?

In principle, any instrument can always be improved!

24. Why is the contraforte not used in Asia or England?

That can only be coincidence if it is so; who recommends it to whom, etc..

25. Do you see the instrument as an orchestral or rather as a contemporary instrument used in ensembles such as Ensemble Modern Musikfabrik, Proton, Ensemble Phoenix and Klangforum Wien?

As an instrument maker, you certainly would not make recommendations as to who should or shouldn't play it. After all, we would only further restrict the already limited market and exceed our competencies beyond measure. So, anyone who wants should play it, regardless of the musical genre.

Appendix B

KUGscholar Links to Fingering Charts

Contraforte Fingering Chart C5–C6: https://phaidra.kug.ac.at/o:134696.

Contraforte Quarter-Tone Fingering Chart: https://phaidra.kug.ac.at/o:134698.

Contraforte Eighth-Tone Fingering Chart: https://phaidra.kug.ac.at/o:134697.

Contraforte Multiphonics (140) with Fingering Chart and Audio (ZIP file):

https://phaidra.kug.ac.at/o:134701.

Contraforte Overblowing / Isolating Harmonics and Trilling:

https://phaidra.kug.ac.at/o:134702.

Contraforte Original Underblowing Chart: https://phaidra.kug.ac.at/o:134703.

Contraforte Glissando Fingering Chart: https://phaidra.kug.ac.at/o:134699.

Appendix C

KUGscholar Links to Scores

1. Muir: *Pigeonholed*, https://phaidra.kug.ac.at/o:134691.
2. Aperghis: *Tag ohne Nacht*, https://phaidra.kug.ac.at/o:134690.
3. Haas: Was mir Beethoven erzählt, https://phaidra.kug.ac.at/o:134695.
4. Posadas: *Ga*, https://phaidra.kug.ac.at/o:134689.
5. Lim: *Nautilus*, https://phaidra.kug.ac.at/o:134692.
6. Dowling: *Travelling Suite*, https://phaidra.kug.ac.at/o:134693.

Appendix D

Transcription of Zoom interview with Alberto Posadas (AP) and the author (LLD) June 23, 2020

AP: 01:32 In the future [after Covid], it will be easier to meet in person, but in the meantime, we will have to use Zoom.

LLD: 01:48 Let's talk about what you sent [the ten chapters]. Then I'll have to look at my e-mails to see what I sent you as it was a long time ago. The ethereal sound bite I sent you is called chapter one.

AP: 02:37 In fact, the name/title of the sound bite—ethereal sounds—was given by you, and this was extremely interesting for me because when I hear the sounds, I don't associate them with a bass instrument.

LLD: 02:50 I think for most composers it is interesting. I didn't send any notation.

AP: 03:20 Chapter one is the first sound from the ethereal sound bite. In the written examples, I isolated the highest pitch of the two very close pitches in the extreme register. Simultaneously, there is a pitch sounding in the middle range. So, for me, chapter one, example 1A, is an attempt to isolate the highest pitch.

LLD: 04:20 I need to think about this because I am not sure I can isolate the two pitches.

AP: 04.38 I think it's possible because in the recording you did isolate the pitches. You are greater than you think.

LLD: 04:54 Oh ok!! I must listen to this sound bite I sent to hear what I did. I can still do the effects, but it’s been a while.

AP: 06.29 At the beginning of your sound bite, only the highest pitch is present and then the tone in the middle range sounds.

LLD: 06.51 I will need to give you instructions on what I did with my mouth and where to bite the reed and what I did with my tongue.

AP 07:01 For me that’s very important.

LLD: Not only you, but for players that want to play the piece in the future.

AP: 7:16 As I don't know the fingering you are using; I don't know the relationship between the fingering and the high pitch. This very high pitch must be a sort of high overtone.

LLD: 07:44 The fingering for this pitch is based on the fingering for the highest note [C6] on the contraforte.

AP: 07.58 Then I guess sometimes you can use different fingerings to get the same high pitch, because in this range overtones are so close that usually you get the same result or something very similar with a different fingering.

LLD: 08:18 Yes I think so. So, I will notate all the fingerings that produce this sound. Regarding fingerings, I constructed three different contraforte templates. I will send them to contrabassoon and contraforte players and ask them which one they like. The first template resembles yours, but I aligned the keywork to where the exact fingers are and I didn't use key names like you. As a bassoonist, I don't refer to the keys as the names of the notes. The other two templates have a simple design and are easier to fill out. They are both smaller and compact and may be easier to publish. I designed these two templates to be easy to fill in. Aperghis composed a piece for me based on quarter-tones. I needed a template to inscribe the two octaves of quarter-tones and standard fingering for the high register I developed. I want this on the internet as soon as possible so players can use this information. I want to use a one-page format covering the fingering for one octave.

AP: 10:41 I have a question concerning your template [shares my template on his desktop] What is this key?

LLD: 11:00 It's an alternative E♭ key. All contraforte's have this.

AP: 12:45 So for me this template is very clear. What's the difference between the flageolet keys 8 and 1? If you look at Wolf's fingering chart, the number 1 flageolet key is used as from F4. Then it's a twelfth.. The second flageolet key is used from Bb4. This is also a twelfth.

LLD: Actually, I am not sure why he called the flageolet keys this. I can find out for you if you like.

AP: 18:46 Yes because I would like to understand the mechanism. I think it would also be useful for your research. So, let me explain chapter one which is about ethereal sounds. I can try to explain the examples (1a, 1b, etc.) and then you can work on this in the next days. Do you agree to work like that?

LLD: 20:21 I'll write some fingerings out this afternoon for chapter one.

AP: 20:54 Yes, and fingerings also for the quarter tones

LLD: 22:23 I'm quite amazed at how good they sound but I think you must believe they work when you play a large instrument. Players were saying they didn't believe in quarter-tones, but I can hear them, and I've been working with a tuner to really adjust to the pitch on the contraforte. And it works and works very well. Yes I'll good I'll send you that.

AP: 23.55 Do you understand all the examples in chapter 1?

LLD: 24:01 Yes but if I don't I will send you a specific question. In chapter 2, overblowing, in example 2a you have included overblowing on fundamentals that don't have a massive spectrum. G and G# have a limited spectrum but I think you are aware of this.

AP: 24:46 Yes. I went up to G# because then, in theory, we will cover the first octave. Of course, the higher we go the less harmonic layering is present. It's clear to me it doesn't matter, but in the end up to G# is also interesting regarding your research work. I think this is important to give a reference to the composers that the lower we go in terms of overblowing, the richer the spectrum.

AP: 25:30 So it means that we not only open the spectrum but try to extend the techniques. So, for me it's a matter of defining where the border is. It means that maybe from F# it is not going to work.

LLD: 26:02 Overblowing works on F, F3, G, G# but it's exactly what you said, they're weak and not rich. Maybe only the 4th and 5th partials are present in the spectrum. I'll send you a recording of overblowing from F to G#

AP: 26:41 For me, I like trying out all these possibilities and in the end finding what functions.

AP: 27:49 For 2A (overblowing to spectrum and returning to a fundamental note) just record F to G# but for 2B (overblowing to a full spectral sound and stopping) and the next examples it's better to have a recording from the A1 up to the say up to D3.

LLD: 28:19 Alberto do you want one recording or can I do short recording?

AP: 28.32 It’s up to you. 2C that you build up the spectrum once you have it just to try to trill.

LLD: 28:41 So I tell you specifically what I trill and give you examples of different things that are consistent. That's a wonderful idea.

AP: 28:56 The idea is you sustain the spectrum not only the bottom not of the trill of course.

LLD: So, can it be a trill in between spectrums? And not trilling an auxiliary key?

AP: 29:41 Yes it’s a spectrum to a spectrum. And one more thing for 2C— I didn't write it— is to start trilling the bottom notes and build up the spectrum. I don't know if this is going to work but we can try.

LLD: 2D have we done this spectrum opening.?

AP: 30:19 2D is once you have built up the spectrum you play a sort of grace note opening an intermittent hole [key] and then the spectrum is broken.

AP: 30:35 Can I play you a recording? I did the recording it's clarinet.

LLD: 30:50 Can you send me the recording?

LLD: [after a faint recording] Alberto, was it a clarinet, bass clarinet or a contrabass clarinet?

AP: 33:41 Clarinet, which means that normally on a bass clarinet this could work much better. I’ll send it to you by e-mail.

LLD: 34 33 OK I'll listen to it later

AP: 34:54 OK good so then we go to 2E. These are blocks of full spectrum sounds

Yes but every time with a full spectrum.

LLD: 35:10 That's interesting. I'm discovering that it's a very different way of playing. I really have to articulate exactly what I do for the next generation. I need equal pressure

from my top and bottom lip at the back of the reed here and you clamp down. I'm hoping that it'll work every time. I want to be consistent.

