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Editorial

This fourth edition of the ÍMPAR journal features five articles, selected from research presented at various international conferences: two were presented at Flute: Hands on Research 2017 and a further two at Flute: Hands on Research 2018, with both events taking at the University of Aveiro, Portugal, while the fifth article was presented at Performa'17 in São João d'el Rei, Brazil. The articles share a common theme - musical interpretation - but each displays a distinct approach, from a particular perspective and the employment of specific research methods. Four of these articles articulate declarative and procedural knowledge, with the inclusion of video and audio recordings of excerpts and/or entire works. The fifth is a reflection on the ethical questions raised in composition and musical performance.

Bonnie McAlvin challenges the limits of flute technique in exploring the technical and expressive potentials of multiphonics, of which, as demonstrated in her recordings, she has an impressive mastery. The pedagogical aspect of this article is also important, and very pertinent for both students and professionals, as is the mythopoetic reconfiguration which influence her interpretations and sonically reveal the possible harmonic dimensions within the score. Ine Vanoeveren's article questions the gender stereotypes associated with the mythopoetic invention which has been instituted by previous interpretations of the complex work, *Cassandra's Dream Song* by Brian Ferneyhough. Apart from gender issues, many other performative options are discussed throughout this article, particularly as it addresses an open work. Matteo Gemolo makes an important contribution toward the reconfiguration of the old concept of the Traverso as a caricature of the modern flute, demonstrating and exploring the expressive possibilities that this baroque flute can bring to contemporary music. This reconfiguration of our beliefs and of our imaginary in relation to this instrument is the point of departure for this article, and the basis for exploring the possibilities of symbolically charged extended techniques on the Traverso, in similarity to the rhetorical figures in baroque music, described and analysed by Dietrich Bartel Lincoln. The article by Monika Streitová describes her experience of interacting with the *Sampo* device - an electronic device created by the composer and inventor Alexander Mihalic for all instrumentalists and composers, which facilitates the performance of electroacoustic repertoire from the 20th and 21st centuries - in the performance of mixed music with sound files or in real time. This article approaches the processes of preparation, construction and execution of three works which correspond to different types of interaction with the *Sampo* device.

Finally, William Teixeira proposes a reflection on the ethical dimension of musical performance. Ethics surpass morals in the manner in which it does not refer to an established code but rather to possibilities and especially to the responsibility of choice. Musical performance implies options which go beyond a simple choice between one sonic effect or another at a given moment. In constructing the meaning of an artistic production in a responsible way, a mythopoetic invention is created, which results not only in the opening of the performer's self for the presence of a meaning embedded in the piece, but also from the opening for oneself, in a person's way of being-in-the-world.

Jorge Salgado Correia

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Using Flute Physics to Tune Multiphonics

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Abstract: The horizon of multiphonic flute playing has not been fully explored, due to well-established perceptions of the technique's limitations. These perceptions are not fully accurate, although they came about with good reason. Sustaining, tuning and balancing multiphonics all present significant challenges. However, this article questions the perceived and widely-accepted limits of the technique, and presents a tool kit of strategies for overcoming the challenges the technique presents.

***Keywords**:* flute; multiphonics; extended techniques; practice; tuning

The perceived limits of multiphonic flute-playing

The horizon of multiphonic flute playing has not been fully explored, due to well-established perceptions of the technique's limitations. These perceptions are not fully accurate, but they came about with good reason; multiphonics are very difficult to sustain, and the western flute's design often naturally nurtures multiphonic intervals which do not fit neatly into the traditional mod-12 atonal or diatonic systems that constrain much of music composition. Further, one pitch of a multiphonic is often more easily stabilized than the other(s), which means that without an appropriate intervention, one pitch will often dynamically overpower the other. This presents a challenge for smoothly connecting inner voices in a chord progression. An alto or tenor line sung by a sole alto or tenor achieves a continuity of timbre and dynamic that multiphonic flute does not easily achieve. This is because, in multiphonic flute playing, pitches that are reiterated are often produced by a different fingering. Different fingerings impart drastically different tendencies of timbre, dynamic, articulation potential, and intonation. For the same reason, pitches that move stepwise are difficult to balance into a smooth, intentionally-shaped line.

As an illustration of the problem, Figure 1 presents a series of multiphonics that can produce the typical diatonic chord progression I—IV—V ^{7}– I $^{4—3}$. To produce this chord progression the flutist must not only tune the major 6th from D to B (measure 2), but must also tune that major 6th to the second sonority, a minor 6th {E, C}. The second sonority is one diatonic step up for each of D and B (measure 3), and these steps must sound like a whole step and a half step, respectively. The chord progression then requires three C's (measures 3, 4 and 5) in close proximity to one another, which use three drastically different fingerings. Matching the frequency and timbre of all three Cs without losing the integrity of any of the vertical sounds (the sixth between E and C, the diminished fifth between F# and C, and the perfect fourth between G and C) presents various layers of challenges. Additionally, the scalar climb in the lower voice, from D through E and F# to G (lower voice, measures 2, 3, 4 and 5) must be tuned like a diatonic scale—the timbre and dynamic of its steps balanced and matched such that a smooth, well-controlled scalar motion upward is perceived. This passage would be very easy to play on piano, and relatively easy on violin, simply because there are multiple strings on those instruments. Since the flute is a singular air tube, the method of producing two pitches at once is to choose a fingering which affords the tube two different wavelengths,

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and discover (with much work and finesse) what type of air stream efficiently supports both sounds.

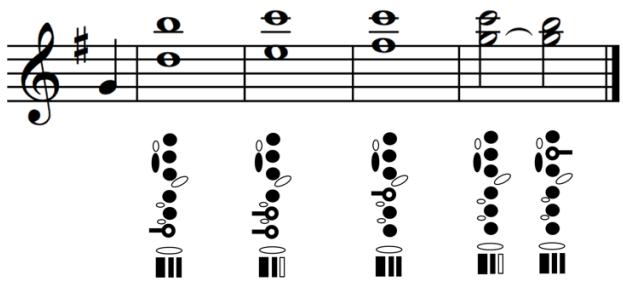

Figure 1 A chord progression that can be played on flute, but which presents a number of problems to be solved

The most common accusations that are railed at multiphonics are that they are always soft, and that they are out of tune. Indeed, some composers value multiphonics for these very qualities, and beautiful works of art have been created by sensitive composers who are willing to work inside the space of these limits. Unfortunately, however, the challenges of balance and intonation are widely accepted to be absolute limitations of multiphonic flute technique. In fact, throughout many of the manuals dealing with multiphonics, authors provide subjective assessments of the various sounds' idiosyncrasies. For example, Thomas Howell frequently describes fingerings as "breathy".[2] This practice has been enormously helpful for composers who do not play flute but would like to exploit the idiosyncrasies of a given fingering; composers seek out sounds that are labelled "breathy", etc. on purpose. It is an advantage because flutists can spend their time pursuing the timbre and dynamic that the flute most naturally produces. On the other hand, it has also served to constrain the usage of the various fingerings, which in turn reinforces the idiosyncrasy.

Another practice that has been beneficial yet also serves to reinforce idiosyncrasies is that of masking the difficulties of multiphonics through compositional techniques. One can find three important strategies that have been employed in the classic repertoire. The first strategy, which is employed in Berio's *Sequenza* and Carter's *Scrivo in Vento*, is to place multiphonics in isolation. This strategy accomplishes two goals: it gives the player optimal room to prepare for the multiphonic, and it masks any timbre or intonation discontiguities among multiphonics or between regular tone and multiphonic tone. A second strategy has been to keep the fingers in a constant flurry, moving between different multiphonics in a tremolo fashion. This strategy, employed often by Robert Dick and Salvatore Sciarrino, for example, creates a fluttery musical texture that masks instabilities and inequalities. A third strategy that is evident in the flute literature is to not mask, but simply embrace intonation patterns that result from the standard fingering system, and integrate multiphonics into sound worlds that are mod-24 or otherwise employ quarter-tones or smaller distances; this embracement is evident in the music of John Eaton and Toru Takemitsu, among others.

[2] Howell (1974)

These strategies have been successful in that despite the difficulty of multiphonics, the sounds have come to be accepted in flute-playing as a standard extended technique and composers have come to regard them as a useful and expressive set of timbres. Moreover, the variety of ways that composers approach the challenges of multiphonics might be regarded as contributing to a stylistic richness within the repertoire. Indeed, the creativity that is evident in the early multiphonic repertoire is breathtaking.

However, the strategies have also helped to carve multiphonic technique into a niche that is largely considered "special effects"; multiphonics have been used skillfully and artistically by composers as a device of timbre, but are not often used to project harmony or voice-leading.

In abandoning strategies that avoid, mask or embrace the difficulties—in asking ourselves to learn to hold a vulnerable multiphonic still, for example, or to move transparently through two harmonically connected sounds, we stand to risk going outside the realm of the practical. However, in doing so, we also stand to open a space where we might push the boundaries of what is possible, and explore the edges of an artistic technique that has the unique power to evoke humility, intimacy, strength, and utter clarity, among other human states. Pablo Picasso once asserted that "the chief enemy of creativity is 'good' sense." This publication aims to challenge some of the generalizations that have grown in and around a good sense of practicality and subsequently limited the repertoire, by asserting that players need not accept *all* the idiosyncrasies that a given multiphonic presents as final or absolute. With work, many multiphonics that are naturally very soft can be made surprisingly more penetrating. It is also possible to widen and/or narrow intervals that are produced such that they can be tuned in mod-12 spaces. One can learn to blow such that a weak component of a multiphonic is strengthened and a balance can be achieved. Finally, strategies can be employed such that complexes can be tuned to one another with a greater precision than the design of the flute naturally allows. Namely, for composers who use pitch systems (tonality or set classes, for example) as an expressive device, multiphonics can be employed more deeply toward projecting pitch-based meaning than is generally believed.

Section 2 of this article presents two examples of works that use multiphonics to project pitch meaning by creating smooth, well-balanced voice leading motions between chords or sonorities, in both a tonal and a non-tonal musical environment. In Section 3 and Section 4, the challenges that arise in this type of repertoire are illuminated upon, and solutions based upon the physics of the instrument are proposed to empower performers to push the boundaries and further the development of repertoire for multiphonic flute. Section 5 then presents a toolkit of adjustments that flutists will find helpful in expanding the limits of tuning and balancing multiphonics.

Meeting the demands of multiphonic-playing is a difficult negotiation which requires the flutist to explore non-traditional techniques of blowing and fingering, and this exploration can often be frustrating. Indeed, one might rightfully ask whether the journey is worth the reward. An analogous question that might be posed, however, is whether or not young artistic voices should be nurtured in an era where technology has already preserved the work of established artists? We simply do not know what the limits are. At the moment, multiphonics provide a set of unique, beautiful and interesting sounds, whose fragile timbres span the expressive gamut from the delicate to the raucous. Their limits in terms of projecting pitch

structures successfully within the constraints of classical aesthetics (with smooth voice-leading, good intonation, careful and intentional dynamics and phrase shape, etc.) are not yet known, despite the air of certainty that dominates many discussions of the challenges they pose.

An introduction to multiphonic flute-playing and its challenges

A multiphonic is any instance where a wind player (flutist, clarinetist, saxophonist, etc.) produces more than one pitch at a time. Early formal usages of flute multiphonics include the *Sequenza* by Luciano Berio (1958) and *Proporzioni* by Franco Evangelisti (1958). Over two centuries ago, in 1810, Georg Bayr made a sensation playing what he termed "Doppeltöne." He published a manual called *Practische Flöten-Schule* (1823) with fingerings for various intervals. The technique was (and continues to be) revolutionized through the work of American flutist-composer Robert Dick, while modern resources include Bartollozzi (1967), Thomas Howell (1974), Dick (1975), and Pierre-Yves Artaud (1980).

Multiphonics are often produced by accident, when a player aims their air such that two notes are produced simultaneously. This is one type of a group of mistakes that are popularly known in wind-playing as 'cracks'. With extreme precision, these would-be mistakes can be sustained, stabilized, and even tuned. Surprisingly, when they are well-controlled, multiphonics can sound like sonorities, and even function harmonically in the way that a violinist's double stops do.

Demonstrations 1 and 2 below present two musical works which ask the performer to use multiphonics toward a smooth voice-leading among clearly-audible harmonies. Both works are by the same composer and use the same multiphonic fingerings, but in two different harmonic contexts. The first piece*, Parallel Transformations*, is tonal, and uses 18th and early 19th century harmonic techniques. The second piece, *Transforming Parallels*, uses a more modern harmonic style; the music uses set classes. In both works, the soloist must work to master the sonorities in themselves, as well as the connections between sonorities. The classical aesthetics of clear intonation, smooth phrasing in inner voices, and a good, intentional control of dynamic levels are vital to the works.

Demonstration 1. *Parallel Transformations* (2015), a work that uses 18th/early 19th century harmonic techniques.
https://www.youtube.com/watch?v=n1wiCDOIEkY

Demonstration 2. *Transforming Parallels* (2017), a work that uses set classes.
https://www.youtube.com/watch?v=y0XLhT69FC0

Reliably producing and sustaining a multiphonic that is well-balanced and in tune presents distinct challenges that need to be overcome. It is a particularly complex endeavor because any adjustment to the tube-length or air stream that is made in order to improve one of the notes of the multi-pitch sonority is likely to impact the other pitches as well, and not always in an amelioratory way. For example, see Demonstration 3 below. In the video, the performer is attempting to tune a fingering which can produce either B4 or G#5. When the two pitches are combined into a multiphonic, some severe issues regarding intonation emerge. The B is

sharp, and the G# is extremely flat. The performer first rolls in to alleviate the sharpness of B, which unfortunately also (further) flattens the G#. The next strategy used is called finger venting. The performer opens the left hand ring finger hole a minimal amount, while keeping the ring closed. This solves the problem of the flat G#, but it also further sharpens the B, then causes the B to disappear/be unstable, and introduces a new low note to the dyad that is not wanted.

Demonstration 3. Adjustments that improve one of the notes often negatively impact the other. https://archive.org/details/Demonstration3

In many cases, these difficulties can be surmounted by being aware of the physics of the instrument and using multiple means of adjustment in tandem, such that an adjustment that improves one of the pitches but negatively impacts the other is countered with another adjustment that remediates the new problem that was created. In short, having a large toolbox of potential adjustments with which to experiment is key to achieving this goal. Such a toolbox is presented in Section 5, as Figure 3.