AP: 35:55 Good. 2F is almost the same thing . You start with an open spectrum and sustain it. 36.39 One more thing about overblowing. I used it for instance in Posadas Poética del Espacio when you played this, and we always had the same behaviour . Every time you built up the spectrum the dynamic increased and when you reduced the harmonic layers down to the fundamental note, there was a diminuendo. I'm wondering if it's possible to do the opposite dynamic gesture. For instance, to begin the bottom A1 with a forte, and diminuendo while you are building up the spectrum.

LLD: 37:18 OK I'll try it.

AP: 37:33 On clarinet it works or saxophone but with two reeds (double reed) I'm not sure this is going to work.

LLD: 37:40 It depends on how thick the cane is at the back of the reed. I've been experimenting with a tenor saxophone mouthpiece on the instrument. It wasn't very good so I used an alto mouthpiece I'll make you some recordings.

AP: 38:17 Chapter 3 overblowing. This example is on building up the spectrum and linking this to a multiphonic. This should be legato which means that not every multiphonic will work because you will need some specific embouchure for each multiphonic. So, we need to make these two worlds compatible.

LLD: 38:54 Chapter 3 looks very interesting. I found that if I opened a key just a little bit—they're all big keys—when overblowing, a multiphonic would sound. It's all about relaxing the pressure on the G pad slightly.

AP: 39:35 I'm going to send you another recording for this.

LLD: What instrument is it?

AP: It's again B♭ clarinet.

AP. 39:49 And I did exactly what you are describing. I played the bottom E on the clarinet and then I opened just one finger—right hand index finger—and I got the multiphonic.

LLD: 39:58 Alberto was it an open tone hole or a key covered tone hole?

AP: Open hole.

LLD: The problem with this exercise is that my instrument has no open tone holes. It only has key-covered tone holes.

LLD: 40:30 [Shows me the clarinet and he is taking his finger away from an open tole hole] You can control that by moving your finger slowly and this will trigger the multiphonic but I just have a pad. The open tone holes are easier to manipulate effects on the instrument. And with the contraforte all the tone holes are covered with pads. This makes opening the just a little bit key harder and I can’t control the effect. On the clarinet you can . It's easier with the open tone holes.

AP: 40:51 I think this case even if I have an uncovered tone hole it works like a key covered tone hole because I just open it. in fact, it's the same concept.

AP: 41:04 So I'm going to send you a recording right now. A spectrum going into a multiphonic.

LLD: 41:27 For this chapter on overblowing merging into a multiphoinc, I'll begin by using the same finger for each overblown fundamental.

AP: 41:59 So again I wrote from A1 up to G#2. It doesn't mean that we will use G# but just to check how it works. Normally we will just use bottom notes for this.

AP: 42:15 Chapter 4 Bichromatic tremolo. This is something I will show you on the clarinet.

AP: 42:34 This is something I call bichromatic tremolo. It means that I'm playing a tremolo between a standard note and a microtonal note. A normal note has a normal timbre, while a micro tonal note has a filtered timbre.

AP: 42:59 : AP plays B♭ clarinet. He plays a normal pitch then opens a side auxiliary key and trills very slowly.

AP: 43:17 I play a normal note with a standard fingering at the beginning then I have this (plays) normal note and then I open a little hole here. Because I open this little hole here (second highest key near the barrel) and I keep this closed (only the right-hand fingers closing the top three holes), the airstream cannot escape entirely through this tone hole (the top tone hole). So, part of the energy of the airstream is going through

this open last hole [the open tone hole of the LH index finger] Because I'm opening this little hole [the second from the top] the note I get is always filtered [in sound].

AP:44:04 Bichromatic and the contraforte. So, the idea for the contraforte would be to play A1 and open the smallest tone holes on the instrument.

AP: 44:19 For instance, the E♭ [auxiliary key] or the C# [auxiliary key] or something like this.

LLD: 44:38 I do have one problem. When I play A1 all my fingers are being used. The smallest key is the flageolet key that is labelled number two. It has a very small tone hole.

AP: 45:31 What about if you play 1 you can try opening the C# or E♭ auxiliary key. Or even the E♭ key in the right hand.

LLD: 45:53 Yes I could do that with the side of my hand. Alberto when you call them bichromatic tremolo I don't have to think in terms of tuning?

AP: 46:25 Bichromatic tremolo on the clarinet is a very light deviation from the sound: a 16th tone or something like that.

AP: 46:37 Chapter 5, you know from Poética del Espacio (2018–19) because we already used some of these examples. I think you remember the idea: just play a single normal note and open something to create this sort of tremolo.

LLD: I'll revisit that, as I know more now.

LLD: 47:05 Chapter 6: I have more multiphonics now.

AP: 47:15 I divided this into two different parts. The first part is beating.

AP: 47:38 When LD is written, it means Lorelei Dowling, and when JS is written, it means Johannes Schwarz from this website he created. However, if you look at the fingering, I'm not sure I understand his template.

LLD: 48:12 I have a look at it. I don't think I understand either.

AP: 48:16 Sometimes I'm confused with his way of writing the fingerings. So, I'm going to share this screen again. For instance, you can see the example on my screen.

AP: 49:52 Here's Johannes template for the multiphonic. It's a bit confusing for me.

LLD: It looks like he's put the bottom A [A1] at the top which is not where it is. Maybe it's a mistake. It's actually the other way round. I don't know why he's done that. You've written different fingerings on the example than in those in the template.

AP: 51:15 [chapter 6 explanation] About beating multiphonics: the idea would be just to get beating on the bottom notes.

LLD: 51:29 I have examples of [roll tones] on bottom E and F#'s. I need to notate that for you and send it to you.

AP: 51:46 And some information I would like to have about these multiphonics is not only the fingering and the pitch, but the dynamic range to get the beating [oscillations] and if you can control the speed of the beating through the embouchure. I have the impression that for some multiphonics you can but for others you cannot. [this applies to oscillations, which is not a beating multiphonic]

LLD: 52:10 You can control the beatings [oscillations] with the dynamics. Also, from using the diaphragm it can be controlled.

AP: 52:40 And the last thing I would like to know is if the beating [oscillations] begins immediately when you start the multiphonic [roll tone] or if it begins gradually.

LLD: Well, you have both I think, and they can be controlled. [answering in reference to roll tones].

AP: 53:11 Chapter 7 is soft multiphonics or dyads. I wrote here dyads or close to. It means that, in most cases, it's not a pure dyad; we have something else. What is very clear is that only two pitches are dominant.

LLD: I'll need to look at that because that's a hard one. Soft multiphonics are hard to start. I need to think about this.

AP: 53:47 Lorelei, in the recording of the ethereal sounds, you have one multiphonic [a dyad] like this, which is magical. At the beginning you have the ethereal sound and right after you have a dyad, a very pure dyad, and if I listen to just this, I would not be able to recognize that this comes from a contraforte.

LLD: A pure dyad. I know what you are referring to in the recording. It was a very interesting effect but I'm still not sure how it works. I'm not sure how that is produced.

AP: 54:44 Chapter eight is just multiphonics with a full sound. We already did some of them but maybe we can have more.

LLD: There's more. I have just worked some out. There's a [good] multiphonic on F# and there's a few more but you have a different technique to execute it [underblown]. I'll fix that up. I started using my teeth on the reed not biting just touching on the reed and then the multiphonic appears. I started using this idea which is an idea from a bassoonist and a clarinet player. They touch the reed with their teeth—they don't bite on the reed— and then a loud, dense multiphonic sounds.

AP: 55:25 So in this case it would be good to have a chart of the multiphonics and a recording as well. For all the multiphonics, I need the recording because if I have only the chart it's no point.

AP: 55:54 Chapter nine. Underblowing multiphonics means using a fingering for a high note and then relaxing the embouchure. I will try to show you this [takes B♭ clarinet] but I don't know if it will work because this sound is very delicate. If I play this note [plays a high note] and underplay [a lower monophonic note sounds plus air]. Now you hear that a lower note which is normally filtered .

LLD: You're bringing out a lower note. In English you say you humour the main note, and a shadow comes out but is maintained [present] I'll think about how that's done.

AP: 56:47 I have no idea if this works on a double reed instrument [bassoon it does].

LLD: It must work because Pierluigi Billone has them in his bassoon pieces. On the contraforte it's a matter of finding them and formulating how are executed. I have to think about what examples I've played in the Billone pieces to understand how I can underblow them on this instrument. Billone did get one note to sound and he taught me how to do that. You think about them and focus on them and then they come. [this is not underblowing]

AP 57:29 Chapter ten is on the notes where you can play bisbigliandi. I really don't know what the range is to play bisbigliando, which particular note can you begin with a bisbigliando.

LLD: 57 44 Could I also refer to this as microtone trilling? Because then there is a big range. I have a big bag of quarter-tone tricks for that, so I need just to work through those. Maybe I don't need to record all of the results. I'll just record interesting sections.