In preparation for presenting this figure, some of the principles behind stabilizing and tuning multiphonics will be illuminated. Two major questions will be briefed regarding the mechanics of flute-playing:

- How does a flute transform an airstream into flute sound?
- Why does changing the fingering change the pitch?

These questions are addressed in Section 3 and 4. Some information regarding the process wherein air is transformed into flute sound, as well as some heuristics and animations for visualizing the impacts of blowing and fingering choices are presented. For those musicians who find it useful to visualize and/or understand the physical processes that impact their tone and intonation, and for those who simply appreciate envisioning some of the magic behind physical phenomena such as multiphonics, these sections will be a valuable resource. It is not possible in such a short article (if at all) to codify and document a mechanistic prescription of exactly how to generate the confluence of blowing and fingering and flute that creates a beautiful multiphonic for *all* multiphonics of the universe.[3] However, some ability to imagine the processes at work can go a long way toward a productive exploration. The science is discussed in this spirit; that the limitations of multiphonics that have long been accepted might be challenged by thoughtful work that is directed by logic and sound feedback.

A brief survey of aspects of the physics of the flute: creating wavelengths through fingering

One way of conceptualizing the production of a multiphonic is that the flutist supports an extremely rapid vacillation among two different wavelengths that are potentiated by a

[3] Some resources that move in this direction include the Virtual Flute, developed by Andrew Botros, and Flouble, developed by Gergely Ittzés. Hanns Wurz' *Querflötenkunde* and Werner Richter's *Bewusste Flötentechnik* are manuals for flute playing that include tables that move in this direction as well.

fingering; these wavelengths produce the two pitches of the multiphonic.[4] The alternation of wavelengths must occur rapidly enough that the illusion of simultaneity is achieved, and neither of the pitches comes to predominate in the listener's perception. If one of two pitches in a multi-pitch sonority gets more "airtime" so to speak, it will appear to over-balance the other pitch; it will be perceived as louder.

Therefore, the activity of producing a multiphonic is really a game of timing, in increments of time that are almost inconceivable. Flutists conquer the same game as regards single-note playing, so the thought shouldn't intimidate the reader. In traditional, single-note flute-playing, the flutist uses their ear to gauge sound feedback and master pressure alterations, such that they can hold a single pitch consistently and move smoothly between the different pitches of a moving line. At the highest levels of playing, flutists learn to manipulate the alterations so that interesting timbres, vibrato and fine nuance can be created within a window of not losing control of the pressure alteration pattern/not producing a "crack" or allowing the pitch to sag/rise. The difference is that for single-note playing, the activity concerns a single fundamental wavelength, while for multiphonic-playing, two fundamental wavelengths are involved.

Both fingering and blowing come into play when achieving either goal of creating a beautiful single tone/series of single-tones, or creating a well-timed vacillation among two well-tuned wavelengths. This section deals primarily with fingering; Section 4 deals primarily with blowing.

When a flutist blows wind across the open hole of a flute mouthpiece, a complex of wind speeds and directions strikes the wall of the mouthpiece's chimney that is opposite their lips. Striking the wall further upsets the air stream-complex that is provided by the flutist; not only does the stream split into two (inside the chimney/outside the chimney), but friction near the inner and outer walls pulls parts of the stream back, while more remote parts continue at more powerful speeds. The dichotomy of frictions results in the formation of tiny tornado-like swirls of current, called *eddies.* Multiphonics require a great finesse of these eddy systems. They are illustrated in greater detail in Section 4.

As long as a flutist continues blowing, air molecules that lie within the complex of eddies find themselves to be amidst a complex and high pressure system. The pressure seeks a release, and will attempt to migrate in all directions toward that release. Currents that migrate to the *outside* of the flute tube achieve this: they dissipate into the open air. Some of the currents that migrate to the more *inner* parts of the mouthpiece soon find themselves to be trapped in the space between the chimney and the crown. This is a critical component of

[4] Other theories have been asserted regarding the nature of the wave activity that produces a multiphonic. The conceptualization that a multiphonic is a result of rapid vacillation among wavelengths has been found to be very useful toward balancing the various pitches within a multiphonic, since it offers us a tangible way of understanding balance. The assertion is based on the supposition that a given air molecule cannot be in two locations at once, and therefore cannot vibrate at two different frequencies during a given moment. Rather, a given molecule vibrates in a way which represents a sum-over-time of the amplitude of the forces that are acting upon it. In blowing a flute, the sum pattern travels through the air, sets the eardrum in motion in synchrony. It is the basilar membrane that separates the sum pattern into discrete pitches, by virtue of its properties of resonance in different locations. (This is in fact how we process timbre, which is rarely a pure sine wave, but is rather a complex sum over time.) The continuity we experience then is an artefact of the physical systems (membranes, neurons, etc.) that transmit and transduce air pressure changes into sound.

how the flute transforms the flutist's air stream into a flute sound. For some moments, a turbulent system grows uniquely in this small space, largely cut off from the rest of the flute by the flutist's continued blowing. However, once the trapped pressure reaches a critical level, the highly compressed air escapes, bouncing fiercely down the tube.

A trail of low pressure follows this high pressure bubble as it moves down the tube. When the high pressure bubble reaches either a substantially opened hole or the open far end of the flute's footjoint, some of the pressure dissipates into the open space, but its high pressure remnants bounce back into the tube, toward the low pressure bubble that was in its trail. Demonstration 4 illustrates this process, for a variety of flute fingerings. It can be observed that if all the keys are closed, a long wavelength is afforded by the flute; the air tube essentially ends at the end of the metal tube, with a small end correction just past the end of the foot joint. This will produce a low B on a B-foot flute, or a low C on a C-foot flute. If, however, fewer keys are closed, the air tube is shorter, and a shorter wavelength is afforded by the flute. This will produce a note that is higher than that of the long tube.

Demonstration 4. The relationship between fingering and wavelength.

https://archive.org/details/Demonstration4

If the flutist continues to blow once the high pressure bubble returns to the chimney, it bounces again—reinvigorated by the newly-accrued pressure (due to continued blowing). The process repeats itself as long as the flutist continues to blow against the wall of the chimney, because this action continues to produce the complex eddy system that causes pressure to be trapped; its entrapment continues to magnify to the critical level wherein it escapes, sending another high pressure bubble down the tube.

The pressure alternations within the space of the flute tube cause a wave of pressure changes to radiate *out* of the flute. The wave complex that radiates out of the flute—in turn—shakes our eardrum in a pattern over time that is synchronous with the pressure alternations. The tiny bones of the inner ear follow, moving the oval window, and the perilymph of the inner ear shakes our basilar membrane—also in synchrony—, causing ion channels to open and neurons to fire. These firings are our physical mechanism for perceiving the pressure alternations that radiate out of the flute, which we call *sound*. It is the pressure alternations that are generated by the flutist's eddy system and escape from the trapped space between the chimney and the crown that begin this very long chain reaction and cause us to hear the sound of a flute.

This process occurs extremely rapidly. For example, A-440 has a fundamental frequency of 440 rotations per second. This frequency is directly contingent upon the length of the air tube, or the fingering that the flutist uses. A long tube takes longer for a rotation, so we call this a long wavelength. It has a low frequency—because farther distance means fewer rotations per second—, so it shakes our eardrum fewer times per second.

A short tube, on the other hand, takes a short time for a rotation. There are more rotations per second, hence the term *high frequency.* A higher frequency of pressure alternations shakes the eardrum more rapidly than a lower frequency. This is perceived as a higher pitch.

The finger holes are usually drilled in locations such that the wavelength increases systematically. On modern western flutes, the pitch lowers according to the chromatic scale. Each hole (not necessarily each finger, due to levers on the Boehm flute) lowers the pitch by a semitone. Within any given fingering, a number of actions can be taken which multiply the possibilities for heard pitches. These are well-known to flute pedagogy, so they will only be briefly reviewed here:

1. Blowing harder and/or closing the aperture through which the flutist blows has the impact of increasing the pressure, resulting in a pitch that is twice the frequency, or one octave higher. This can also be accomplished at 3/2 the frequency (an octave plus a perfect fifth), 4/3 the frequency (two octaves), 5/4 (two octaves plus a major third), 6/5 (two octaves plus a perfect fifth), so on so forth. (This is called the *harmonic overtone series.*)
2. The doubled or three-halved pressure can also be obtained by rolling in, which has two impacts: it decreases the distance between the source of power (the lips) and the edge of the wall it strikes, thus allowing less force to dissipate before reaching the chimney, and it changes the angle at which the air stream strikes the wall. However, this particular method has the added disadvantage of increasing the width of the end correction zone, whose size is directly dependent upon the size of the blowing hole. In rolling the headjoint in toward the lips, part of the blowing hole is eliminated, and the end correction zone is increased. This in effect lengthens the air tube, flattening the pitch a number of increments.
3. The aperture can also be moved closer to the edge of the wall by changing the jaw position or the shape of the front of the lips.[5]
4. Opening a tone hole at a strategic location in between the end of the air tube and the mouth suppresses the fundamental frequency and promotes an overtone to full-fledged pitch status. The flute's high register fingerings reflect this strategy. For example, opening a tone hole that lies near the halfway point in an air tube promotes the first overtone: E6 is produced by fingering an E4 and opening the tone hole that is roughly at the mid-point of the air tube, causing the note that is two octaves above E4 to sound. Opening a tone hole that is 2/3 of the distance of the air tube promotes the second overtone, a note that is one octave and one perfect fifth above the fundamental: D6 is produced by fingering a G4 and opening a key that is 2/3 of the distance down the air tube.

In multiphonic playing, two wavelength distances are supported within the same metal tube. The pressure alternations escaping the space between the chimney and the crown vacillate rapidly among these two (or more) fundamental wavelengths. For example, the fingering that produces an F5 and C5 dyad is shown in Figure 2 below.

[5] Some pedagogues warn that excessive jaw motion on a horizontal axis can contribute to a set of medical conditions related to the tempo-mandibular joint.

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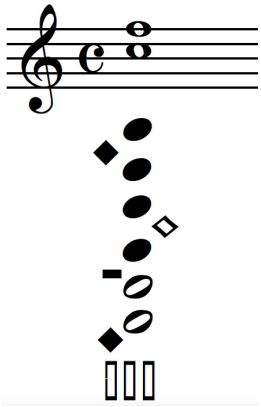

Figure 2 This fingering can produce F5 and C5

The aspect of the fingering that supports the wavelength for F5 is that all of the keys are closed up to the flutist's right middle finger. The distance that a trapped pressure bubble moves following escape is such that our eardrum shakes enough times per unit time that F5 is perceived.

The aspect of the fingering that supports the wavelength for C5 is the open trill key. If a flutist opens thibullets trill key without closing any of the keys associated with the F5, the pitch that is produced is a slightly-sharp D5. Adding the closed keys that are associated with the F5 has the impact of lengthening the air tube, thus flattening this sharp D5 into a C5.

Meanwhile, the open trill key—since it is located near the halfway point of the wavelength for the F5 fingering—only impacts the F in the sense that it suppresses the fundamental (F4), promoting the first overtone (F5) to full-fledged pitch status as described in number 4 above. This serendipitous relationship allows this fingering to produce the dyad C5/F5 as shown in Figure 2, as long as the flutist modulates the pressure systems in the space between chimney and crown in such a way that those wavelengths vacillate in a good balance.[6]

Since this task begins with the creation of an eddy system near the chimney wall, eddy systems will play a starring role in the discussion of Section 4. The discussion begins, however with a strategy called finger-venting.

The most immediate way of modulating the pitch or balance of a multiphonic is to vent a key hole that is closed. That is, to close the ring of the key but move the finger off of the hole at the center of the key to some degree. This can be done in increments varying from fully vented (the entire hole is open) to barely vented (the shape of a crescent moon is open). Finger-venting decreases the length of the air tube in a miniscule but audible way: a closed but vented key produces a note that is sharper than that of a fully-closed key.

This strategy is illustrated in Demonstration 5. The performer demonstrates a fingering that can either produce a G5/E6 dyad or a G#5/E6 dyad. The difference between the dyads is the size of the crescent-shaped openings on the left hand's middle and ring finger keys.

[6] See Botros et al (2002) for a useful diagram of the standing wave patterns that can be created using this fingering.

Demonstration 5*.* Finger venting.

https://archive.org/details/Demonstration5

A brief survey of aspects of the physics of the flute: creating an eddy system that supports a set of wavelengths

Finger-venting is the single most immediate method of tuning. It can even be done to fingerings that are traditionally fully-closed/use no vented rings. For example, one might slightly vent the left hand ring finger to sharpen a single-note *ppp* D6, which is a notoriously flat note on many flute models. However, finger-venting has its limits; this was evidenced in Demonstration 3, where the performer attempted to sharpen the G# of a B4/G#5 dyad by venting the left hand ring finger, an adjustment which caused the B to become unstable and even introduced a third, unwanted tone to the sonority.

In a case where finger venting is ineffective or not effective enough, all of the traditional means of tuning can be used in tandem: rolling in/out, blowing more/less, and changing the size and/or location of the aperture. In addition, the tongue, which is a very flexible structure, can be shaped into a tremendous variety of shapes, both symmetrical and asymmetrical. To begin understanding how each of these adjustments work, it is useful to look in greater detail at the phenomenon of the eddy. After all, the first task of creating either a multiphonic or a single-note flute tone is to generate an eddy complex, by blowing across the wall of the chimney, and it is the success of the flutist's eddy complex that determines whether the flute successfully supports the wavelengths that are demanded by a given fingering, and whether those wavelengths are supported in a good balance.

For some flutists, it will be helpful to have a visual representation of what is going on physically during the moments between the onset of blowing and the moment when trapped pressure escapes the space between the chimney and the crown. This visual representation can be useful when deciding how to experiment. I therefore invite the reader to imagine, as an heuristic, the familiar process wherein ocean waves meet their shore: in particular, the type of ocean wave called the *plunging breaker*. As a plunging breaker approaches shore, the ground beneath it becomes higher and higher—eventually approaching the level where land rises above the sea. As a wave approaches this point, the water that is caught in the wave cannot climb indefinitely against gravity. The sand's gradient and gravity work in tandem to compress the space where the wave might fill. The water molecules that are closest to the sand beneath the wave are forced to slow down; the sand "captures" some of the force and this is called *shoaling.* In the meantime, the force at higher locations in the wave continues to smoulder forward.