AP: 58:28 Yes. This is especially good information for composers to know which notes cannot be played when we apply this technique. And if the microphone trills mean a change of timbre, sometimes it is a pure micro tonal trial with the same timbre. Sometimes, we go to a darker or brighter timbre. Velvet tones mean just in which notes have the possibility of sounding from a normal to a filter sound.

LLD: 1:00:18 OK good. That's great Alberto. That's wonderful guidelines.

AP: 1:00: 23 I know it's a lot of work for you.

LLD: 1:00:26 Yes but I have the time now and I'm excited by it. I know much more now than I did a year ago, so that helps. I changed all the top fingerings for the top octave so it's in tune, and then I found all the quarter-tones. Now, with this, I actually have something to work on. The quarter-tones work, so that's a good thing. I'm going to start work on this tomorrow. Shall we meet again or shall I send you through things?

AP: 01:01:22 You can e-mail me questions and recordings. Then, I can listen to them and respond.

LLD: 01:01:30 That's great Alberto. Thanks so much. Bye.

Posadas's Chapters

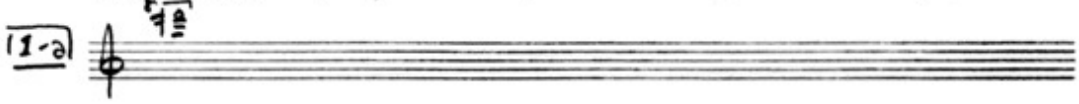
CHAPTER 1 Ethereal sounds

(Example : audio Lorelei)

Audio Lorelei

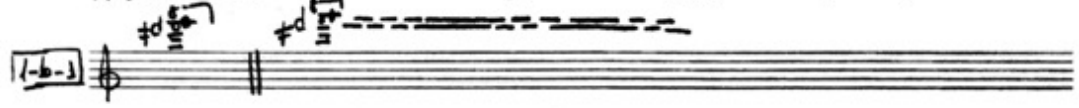
Ethereal sound (one pitch) - Relationship between fingering and resulting pitch -

1-a



Ethereal sounds (Two pitches - Oscillating (alternation trying to be together))

1-b-1



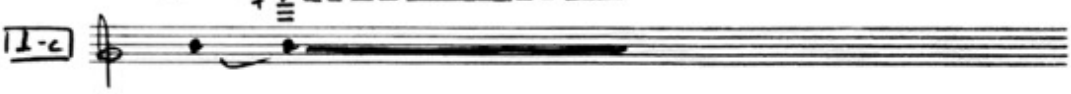
Ethereal sounds (Two pitches - Simultaneous)