The difference in momentum between the top and bottom portions of the wave becomes paramount, as it is in tension with the force of gravity pulling the wave down, and the bonds which attract water molecules to one another. These forces act on the water simultaneously, causing a plunging breaker to achieve its characteristic concave shape—its top racing ahead of its bottom while it crashes in on itself.

The key element in the heuristic is the curling impetus due to the competition of forces that act on the water molecules as the wave achieves its climax. In flute-playing, the same

curling phenomenon occurs when the air stream strikes the chimney wall, because of a dichotomy of frictions between parts of the air stream that are close to the chimney wall and parts that are farther from the chimney wall. Demonstration 6 provides two heuristics for visualizing this.

The video begins with an heuristic of a basin, filled with water. Sprinkled into the water is cinnamon, which doesn't dissolve in water. The will enable us to see the currents that arise when a force is applied to the water. It can be seen that when a utensil is moved along a trajectory through the cinnamon water, water is temporarily displaced. But it is not simply displaced in the direction of the disrupting utensil. Tiny swirls arise in the trail of the utensil. These swirls— eddies—arise because efforts to fill the empty space that is left in the path of the utensil interact with efforts to maintain an intact (though liquid) structure and—for the molecules closest to the utensil—, attractions between the water molecules and the utensil itself. The interaction of these forces results in a dichotomy of friction strengths at various locations in the water. The forces counter one another, and the molecules' motion reflects a type of sum-over-time of the forces. Points of high displacement, in interaction with points of lower displacement cause the water to curl into the circular motion that can be observed. This is an eddy.

The video's (second) heuristic is perhaps more illustrative for the flutist, since it represents a current which meets a barrier, just as the flutist's air stream meets a barrier in the walls of the flute's chimney. The video shows a gentle current entering an inlet of sand. The foam in the video makes the currents apparent: when the current meets the opposing sand barrier, the sand absorbs some force, and levels of friction interact, causing eddies.

Demonstration 6. Visualizing eddies. https://archive.org/details/Demonstration6

The purpose of these heuristics is to help the flutist to visualize an invisible air stream, and understand how changes in blowing angle, pressure and location in relation to the walls of the chimney impact the pressure system they are supporting. The multiphonic flutist needs to open a tremendous flexibility in terms of how and where they aim air for each of the various fingerings. Of particular use for multiphonics will be a flexibility in the shape and location of the tongue. The tongue is highly flexible and is capable of producing many shapes, both symmetrical and asymmetrical. Thinking of the tongue as a bed of sand which shapes an eddy system much like the sand in an inlet shapes the currents entering it can guide experimentation and open the potential for stabilizing and balancing multiphonics that otherwise are unstable or out of tune.

Many variables shape a system of eddies. Gradients along three dimensions come into play. At what angle does the current strike the various barriers? The general rate of change in gradient (the lumpiness of a sand bed, or in flute-playing, the lumpiness of the tongue) modulates the force and decay of an eddy. Eddies can interact with one another in a reinforcing way or a destructive way, and peaks of interaction among eddies can be located in different places by changing the location, angle, force, and shape of the initial air stream. Keeping in mind that the goal is (for holding a single note) to produce a trapped pressure bubble that will move with just enough energy to get to the far end of the air tube, and (for holding a multiphonic) to produce a *series of* trapped pressure bubbles such that they will

escape in confluence with the fingering—a good experimentation can begin. The goal is to build an eddy system that is optimally compatible with a vacillation among the wavelengths afforded by a fingering.

A toolkit for balancing and tuning multiphonics

Often an efficient way to begin working is to choose a set of pitches to pursue, and find a fingering that is likely to produce those pitches. One can work ad hoc, discovering fingerings by using the standard fingerings as a guide, but there are several powerful software tools available that predict fingerings based on impedance minima. Virtual Flute and Flouble are two programmes that do so.[7] One might also choose a multiphonic flute piece that suggests fingerings, or one of the many method books that were cited above as a starting point. These programmes and publications make good predictions but they are not absolute, as they were created using individual flute players (with all their unique blowing properties, dental structures, headjoints, etc.) as initial data. Therefore, it is best to choose one fingering and work with it for a while, using various strategies, and be prepared to abandon that fingering if it has truly been exhausted and still doesn't meet intonation, dynamic, and timbre goals.

The flutist can begin their practice by simply blowing a fingering, and allowing the flute to reveal its strongest propensities for that fingering: which pitch is loudest, how wide/narrow is the interval, etc. Adjustment can then begin by allowing a more prominent note to sound for a moment and gradually inviting a second pitch in. Key to this process is to sustain the prominent note, but allow the second wavelength to vibrate as well. Another method would be to produce the naturally-weaker pitch, and gradually invite the naturally-stronger pitch in, correcting in a more refined way each time the stronger pitch overwhelms the weaker one. Gradually the pitches will even out for the patient and flexible practicer. The flutist might find themselves blowing out of unexplored areas of the aperture; they may feel the aperture taking on strange or asymmetrical shapes, or reaching forward into a tunnel-like shape. The tongue might raise to different heights, higher or thicker on one side than on the other. These oddities are what will allow the eddy complex to support a vacillation among wavelengths. The flute will reveal what it needs if the flutist provides it with a wide variety of adjustments and listens carefully to its response. The work will be slow at first, and rough: the muscles will need time to discover what the multiphonic requires.

The table 1 makes a handy summary of strategies that can be employed toward achieving a clear pitch, a salient timbre/balance, or a desired dynamic level for a given fingering. The chart is necessarily ad hoc, for four reasons:

1. There is a range for each of the adjustments. For example, blowing harder makes a pitch louder to a point, but after that point, it makes it quieter, since the force causes the air stream to overshoot the target area of the chimney wall.
2. Combining adjustments has a synergistic effect. Aiming higher on the chimney might provide something a fingering needs, but when combined with blowing to the right of the chimney, that benefit may be lost.

[7] Virtual Flute can be found at http://flute.fingerings.info/. Flouble can be found at http://flouble.com/.

3. Adjustments affect different fingerings differently. The flute is not a fixed instrument: we change its shape every time we change our fingering. The energy that is used to support these wavelengths needs to vary accordingly.
4. Different dynamics on a given fingering will require different adjustments.

The multiphonic flutist needs to embrace and continuously develop a highly detailed blowing palate. This toolkit is intended to provide useful guidance toward building that palate.