tenuto

1-b-2

Ethereal sounds + ground pitch

1-c

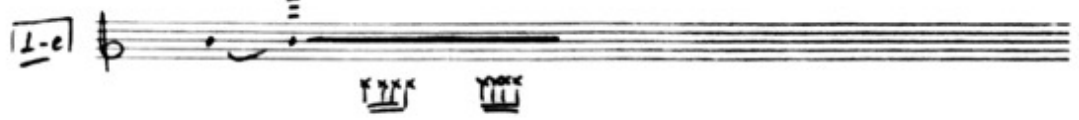


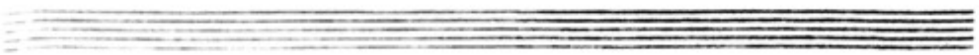
Ethereal sound + trilled ground pitch

1-d

Ethereal sound + Key clicks

1-e



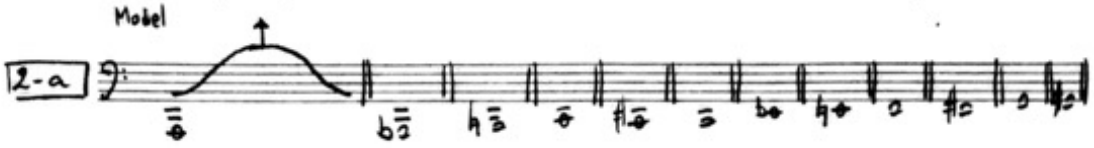


CHAPTER 2 – Overblowing –

Spectrum opening and closing

Model

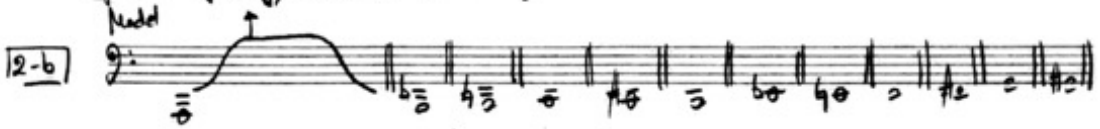
2-a



Spectrum opening, sustained and closing

Model

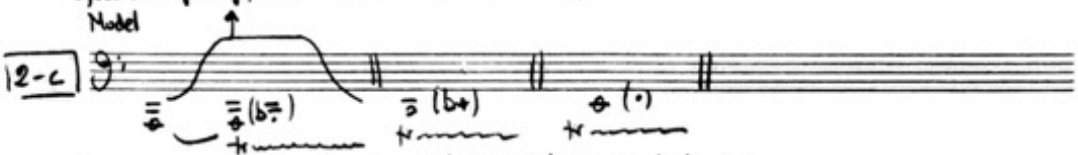
2-b



spectrum opening, sustained (trilled) and closing

Model

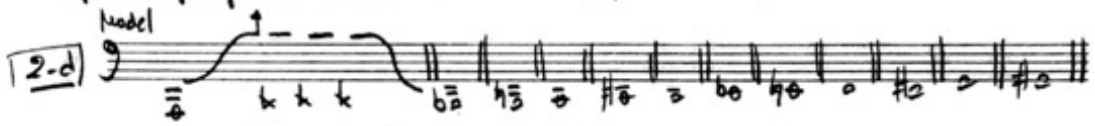
2-c



Spectrum opening, sustained with short (filtered) gaps and closing

Model

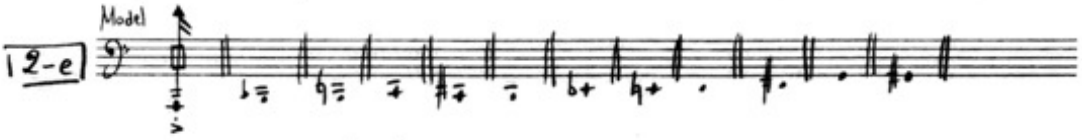
2-d



Straight overblowing - short notes

Model

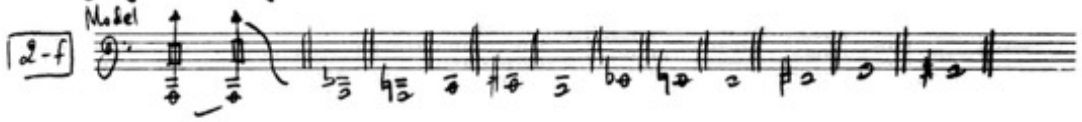
2-e



Straight overblowing and sustained

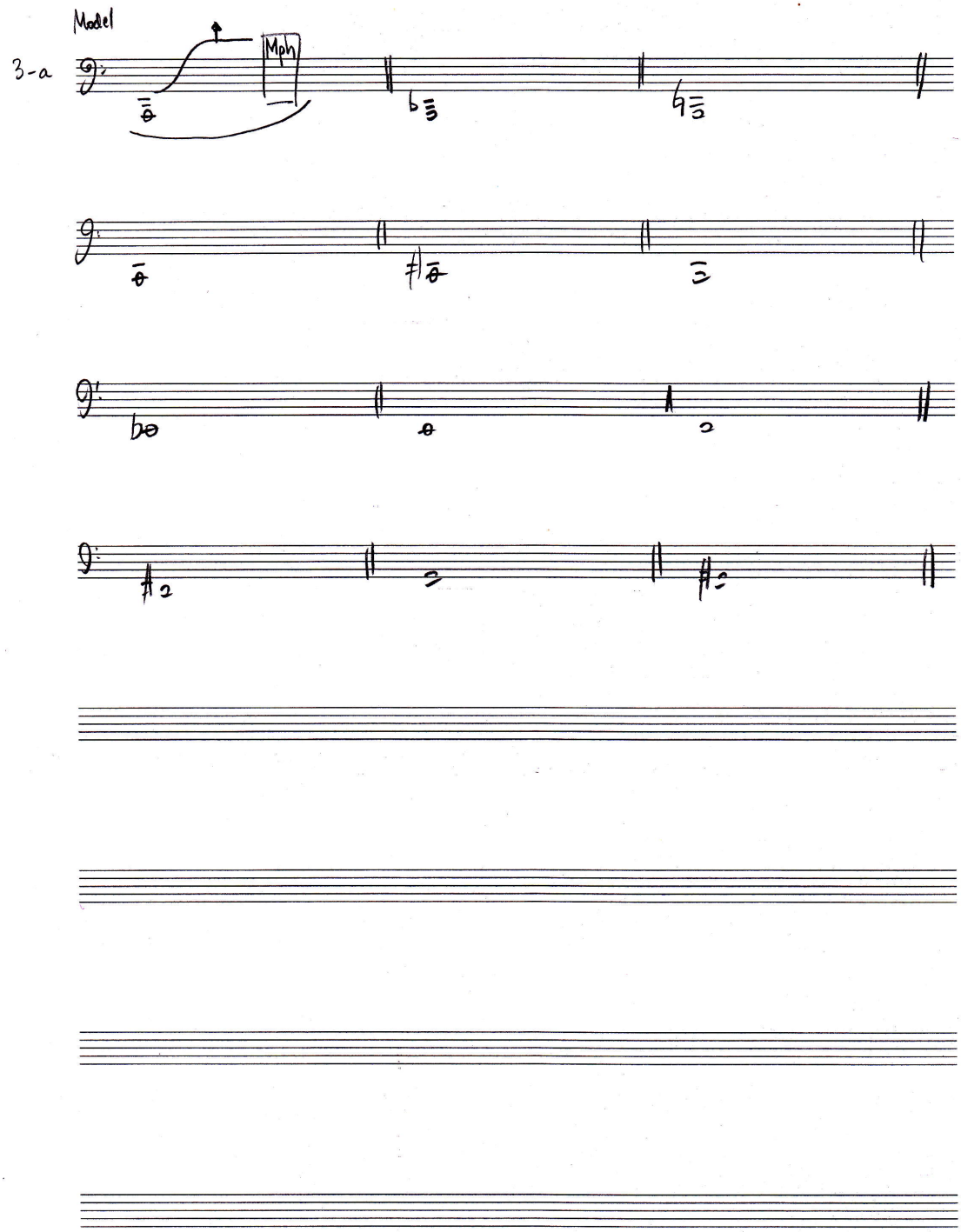
Model

2-f



CHAPTER 3

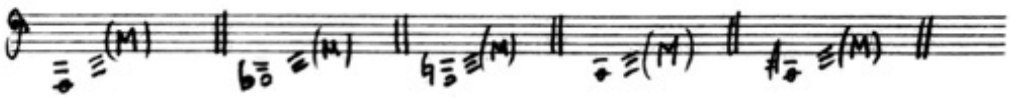
Overblowing linked to Multiphonic (slurred)

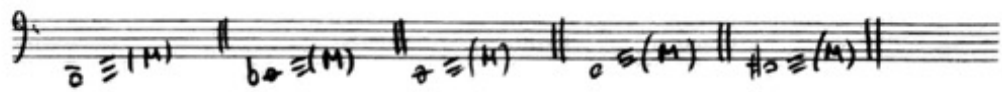


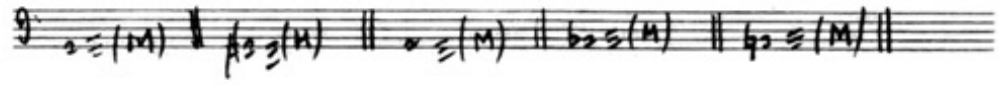
CHAPTER 4 Bichromatic tremolo

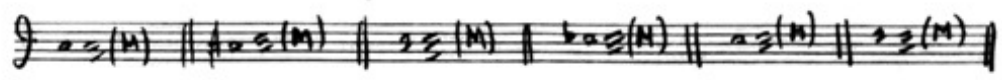
CHAPTER 5

Tremolo between a single note and a dense multiphonic



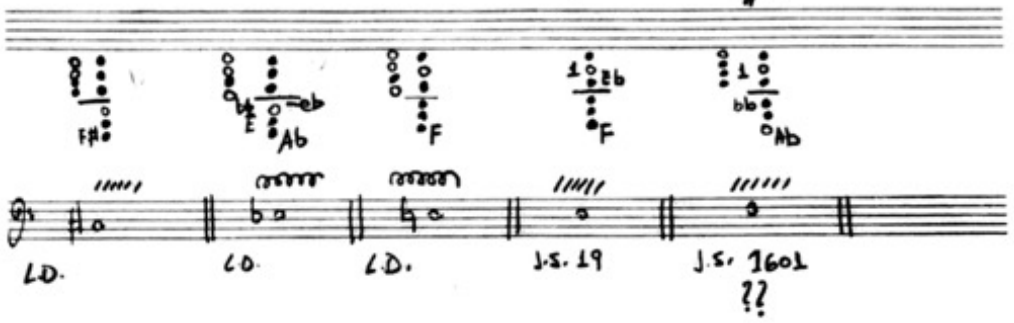


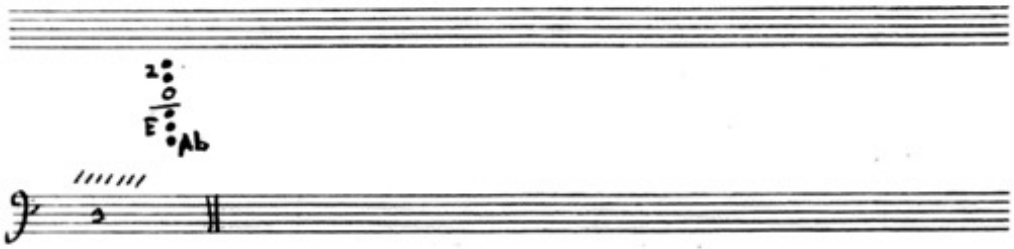


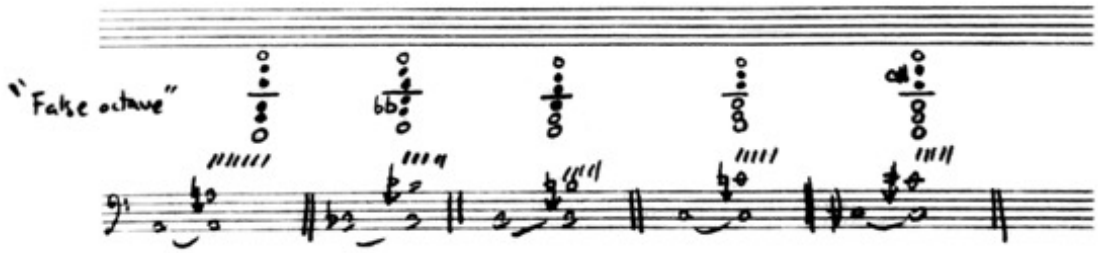


CHAPTER 6

Multiphonics
Category A → beating and slow oscillations
(IIIII = beating) // (ooooo = slow oscillations)