Table 1 A toolkit for balancing and tuning multiphonics

Strategy	***Physical Impact***	***Result***
Things to do with the fingers/hands		
Finger venting somewhere near the last closed key or last few closed keys	Shortens the air tube.	Raises the pitch to a point, after which the integrity of the desired wavelength might be lost; in this case a new set of wavelengths established/can be discovered.
Finger venting near the middle of the air tube	Will create an impedance that causes a node in the wavelength, suppressing a fundamental, and potentially creating a new wavelength.	Causes some pitches of a multiphonic to disappear, as the fundamental tone is suppressed. Might introduce new pitches if a new wavelength is afforded due to the vent.
Trying a different fingering (closing/opening a different set of holes or vents)	Will change which wavelengths are afforded, and will change whether the various wavelengths will compete well with one another for the energy the flutist provides.	Changes the pitches which are possible.
Rolling in	Decreases the distance between the chimney wall and the aperture; also increases the end correction (lengthening the air tube).	Lowers the pitch, after a point higher partials sound easily.
Rolling out	Increases the distance between the chimney wall and the aperture; also decreases the end correction (shortening the tube).	Raises the pitch, after a point substance of the tone is lost.
Things to do with blowing		
Blowing harder	Adds force.	Will raise the pitch and louden the volume, to a point, after which higher partials are supported. Blowing much harder without opening a wider aperture results in a rapid vacillation among partials.
Blowing less	Provides less force.	Will lower the pitch and quiet the volume, to a point. At a point, higher partials cease to be possible.
Things to do with the tongue		
Curling the tongue	The tongue acts like a luge track; it directs the air. Frictions develop at the periphery of the	Affects different fingerings differently; generally, can promote a more penetrating sound to a point. This can

	stream which result in complex interactions among eddies.	be an effective way of strengthening a weakly-potential pitch within a multiphonic.
Raising the tongue	Compresses the space inside the mouth.	Affects different fingerings differently; generally the higher potential sounds will become more prominent/easy to stabilize.
Using an asymmetrical tongue shape	Directs the air on one side in a way different from the other side, resulting in different forces as the stream exits the aperture. This changes the locations of frictions that are borne as air travels over a lumpy structure.	Affects different fingerings differently; is very effective at stabilizing combinations of pitches that are naturally unbalanced.
Forming a concave shape with the tongue/angling the tongue on a diagonal such that its tip is lower than its middle/back.	The tongue acts like a luge track; it directs the air. A concave shape results in distinct friction patterns due to differences in momentum at points that are not in the direct path of the air stream's force.	Can be effective at supporting multiphonics with a wide range and/or three or more pitches.
Things to do with the lips		
Using a smaller aperture	Increases the pressure of the air stream (given the same volume) and is likely to change the angle of the stream (see "aim lower/higher on the chimney wall").	Concentrates tone to a point, after which higher pitches become more prominent.
Using a larger aperture	Decreases the pressure of the air stream (given the same volume) and is likely to change the angle of the stream (see "aim lower/higher on the chimney wall").	Makes the tone airier. At a point, lower pitches sound, eventually the air stream loses its ability to support a standing wave.
Aiming higher on the chimney wall	Locates the primary stream of force at the initial eddy complex that is borne at the chimney wall.	Affects different fingerings differently; generally will raise the pitch of part or all of a multiphonic. Often some pitches will raise to a higher degree than others, even within the same fingering. Some pitches might disappear or be introduced.
Aiming lower on the chimney wall	Locates the primary stream of force deeper within the chimney.	Affects different fingerings differently; generally will lower the pitch of all or part of a multiphonic. Often some pitches will drop more than others, even within the same fingering. Some pitches might disappear or be introduced.
Aiming toward the right or to the left on the chimney wall	Locates the primary stream of force on one side of the chimney.	Affects different fingerings differently, and different components of a fingering differently. Aiming part of the air to one side and part of the air toward the

		middle is often an effective way to strengthen a weak pitch and balance a multiphonic.
Moving the bottom lip forward in relation to the top lip	Will change the angle of the stream as it strikes the wall (resulting in different interactions in the eddy system); will change the distance between aperture and chimney wall (promoting or disallowing a dissipation of force before striking the wall).	Raises the pitch, after a point substance of the tone is lost. This is an effective way to strengthen higher components of a multiphonic.
Moving the bottom lip back in relation to the top lip	Will change the angle of the stream as it strikes the wall (resulting in different interactions in the eddy system); will change the distance between aperture and chimney wall (promoting or disallowing a dissipation of force before striking the wall).	Lowers the pitch, after a point substance of the tone is lost. This is an effective way to strengthen lower components of a multiphonic. However, it often must be accompanied by a small aperture, or some other means of maintaining higher components.
Using a wide, short aperture (a short oval as opposed to a circle)	Affects the locations of frictions that are borne when the air crosses the tissue of the lips.	Affects different fingerings differently. Changing this variable at the moment of connecting two different multiphonics (when done well) results in a cleaner or purer approach to the new multiphonic/connection between multiphonics.
Using a a narrow, tall aperture (a tall oval as opposed to a circle)	Affects the locations of frictions that are borne when the air crosses the tissue of the lips.	Affects different fingerings differently. Changing this variable at the moment of connecting two different multiphonics (when done well) results in a cleaner or purer approach to the new multiphonic/connection between multiphonics.
Making a very long, tunnel-like aperture	Allows more force to reach the chimney wall.	This is an effective way to strengthen weak components of a multiphonic.
Using an asymmetrical aperture	Will change the force of the current at various locations within the air stream, which results in more powerful eddy systems in some locations and less powerful/complex eddy systems in other locations.	Affects different fingerings differently. This is an effective way of strengthening a weak component of a multiphonic/balancing a multiphonic. It is also a very effective way to widen or narrow intervals within a multiphonic. One pitch can be lowered or raised more than the other.

Ultimately, the variables of headjoint cut, individual flutists' conceptions of what constitutes more/less/large/small/where one should keep their tongue, etc., and even things that are largely out of our control, such as the weather, make the pursuit of good multiphonics a very individual pursuit. Flutists should use their ears as their primary device of feedback *("If it sounds good, then it is good").* The sound we hear is our interface—our feedback, and our

only way to communicate with this otherwise invisible phenomenon, save for having fancy lab equipment that can measure and model the phenomenon in another way which enables us to manipulate it. Having said that, a keen awareness of the potential variables that are within reach can spark the imagination of the creative experimenter. Additionally, in many cases visualizing the impact of our blowing choices on a close level can expedite work, since it offers us a tangible means of documenting what we have tried, and what we have not yet tried. This can take some of the frustration out of work that can often feel directionless for a student. Most importantly, the toolkit enables a flutist to believe more definitely in the possibility that some felicitous combination of elements lies in their future, which will be the key to achieving a balance or intonation goal.

Toward the development of repertoire for multiphonic flute

Often, multiphonics are defended on the basis that they are pedagogically useful. As an example, Robert Dick assesses that this type of work "develops the strength, flexibility and sensitivity of the embouchure and breath support, increasing the player's range of color, dynamics, and projection. The ear is strengthened, too: one must hear the desired pitch clearly before playing it when familiar fingerings are not used, and quarter-tone and smaller microtones sharpen the sense of pitch as well".[8] This is all true. However, this article acknowledges a relevance for multiphonics that doesn't appeal to how their practice can serve a player's traditional playing, or playing-in-general. Rather, it asserts that multiphonics can be a source of harmony and project voice-leading in tonal and non-tonal mod-12 environments, and that challenging the accepted limits of the technique untraps a formidable artistic potential. After all, multiphonics are an interesting timbre. Even outside the element of the mystical that is evoked by the thought of a single flute producing two pitches at the same time, the timbre holds interest that is not the same as that that can be found in a duo of flutes holding a dyad: there is a beauty that is born in fragility. Many composers and flutists already knew this; it is evidenced by the prominent timbral role that multiphonics play in much music of the later 20th and early 21st centuries. The question is whether this unique voice might be used more extensively if the sounds that flutists make 1) projected pitch meaning more successfully, 2) were more audible as discreet pitches, and 3) sacrificed less in terms of balancing and controlling dynamics and timbre. The music presented in Demonstrations 1 and 2 represent beginning steps into such an exploration.