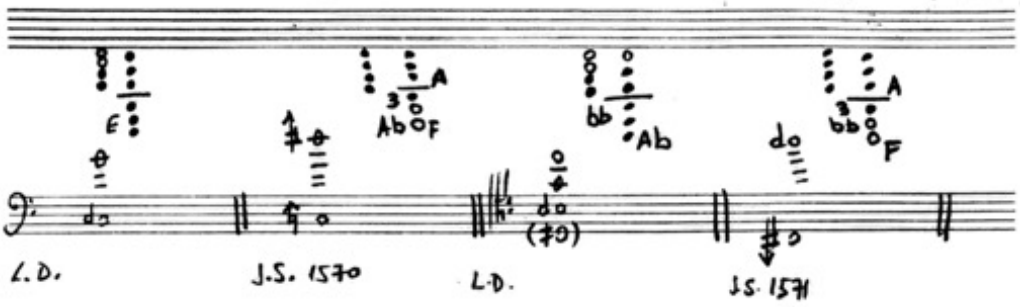


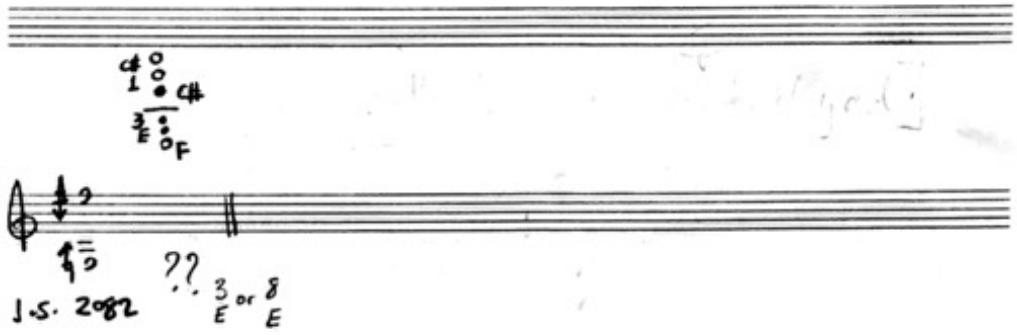




CHAPTER 7 Multiphonics

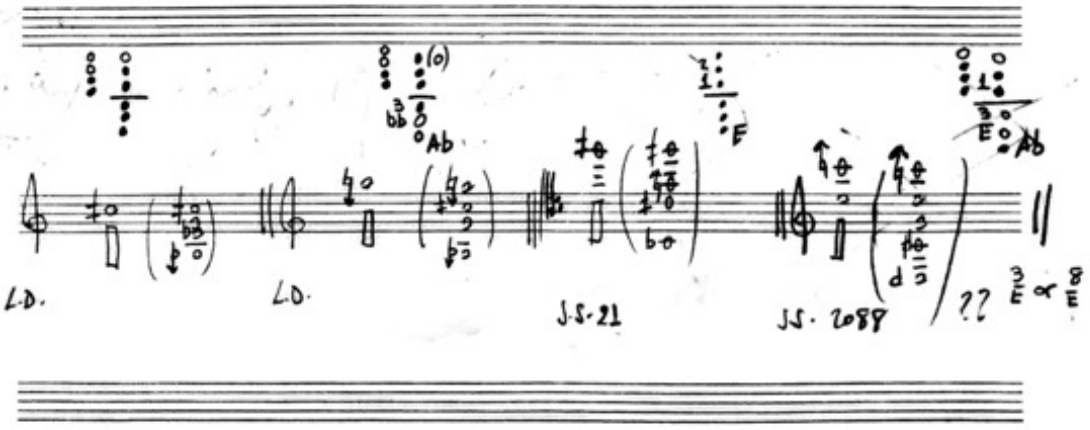
Soft multiphonics/dyads or close to





CHAPTER 8 Multiphonics

Full sound / Easy speaking and good connection with single notes



CHAPTER 9

Underblowing Multiphonics

CHAPTER 10

Bisbigliando

9-a Fast bisbigliandi (like trill speed)

9-b Velvet notes (for slow transitions from and to normal notes)

Appendix E

Transcriptions of Zoom interviews with Liza Lim (LL) and the author (LLD)

LIM1 January 20, 2022.

LLD: [Looking at the sketch Liza Lim had sent after hearing an audio of overblowing low notes while simultaneously trilling two fingers. Lim's notation resembled a clarinet part I have seen for overblowing a bottom note and isolating harmonics]. Don't compare the contraforte to a bass or contrabass clarinet. As the instrument is new it doesn't really define things like that. Oddly enough, I was trying to find examples of overtones in the ensemble repertoire.

LL: 00:41 [Looking at her sketch] I was notating what I could hear, which sounded quite defined.

LLD: Yes, the harmonics are quite defined, but not this effect. I started using a system where I used my embouchure to isolate harmonics as I moved my mouth slowly up the reed. But it's not comparable to how this effect [isolating harmonics] works on a single reed instrument. I experimented using a tenor saxophone mouthpiece on the contraforte to see if I could pick out the harmonics and create glissandi. This didn't work.

LL: 02:39 What I think was happening in that soundbite you sent me was this E-B-E-B-E pattern. And I think what happens then is that when you have the repetition, it creates a certain resonance, so it's easier to sort of pop around. I could hear you doing something similar to what flutes can do. It's a bisbigliando, isn't it?

LLD: I started opening different keys to sound harmonics. This is my version of isolating harmonics.

LL: 03:22 It would be interesting to know where these bisbigliandi fingerings are right, where you can get these articulations and not necessarily change the pitch so much. Like, you get it going. It's for me—a bit like the cello bowing on the strings. That builds up a feedback system within which it gets easier and easier to bring out all these richer and richer harmonics. That's something I'd be pretty interested in exploring. I certainly heard that as happening in that excerpt.

LLD: One of the main characteristics of the contraforte is overblowing.

LL: I could hear that in the Aperghis as well. That was a rougher sound. But I like this thing of repetition. What would be interesting for me to know would be the easier fingerings to alternate and where there are a few bisbigliando options because then you can use them to get this kind of rhythmic articulation.

LLD: 04:38 OK, and then thinking along the lines of that, I'll also see how it goes with circular breathing because then you can have a longer line. Unfortunately, the instrument is so big and has so much resistance that it takes more air and is more challenging to play than the contrabassoon. Even the mechanics are more complex. I feel it is built for men's hands. It could be simplified, but that's hard to do. Wolf doesn't want to do that.

LL: 05:16 I haven't listened to all the excerpts you sent yet, but what is striking in the Aperghis and the Posadas is how agile the instrument is. It can play super-fast.

LLD: The examples are me practising Posadas's ensemble piece [*Poética del Espacio*] I sent it to you to show that it's not a dinosaur of an instrument in terms of agility. I wish to push the contraforte as a high-sounding instrument. I want to convey 'the beauty' in 'the beast', so to say. I'll have to find you an excerpt from the Haas. He wasn't thinking along those lines at all, but he did use the quarter-tones in the extremities of the instrument, which I had to work out. Quarter-tones add another lovely timbre to the instrument. Surprisingly, the Haas piece all worked. It was a very convincingly contraforte part.

LL 06:26: [Looking at the Aperghis music]So you went up to the high E at the top of the treble staff, above a written Stravinsky D in the Rite of Spring.

LLD 06:45: Yes. I can go higher. I worked extensively with Posadas; he used a whistle tone I could control. Posadas has written one solo. I'll send you the music because he worked intensely on the piece. You've heard some excerpts that I've sent. Having the music means you can see how it's notated. We worked extensively on different things. There were things I thought he liked more. We set out a structure, but he was more influenced by what he knew of bass clarinet (and saxophone), but that's OK. He's into adding keys at the same time as playing something.

LL: Yeah, I mean, he’s done a lot of stuff with saxophones, you know, releasing keys and then doing something. That is also in Axis Mundi [her solo bassoon piece}. Is that particularly effective [on the contraforte] in your view?

LLD: 08:13 Yes/No, it's a bit limited. Posadas also likes underblowing: bending the note down, and yes, it worked sometimes. I mean, the piece he wrote for me is called *Ga*, a mineral that is either in solid or liquid form. The name is appropriate because the instrument sometimes does and doesn't work or comes out differently. I think because it’s such a large instrument, sometimes I get variations I don't want—it just happens.

LL: 08:49 And so, Lorelei, is your thesis a kind of enumerating these different techniques? Is that the basis of it?

LLD: The basis is that there was no research on the contraforte, and if I could produce four solo pieces— and put the effects in context— that would help lift the instrument's profile so it could be a viable instrument for ensemble works. I tried to cover many areas of extended techniques— a lot of bassoon contemporary techniques—but many things that worked on the bassoon didn’t transfer to contraforte. For instance, multiphonics that I produce in the tenor register of the bassoon with lip bends don't work on the contraforte. I did a lot of experimentation and evaluation. I used finger combinations that worked on the bassoon and adapted them to the contraforte, but not many things worked. I examined many effects resulting in beatings: roll tones, lip tones, and dyads. Different resonances come from the pads. That's idiosyncratic to the instrument.

LL: 11:11 I thought there were a lot of techniques, colours, and stuff going on in the Aperghis. I love the singing. It sounds a bit like screaming and playing.

LLD: 11:27 The singing and playing is his idea. It wasn't even a collaboration, really. He just wrote the piece. He composed mainly in the C4–C5 although he could've used the next register.

LL: Sorry. You can go an octave above?

LLD: I go an octave higher. I was in the top register in the Hass piece— up to a C6. This is an octave above what Aperghis had written. And that's how high I played in the duets with the violin in the Haas piece. Aperghis’s piece for contraforte was very much

based on his contrabass clarinet piece I think, and he asked me how fast I could play quarter–tones—the instrument also doesn't speak as quickly. I think that the slower the tempo the more the sound is defined: the more you hear what is played. Also, I had to decide on how I would sing or scream in the Aperghis. I tried four or five different ways to get that effect on the recording. It worked best scream/singing above the pitch because you could hear it.

LL: It comes through. It's great.

LLD: 12:27 Aperghis wrote the piece then asked me if I could play it, if it was difficult. I sent him suggestions via recordings and thought about how I could execute his ideas. Reflecting on how to sing and play pushed me further as a performer, thinking about how other wind instruments achieve his colours.

LL: The quarter tones are mainly in the higher register in the treble staff.

LLD: The chart begins on a written G2 because anything lower than this doesn't' sound like a pure quarter-one but a muted note. It's like on the bassoon: a quarter-tone on E2 is the lowest quarter–tone a composer should use.

LL: 13:42 There are many bisbigliandi type things in the Aperghis.

LLD: Yes and he also used glissandi. I'm still unsure if glissandi are effective on contraforte. I've been looking at Xenakis's Kraanerg score, that was composed with a contrabassoon. in mind He uses long passages of glissandi with contrabass clarinet. Maybe he was thinking that if it works on a single reed instrument, it works on a contrabassoon. It's a little bit awkward because there are breaks between finger movements: it can't be smooth. The question is whether the player plays the passage chromatically and smears it together with lip bends.