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Cassandra's Dream Song: Let's (not) talk about gender

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Abstract: Cassandra's Dream Song (1970), the first flute solo piece by the British 'New Complexity' composer Brian Ferneyhough, has been a controversial and gender related composition for decades. The Western stereotypical stigmatization is still intertwined with the interpretation of this complex masterpiece. In my search for a truthful and contemporary analysis of the piece, I explore Cassandra's psychological path.

***Keywords*:** Hysteria; gender stigmatization; conceptual interpretation

Brian Ferneyhough (1943), the British composer, generally described as the 'father of New Complexity', drastically changed the oeuvre for flute in 1970. His first solo piece for the instrument, *Cassandra's Dream Song*, was so advanced, it took up to 4 years before it was premiered. In 1974, one of the most renowned avant-garde flutists of that time, Pierre-Yves Artaud, brought this stunningly complex work to life.
Besides the extremely complicated musical notation, the structure of the piece was also quite bizarre for the more conventional music scene in the 1970s. The piece consists of two pages, whereby the lines of page one are alternated with a line of the performer's choice from page two. Therefore, the performer has a big influence in the structural course of the piece. In his *performance notes*, Ferneyhough instructs the performer to not determine the order of the lines beforehand, but to instantly decide on stage. That should preserve the unique character and free experience of the piece, every time it is being performed.

The mythical figure of *Cassandra*

In order for a performer to determine this 'free structure' in a profound and logical way, it is advisable to examine the mythological figure of Cassandra. She was one of the eighteen daughters of King Priam of Troy – she also had 67 brothers! – and was chosen by the god Apollo to become a seer. If Cassandra would agree to spend the night with him, Apollo would reward her with the gift of fortune-telling. While the moment of passionate lust was approaching, Cassandra had second thoughts and she did not fulfill her part of the deal. Apollo, not used to being treated this way, was beside himself with anger. Unfortunately for him, a gift of the gods could not be made undone and he already had blessed Cassandra with her supernatural gift. Historical sources about this act differ widely: some say Cassandra was spat in the mouth by Apollo himself. Others claim that Apollo first disguised himself into a wolf, before spitting into her mouth to provide the godly gift. Yet other sources tell the story of Cassandra as a child, falling asleep in a temple of Apollo. A snake approached her and whispered something into her ear. When she woke up, she possessed the extraordinary gift[2].

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[2] Homeros. *Illias.* ca. 850 B.C.
Appolodorus. *Bibliotheca.* ca. 1st – 2nd century A.D.
Hyginius. *Fabulae.* ca. 2nd century A.D.
Aeschylus. *Agamemnon*. 458 A.D.

A god would not be a god without having a trick up his sleeve: Apollo cursed Cassandra's gift. She would be able to predict the future and always tell the truth, but no one would ever believe her.
Cassandra was very interested in the political and societal life within the palace walls of Troy. Often, she tried to warn her father, King Priam, and his closest advisors of impending distressing disasters. But, as according to Apollo's plan, no one took her predictions seriously.
Cassandra became more and more desperate and frustrated. More than once, she was carried out of her father's royal chambers, screaming and crying.
Female hysteria was born.[3]

Musical analysis of the piece

Cassandra's Dream Song can be analyzed on three different sub-levels or *layers* (Vanoeveren, 2016): the micro layer, the macro layer and the middle ground. The **micro layer** is defined by the execution and analysis of all the little details and techniques within the score. The **macro layer** or the overall structure of the piece, is mostly determined by the structure of the **middle ground**, which is the organic and logic connection between the lines on both pages. This is in order to create a personal and surprising structural interpretation of the piece, each time it is performed.
The next quote from the composer himself – after hearing many performances of his work – regarding this middle ground, caused great controversy, which led to an indelible gender-related connotation of the piece:

> The lack of a consciously analytical approach to the piece – the solving of the middle ground – is where many performances, particularly by women, have been less than successful in realizing the work's formal and expressive potential (Waterman, 1994, p.156).

The fact that more and more performers – and for the first time also female performers – performed the piece, caused Ferneyhough to say this very unfortunate quote. In the 70s and 80s, most professional flute players were men and in the small niche of contemporary music, this imbalance was even more prominent. From the end of the 80s and especially from the early 90s onwards, under the guidance of a strong female counter-movement in the musical scene, the contemporary performance landscape became more diverse. It will come as no surprise that this deplorable quote was targeted by many female performers and musicologists of that time (Waterman, 1994).

The first (male) performers of the piece, Pierre-Yves Artaud[4] and later on Harrie Starreveld[5], interpreted the *middle ground* based on a mathematical analysis of both pages – the so-called *pioneer's version* (Waterman, 1994). The feminist equivalent by Dr. Ellen Waterman, focuses on the emotional development of Cassandra in order to give structure to the piece.

[3] Homerus, ca. 850 B.C.
[4] Neuma: New Music Series, Vol.2, Neuma 45072, 1988.
[5] Interview with Brian Ferneyhough, March 4th 2015.

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The pioneer's version

Artaud and Starreveld used the mathematical construction of the first page to determine the (fixed) order of the second page. The amount of sections appearing on page one is structured according to the principle of a palindrome (2-4-5-5-4-2) (fig.1). Inspired by this analysis, the pioneers structured the order of the second page according to a similar mathematical approach. They counted the amount of sections per line and sorted them in an increasing order (4-6-8-9-11) (fig.2). The constantly diminishing sections, where the performer needs to breathe more often in a more restless way, contribute to the metaphor of Cassandra's hysterical episodes.
Here is the structure of the piece according to the *pioneer's version* (Waterman, 1994):

Line 1 (2 sections)	Line C (4 sections)
Line 2 (4 sections)	Line E (6 sections)
Line 3 (5 sections)	Line D (8 sections)
Line 4 (5 sections)	Line A (9 sections)
Line 5 (4 sections)	Line B (11 sections)
Line 6 (2 sections)	

Figure 1 Cassandra's Dream Song for flute solo (1970) by Brian Ferneyhough, edition Peters, page 1 - mathematical analysis