LL: Meaning you fake over it. [We then talked about Covid and getting out of Australia].

LLD: 16:31 One problem I had with the other examples of pieces I sent you was the isolation of sounds. If it's isolated effects these work out of context. Posadas spectrally analysed underblowing with too many pitches for my taste. I told him not to notate like that because a young composer will come along and say, 'I just want you to isolate that pitch in the chord', and that's impossible.

LL: Also, there is so many kinds of variables in the setup of the instrument, the bocal, the reed, that all makes a difference.

LL: 17:19 Yes. When I spoke with Chris Redgate, he agreed it's all about teaching your instrument how to play the effects. I've blown in effects on the contraforte here in Vienna, and it all works but it doesn't mean other instruments or players can play what I can. Other players will need to believe they can do it.

LL: 17:54 So back to our piece: I've done plenty pieces that explore various techniques and whatever. I guess I'm not that interested in multiphonics. Or only in making an effects piece, so I hope that doesn't worry you. Probably the thing that has attracted my attention so far is that kind of bisbigliandi overblown thing. It would be a really great to get a few more examples and your thoughts about that. That would be good. What sort of sits naturally under the fingers offers a few options because then I can build around that. I don't want to do something that's super awkward. It attracted my attention when you were doing this overblowing thing, which was just repetition because of the different overtones coming out. You're getting these kinds of cross-rhythms, and I think that's interesting.

LLD: 18:59 That was a new technique I developed with alternating fingers.

LL: 19:08 Lorelei, it would be great to get an iPhone video of you doing that so I can see the physicality of it.

LL: 19:45 And so just to go back to the question of speed because what you were doing in the Aperghis seemed super speedy. Super delicate and articulate. Is that just only you? Are you the only person who can do that?

LLD: 20:06 That's just tonnes of practice, to be honest. And if it's tonnes of practice, others can do it. So, when I sent you that example which says Posadas, it was in that register where you could go fast. For Aperghis, I developed and used short, uncomplicated fingerings to be more agile. You still get a bit of cross-fingering, but it's playable– E♭3 is with this finger, and then you must slide down for a C3.

LL: You did something on F2 and G2. What was that?

LLD: 22:47 Appoggiatura (grace notes) to a third, + B♭, beating, lip gliss, multiphonic, lip gliss + octave key = monophonic note. Having experimented, I'd say it probably only functions on those notes.

LL: 22:29 You said this before, but glissandi is quite restrictive, isn't it? Even in the high register ?

LLD: Yes, but playing the Berio Seuenza on the bassoon, which is all about glissandi, influenced me. If I can do it on bassoon, maybe I should investigate another way of approaching glissandi. I'm unsure.

LL: There's not that much room for a glissando, just with the mouth and a reed. Do you have to use the keys?

LLD: Yes and with the keys it must be a smooth progression. I've been mapping out a fingering chart that has taken me much longer than I thought. I keep taking breaks from it, returning fresh, and finding other solutions. 23:49: What else interests you? LL: Bisbigliandi, overtone type things on patterns. What about underblowing multiphonics?

LLD: 24:14 I was disheartened about underblowing because my results were not consistent or convincing, but like I said, it's been a while. I established three different types of reeds to take a fresh look at them. I wanted consistency. I'll send you the music to *Ga*.

LL: I mean, why do some of these things that work well on bassoon don't work on contraforte? Is it purely the size of the instrument, the reed, or is it like where the holes are?

LLD: 25:18 The contraforte has covered keys, and the bassoon has nearly all opened keys. Glissandi, I can execute on the bassoon with my fingerings slowly rolling over the holes; on the contraforte, I can't use this technique. Also, the size of the reed comes into it. There's nothing refined about a reed this size [shows contraforte reed] to try and make things work, I started experimenting with a new embouchure technique—smiling—which results in equal pressure on the reed and helps start notes like C6. In Haas's concerto, there are many C6's. Employing this technique at the back of the reed helped to sustain C6. I should try this way of playing to execute underblowing. It might work, and it could help sustain the underblowing result.

LL: 26:07 The beauty of under-blown multiphonics on a bassoon is that it's not an extra fingering. This, for me, feels a bit more idiomatic, even if it doesn't work on the contra-forte. From a compositional point of view, there's something very positional about it that's attractive. And it comes in very easily. But tell me, what's your schedule? When I get a few more things from you, I'll start on the solo. When do you need it by?

LLD: April/May.

LL: Send me a few things, and hopefully, I can make a few sketches and perhaps send them to you. You can say yes, this works, and this doesn't.

LLD: Send sketches, and I can record them in different ways and tell you exactly how I do it. While playing, I reflect and think: How would it sound on another instrument? What would they do? How would they approach it mentally? Often, I come up with new solutions.

LL: 31:22 Fantastic. I think that's a really good way to go. Let's just make a stop. Maybe in March, you know, there'll be a few sketches as well; that would be cool.

LLD: What are your ideas about the instrument? Not that you would have heard much diversity.

LL: It hasn't crystallised into anything yet. I'm just waiting for you to send a few more things and then we can really begin on it.

LLD: Ok. Nice to chat. Speak soon. Bye.

LIM2 January 28, 2022.

LLD: I only looked at the first page, and I was happy to see you've used the characteristics of the contraforte instead of the contrabassoon. You've used the top register, the A1, the tenor register (begins on, say, C4, which is much better and easier) and the very top octave, which people are only starting to become acquainted with.

LL: 01:25Yeah. So, you can see I'm very attracted to the burbling, rippling, partials sort of double trill thing. So, the question was, how idiomatic is that for you? Does it need more time to speak? And then moving in and out of that is a question. You can see sometimes I've written 'alternate freely 'and you get a sort of that partial sweep, but then can you also emphasise a particular partial [bar 5] and move around to find these

other patterns and sweep down [harmonic layering diminishing] which I think you can right? It's just a matter of organising your fingerings.

LLD: 02:03 What is nice about collaborating is that the more precise your work is, the more I work it physically on how an effect is executed. Then, I can articulate it on paper and teach it.

LL: 02:33 That's great. Are these glissandi in bar 8—G quarter sharp4 to G#4 in the highest register?

LLD: 02:53 The G4 is not in the highest register. The sound of the contraforte which, you need to know as a composer for orchestrating, is an octave lower than written. You don't need to indicate that on the score for me as a performer. I have a question about notation.

LLD: 03:23 In bar 1, does an arrow going down mean a micro-tone or a quarter-tone or it doesn't matter? For example, on G3.

LL: 03:42It's undefined and I used your notation. Does it matter to you if it's the exact tuning?

LLD: Absolutely not.

LL: To me, it doesn't make sense to say it's a quarter-tone. I mean, it's slightly flat.
LLD: A point about the partials on this big instrument is that they don't fit into the harmonic tuning system.

LL: Yeah, and this is distortion.

LLD: 04:18 [Looking at the sketch] I see what you've done in bar 8. You took the idea when I said I've got this amount of room in my mouth to do this G-G#4 glissandi. In bar 15, the glissando between E and F is between a simple fingering and a complex one—it's over a break. I worry about this when playing a glissando between E4 and F#4 in bar 14. I don't think it's as convincing as the octave above, but it will work. In bars 8 and 9, at the bottom of the first page, I'll play the glissandi with a lip bend and add some auxiliary keys to help make the glissandi smooth.

LL: So, this works fine? Yes. Great. Does the glissandi slightly above that, the B♭4 in the treble clef, bar 11, work?

LLD: 07:10 Yes, I have more resistance in that register, but it all works quite well.

LLD: I just wanted to ask you about bar 19. Can I consider that a tremolo effect rather than overblowing and then a shake between B♭1 and F3?

LL: Playing this tremolo is simply opening the first hole isn't it?

LLD: Yes, and if it's a bit slow in sounding so, I'd take another fingering to make it speak faster.

LL: 08:01 In Bar 1 there's a low C, and these are the right fingerings? So yes, is an alternating fingering and what I imagined is it starts slow, so you just open and close, holes, it's randomised, but there's a sort of upward pattern and you use your embouchure also to enrich the sound as you were doing in the beautiful video you sent me. So, I haven't tried to show a graphic notation or anything like that, it's more relying on the dynamic: the louder it is, the more partial rich it will be. Is that enough information?

LLD: Yes, it is.

LL: 09:14 Do you need an extra graphic? Because I think the basic thing is— and you know this from playing my other work—it's about fluid transformation between things. If things are smeary, blurry, and highly textured, that's great. 09:17: It's not about the note sounding clearly; it's about a kind of overall effect. So, from a technical point of view, this sits under the fingers quite nicely.

LL: 09:42 And then all this stuff in this tenor register, you don’t mind having in a treble clef bar 10?

LLD: 09:51 No, I don't. The only problem is the next generation. They will hate it.

LL: They don’t like treble clef?

LL: No. I’ve just gotten used to it, and I never questioned why composers used this clef instead of tenor clef, and now we’ve got this problem. An added problem is that the generation behind is not really into new music because all these techniques confront them, and then the use of treble clef just adds to the confusion of contemporary music. Perhaps you can remind your students to use tenor clef when you teach. It shouldn't be the normality that the bassoon reads in the treble clef.

LL 11:42: But tenor clef is the orchestral standard clef for bassoon right?

LLD: I would recommend that composers write in the tenor clef because there's always a crossover of orchestral bassoonists playing new music, and using the tenor clef is easier for them. [We lost the internet connection and had to re connect to it]

LIM2A

LL: 01:05 But for this work, it's okay to use treble because only the most adventurous, smart people are going to be playing this, so I'm happy that the glissandi are fine from your point of view. [Score share again] Hey, this is very exciting, Lorelei. I am really, really pleased with our collaborations so far. Now, can I just check A5 in bar 22?

LLD: One of the notes that has a lovely underblown result.

LL: Yes, and that's what I'm working towards in bar 28 is this underblown A5 because that's so beautiful. The U stands for underblown, and on your chart and recording, that was so beautiful. 02:00: It was basically an F chord with an added A.

LLD: 01:59 I've realised why it worked so well. There are some notes in the top register that I can miss pitch and they result in a note a third below sounding rather than the intended pitch. This is because two flageolet keys are open. It's a characteristic of the instrument. The A5 is one of the best notes to underblow.

LL: 02:30 Yes, it's beautiful. I've made a big feature of it. That's where I got to right, so U means all underblown.

LLD: 02:33 I understand. So, bar 14, is that underblowing as well?

LL: 03:01 Yes, that's underblowing on the F#4. In bar 14, there's a little 'scoop 'into the underblown and then back out with a glissando ending it in b ar15. The F#4 is underblown—I was working off your chart and recording—that F# seemed quite nice as well, that F#. In bar 14, there is a little scoop into it and then having a little bit of time on the underblown sound, and bar 15 comes out of it and there's a glissando. Does that make sense to you?

LLD: 04:14 It makes sense. I need to think about executing descending glissandi, which I am not comfortable with. I find ascending glissandi easier. Ahh, I know what I'll do: I'll end on a different F# fingering.

LL: 04:45 That means the same thing with this B♭ descending glissandi. Maybe you should finger an Ab, then pitch higher?

LLD: 04:54 I've got multiple fingerings for most notes, so maybe that will work.

LL: 05:06 Looking at bar 15, getting out of that F—does this make sense at all? This is based on clarinet thinking, that a sort of multiphonic (or overblown spectrum) on that is [derived from the B♭] Basically I want to arrive at the B flat making a connection between that tenor register F down to the B flat fundamental. Will this kind of thing work?

LLD: Yes, but I'll need to find some solutions. I'll send recordings to you.

LL: Ok. So, I've sort of focused on a few techniques. One of course is the beautiful partial burble trill key thing, the beautiful the tenor registers you've suggested, as well as popping up to the very highest registral space, and in that highest registral space to exploit some of this under blown stuff (A5). And the next sketch I want to check with you—maybe I should send it to you because it'll be too unclear to explain—it's the burble fingering figure, but it's shifting between two pitches—C and B (or RH 1 and 2)—which are almost the same fingers that are moving OK, but you're moving between C2 and B1 and on the left hand you're moving your index first finger) If you can imagine crotchet =60, first quavers, then triplets, but still movement going but changing the fundamentals. Could this work?

LLD: 07:17 I'll have to experiment with that.

LL: I'll send you something written out so you can see what I'm thinking. But again, clearly, it's about getting a texture going but having that rhythm underneath. So, it's a bit like an accident where you get this: Dida, Dida. It's like a quiet polyphonic thing. So that's another region that I'm really interested in.

LLD: 07:51 OK, great. In bars 24 and 25, why do you have question marks above the sextuplets in the bottom register?

LL: I just don't know whether I like that compositionally. I'm trying to make a link again between that top register and the bottom register. So that's just a question more for me. If you can make a recording, then I can make a judgement if it's going to work. It's a compositional question in terms of how I'm making the connection so that and how

the other part of the piece can unfold, which is going to exploit more of this lower register.

LL: 08:55 I'm not quite sure about the title, but the Lorelei poem is so beautiful.

LLD: I thought it was a bit dark.

LL: 09:16 It is dark. It's a little bit of a glance from the side, the title, I mean. It's not about the Sylvia Plath poem, but it's this idea of the instrument as a giant ear. Not just the ear that is seeing but also the ear that sings. That was kind of the image I have. This is very inspiring! When you have time, it would be great to get a recording of these things we've discussed. 10:30: I am also curious if things need more time to really warm up and become this sort of very rich world or is it ok how I've composed it? What's the framework in terms of duration in which sounds really come to their most beautiful quality?

LLD: I must think about that. I would use circular breathing.

LL: 10:58 Well, I mean, I've sort of gone for a medium length of things, with this idea of yes you have to breath. I prefer natural breath in terms of how I think about phrasing. If you make a recording, it will just allow me to refine what I'm thinking in terms of duration. But I think you get a sense of what the main materials are and how things are connected. It's very positional in terms of this fingering gives you this pitch which then allows you to move into another register. You know, it's really me as a composer following the grain of the instrument trying to work in as idiomatic way as I can. So, something like an eight-minute piece. Is that what you're looking for as well?

LLD: Yes, because as we know it's easier to programme and compositionally enough is said in that time.

LL: So that's what I am aiming for, and there's a nice flow. I love all these kinds of techniques you're discovering. It's fantastic.

LLD: For the next generation, we can only hope they will be intrigued by them.

LL: 13:00 We can sort of move it into quickly, which is exciting, and you can reflect on the piece. You know there'll be other things later.

LLD: 13:26 I never asked you this, but why did you use a contrabassoon to begin *The Alchemical Wedding*? How did you decide to use that voice?

LL: 13:42 I wanted a low-reed instrument. There's this Rumi poem about the reed. The God speaks through the wind through the reeds. So, it was a kind of translation of that.

LLD: You were sort of the first to compose something challenging for a contrabassoon. Then the bass clarinet comes in afterwards. You're also in the tenor register for the contrabassoon, which is good. Anyway, I'll get onto recording some things.

LL: OK. And I'll send you another chunk to look at as well. And then I think I'll probably have enough to pull it into shape.

LIM3 February 21, 2022.

LL: Am I kind of on the right track in the piece with the use of the special techniques.

LLD: Yes, I feel like I've let you down and haven't sent you enough. Do you need more? I started mapping out more sounds and being very precise with instructions to get the sounds. This will give you more of a soundscape. Or are you happy to be creative and say, 'I want this here' and I offer you things?

LL: 00:43 There was a question I asked about that beating multiphonic, which I really loved. The pitches fitted with what I already had. That's why I folded that into the second part that you saw.

LLD: Can I just ask, when you said can that beating multiphonic connect to the low B♭ alternating trill— Is there a place in the score where this happens?

LL: Yes, on page 4 but in the end I didn't really do it like that. I think limitation is good and the thing that really appealed to me about those ultimate fingering trills where you can step through a type of overtone series—even though it's a distorted series—Is that there is an incredible sort of fluid movement that is so idiomatic.

LL: 01:56 That's what I'm always looking for. I love the sound. I was really happy to have that as the real core of the piece. So, there's those kinds of things, and then you've got this sort of total mad high register stuff. And a couple of these underblown elements, which is like colouring in.

LL: 02:42 One of the things that's always so tricky with the focus on new techniques and fabulous new effects and so on, is that you just end up with a bit of a shopping list. I wanted to avoid that.

LLD: Good, because from my side I was having a crisis putting all this together. I thought I should have had everything systematically done. But I was thinking that as a composer you would have treated my systematic categorising like the shopping list idea: I'll take that, and that, maybe that, yes, and a bit of that.

LL: 03:07 I think what has served me very well is that this technique—which really comes into focus with the alternating trills—is a way of rethinking, those big overtone sounds that people are more familiar with in the clarinet repertoire. I think all of that is marvellous and that really has become the core part of the musical language of this piece. So, I hope this sits in a balance with other elements and it's not 'oh, here's this effect again.'

LLD: 03:47 I really enjoyed looking at the score today because comparing it to Posadas's piece, I find yours a more musical piece. His piece is an effects piece: one effect after effect.

LL: 04:49 It's not a massively long piece, but I think it's a good start. I think that's how we can treat it. I'll write more things later for you Lorelei later and I hope to use these worlds of sounds in ensemble pieces, because it's so rich, it's so amazing. So, if we can understand the piece as a first step, that's great.

LL: 04:51 Is there anything in the first three pages that are problematic? I mean, it goes super high, but I know that's what you can do.

LLD: No. I like how the piece goes to an A5 even though the instrument's range is to a C6. The top register is idiomatic to this instrument and is not being explored.

LL: 05:58 I find that the C6 is a little bit thin in sound and the A5 has a fabulous resonance. Underblowing the A5 is so beautiful and that's why I really chose that as a focus.

LLD: 06:14:Did I send you a recording of underblowing on the F#5?

LL: Yes. I have the list, but I use the F# (4) from the octave below, which I really liked. There was something about that A5 with that strong chord of sounding F. It was really, beautiful.

LL: 06:39 So, if that feels technically ok getting around the piece, that's great. And this kind of aural transmission in terms of how to play the alternating trills. It's not like arpeggios, but it's much blurrier as you trill. I think that fluid shaping, which is very much up to you as the player to do, is what I'm really looking for. That's not so apparent from the notation but I think you know that. In terms of how it's evolved, that's really the kind of thing I'm looking for a much freer-flowing approach.

07:33: [Looking at the new sketch: part two (page 4 and 5).]

LL: 07:50 I didn't get a fingering for the beating multiphonic. It's beautiful. You said it was a C#/D fingering, but you can also hear other beautiful tones above it. I want to know what the basis of this is. Is it a C# fingering?

LLD: 08:39 I play the bottom D of the instrument, which is a D2. Then by taking off my left-hand first finger, the air in tube is disturbed and this activates an oscillation. It's called a roll tone. Unlike the bassoon, the contraforte has all covered keys, so can't use half holes. I use my embouchure in four different positions to get harmonics.

LL: 09:32 The single finger disruption idea is what I used in my bassoon solo piece, *Axis Mundi*. So, it's not some weirdo fingering right!

LLD: No, it isn't. As a player I'm thinking about the harmonic overtones in the lower register on bassoon, contrabassoon and contraforte. I want to highlight these.

LL: 09:48 That's marvellous. So, if you look at the score on page 4, I notated the pitches and then I added the C# / D there, and then with the graphic, I think that gives scope for exploring the different embouchure positions to bring out different colours. That seems to be a reasonable approach to that fingering (bar 37 and 38). Try it and maybe there are some other observations about the fingering that you want to tell me about that. It's the only fingering I'll notate like that.

LLD: 10:53 There's some auxiliary keys that make it different and add a different timbre.

LL: So, auxiliary keys can be used like grace notes?

LLD: 11:00:Some act like a bisbigliandi effect, and others interrupt the multiphonic and perhaps even cause the multiphonic to become richer and louder.

LL: Send a recording. Those things can be represented a little bit more graphically with some suggestions. You can see in bar 39 how the multiphonic is connected to the D.

LL: 11:48 Then it tracks back to some of the previous high material that is related to the overtone structure.

LL: 12:09 In bar 49 I need your feedback. When you've got either your right hand second finger or left hand first finger alternating say for example on the C2 and B♭1, can you get a pattern going between these things which are indicated by the lowest notes (C, C, B , B , C, B, C, B, and B♭). 12:56: The alternating fingerings are trilling but the underlying rhythmic pattern above is a constant burble, so the resultant is not so specified. There's an underlying bass pattern at the same time as the trilling. Does that make sense? You just play the bottom movement and add your alternating finger trilling like a decoupled thing.

LL: 14:44 What I imagine, in bar 49 to the end is that the fingers are alternating trilling, you are overblowing and you're also changing the fundamental.

LLD: And with alternating lip pressure the pitch will go up and down.

LL: It's sort of like a circulating thing. It's becoming smeared because you're changing the underlying fundamental.

LL: 15:26 Bar 49 to the end is all just alternating fingering business but thinking the fundamentals: C, B, B♭. I'm just curious if you get a cross rhythm that comes out. I am curious if a cross rhyme comes out. That's the big question for the end as to whether that's interesting texture. Does it work or does it get too lumpy and awkward sounding instead of big fluid movement. That's the main materials and the questions I have. I want to check exhaustion level; do you need more time to breath. I know there's a lot of air going through the instrument. Give me feedback if you need more time for something or if it's not possible to go for so long.

LLD: 16:39:I think it will be ok. I do circular breathing, but I can't on this harmonic build up as there's no resistance. I am happy you didn't write the C6 as it is a thin note. A5 works well with jumping around.

LL: So, it's ok to go from A1, the huge tube, to the tiny tube of A5. Good. Are the dynamics realistic etc.? I know there's much more delicate [soft] control on the contra-forte compared to contrabassoon. The main thing is, will bar 49 be interesting from a cross-rhythm prospective? Are there emergent qualities and if I can hear that, I can work on that a bit more. Until bar 47, is everything good and workable?

LLD: Yes. I like how you've incorporated microtonal glissandi.

LL: 18:39 Some of them have a wider interval.

LLD: Yes that's great. I've been working on eighth–tones so I would use another fingering from my chart and couple that with a lip bend for the wider intervals.

LL: Well, if that's workable that's great. The piece has a certain type of sub aquatic feeling to it I hope.

LL: 19:21 What is useful is to have a reasonably compact piece. I hope you don't mind that. It gives something to build from and to go forward. I think it works as a stand-alone piece that demonstrates the instrument and where you go "Wow, what is that instrument!" which is what you want to do with the contraforte.

LLD: 20:03 You want to use its idiomatic things which is the overblowing.

LL: Bar 49 is the big question mark, I reckon. If it's working pretty well there's probably some other ideas to pull out of it. But I think I've almost got a piece for you.

LLD: How long do you think the piece is?

LL: 20:40 The first 3 pages is about four minutes. So maximum seven maybe eight minutes. After the eight-minute mark, it's time for a contrasting piece. As I said this is the start of continued exploration. This is just scratching the surface obviously of what you can do.

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LL: So, let's talk contraforte. You had some suggestions for the end but have other things that also could be tweaked.

LLD: 00:22 Yes bar 20. Could this be detached and not legato?

LL: Yes

LLD: In bar 34, why did you use the word harmonic? Is it a mistake?

LL: I imagined pure harmonic. Is that possible? Or I just get rid of the word harmonic and just say ‘ord.’

LLD: Yes write ‘ord.’

LL: Yes you’re just going from underblown to a normal note.

LLD: 02:11 In bar 38: are they appoggiaturas?

LL: Yes.

LLD: I noticed in bar 47 that there is a quarter-tone trill. I can begin this slowly, so it’s defined, but when I go fast, there is a lot of distortion and interference, and the pitch centre is gone. Is this what you want?

LL 02:50: That’s fine. Noise is fine. I don’t have to notate that or specify anything right?

LLD: No.

LL: 03:10 For me in any case, everything is blurry, and morphing. This is good.

LLD: In bar 50, I feel I should bring out the fundamentals more and you’ll hear that rhythm, rather than the fingering trilling. I’m thinking of using bisbigliandi rather than the alternating fingering, then you’ll hear the fundamentals more.

LL: 03:51 Rather than mixing up the sound with the trilling?

LLD: Yes, because you won’t hear the rhythm of the fundamentals. It will be an undefined blur of sound.

LL: Will that work using bisbigliandi when you change between the B and B♭ fundamentals?

LLD: 04:08 Yes, I will emphasize the fundamentals with breath accents.

LL: Ok I’ll just write ‘bis’ and take out the alternating fingering changes.

LLD: 05:04 Great. The last page is all in the low register and it sounds a bit all the same. So, I would like to suggest some changes for bar 54 where the same motif is repeated four times. I’d like to keep the rhythm from the fundamentals but from opening the third flageolet key the pitches sound two octaves higher. This will also result in

multiphonics. Playing the same pitches an octave below I can get a beating result. Adding an auxiliary key to this I will get a distortion. The fourth time I play it, I will play what's indicated. I will send a recording of that. This will give different timbres to the repeated passage.

LL: That sounds wonderful, so I'll change how that's described?

LLD: 06:08 No. It will be different effects, but in the parameters of what you have. The ear gets lost in the low register unless you have sensitive hearing for low partials, and most people don't and can't hear the difference. It then sounds like one big blur.

LL: 06:31 Maybe what you do in bar 54 is a good template for how it ends?

LLD: Yes and maybe some variation with embouchure manipulations so it's more colourful would help the end. The tempo at the end should be faster MM = 66.

LLD: 07:01 I was reflecting on whether the whole piece should go faster but maybe not. The ear can really hear the quarter tones at the speed of MM=50 and there are some lovely melodic lines on pages 2 and 3. This works at the indicated tempo, but the end should go faster from bar 54.

LL: 07:44 That makes sense. I can easily adjust those earlier things and if I can hear what you 're doing in bar 54 and then reshape the ending then that sounds wonderful. Thanks so much. I hope the piece is useful for you in terms of the doctoral project.

LLD: It is. It says a lot. People hear the instrument differently. It's got contrasts up high and down low. It contrasts with the other pieces in my doctorate.

LL: 10:17 No doubt I'll keep writing for it as it's a big entrée for me into that world.

LLD: Great. Thanks for everything. Bye.

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