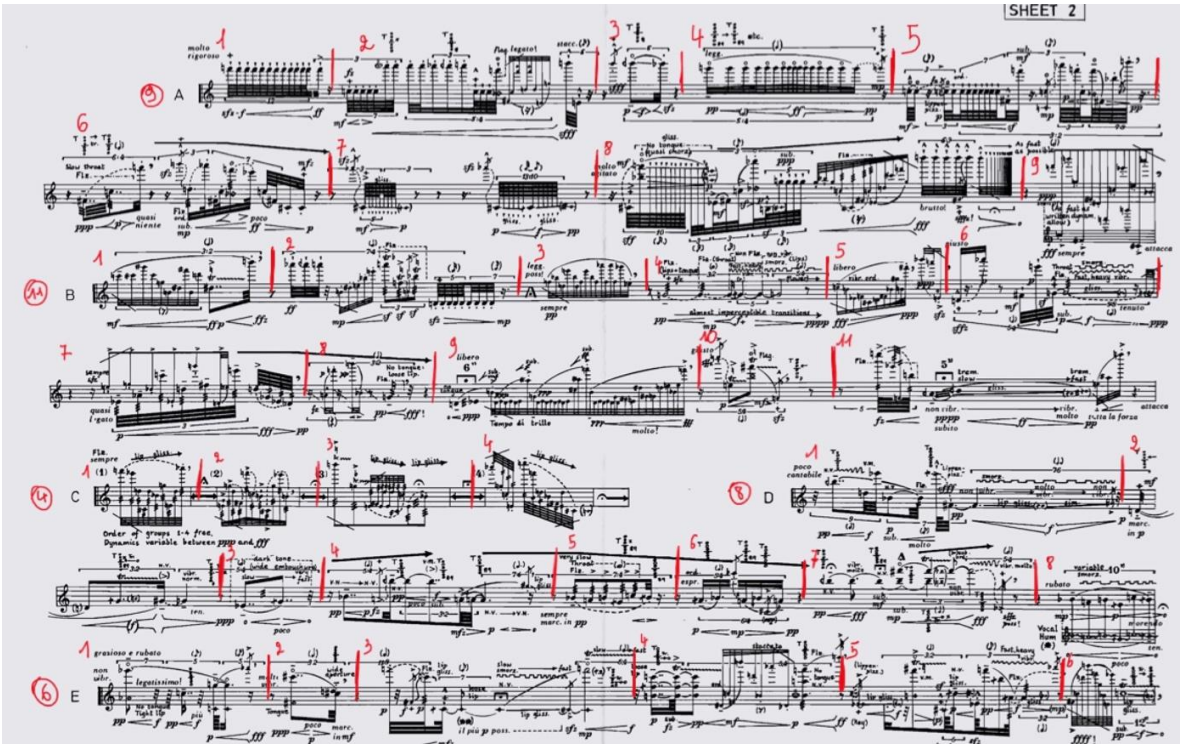

Figure 2 Cassandra's Dream Song for flute solo (1970) by Brian Ferneyhough, edition Peters, page 2 - mathematical analysis

The climax of the piece – the highest note (D7) – occurs at the end of line B, which only emphasizes the analyzed and organic character of this interpretation.

For me, this interpretation contains two problematic implications. First of all: the order of the second page is predetermined and fixed, although Ferneyhough specifically asks for the opposite in his performance notes. Secondly: this interpretation maintains the rather archaic and rudimentary binarity within Western classical music (Sergeant, 2016).

Page one, the *Apollo voice* or the 'male page' is well-balanced, rational and notated in a very rigid and structured way. Page two, the *Cassandra voice* or the 'female page' is rather chaotic, hysterical and all over the place (Waterman, 1994).

The feminist version

During her doctoral education in the early 90's at the University of California, San Diego, contemporary flutist Dr. Ellen Waterman, decided to update the analysis of *Cassandra's Dream Song.* It bothered her that Artaud and Starreveld embedded the piece in such a patriarchal interpretation (Waterman, 1994). She was not only disturbed by the controlled, rational and mathematical approach, she also decided that the stigmatization of the female protagonist, as the prototype of a hysterical woman, could use some restyling. Waterman decided to research the myth of Cassandra and Apollo more profoundly and turned towards the novel *Kassandra* by the German author Christa Wolf.[6] She tells the myth of Cassandra from the perspective of the female protagonist, not from a male dominated and patriarchal point of view, as usually happened in the tradition of old-Greek storytelling.

Waterman uses Wolf's description of Cassandra's emotional evolution, as a woman in a patriarchal society, as the guideline for her – fixed and predetermined – order of the second page (Waterman, 1994) (fig.3):

Line A (blind ambition)
Line E (formation of an individual voice)
Line C (choice)
Line B (hysteria)
Line D (resolution, self-knowledge)

[6] Wolf, Christa. *Kassandra.* Baker & Taylor, CATS, 2009.

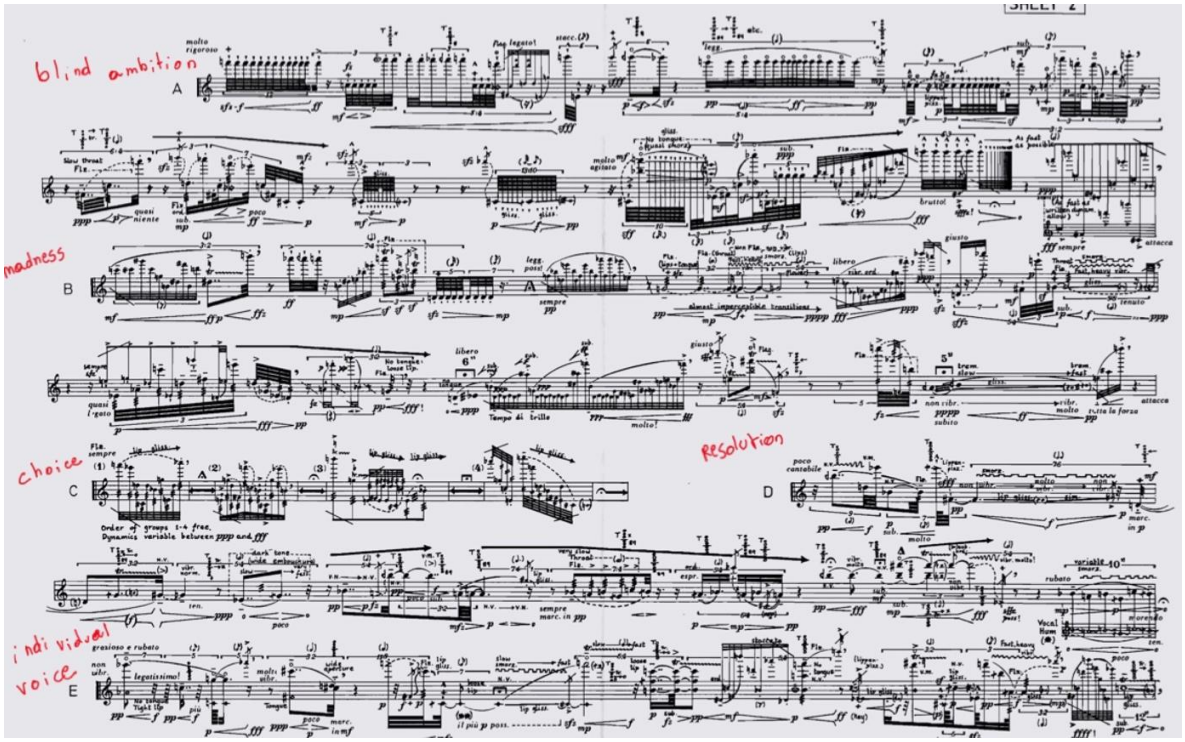

Figure 3 Cassandra's Dream Song for flute solo (1970) by Brian Ferneyhough, edition Peters, page 2 - feminist analysis

This version also avoids Ferneyhough's instruction to not predetermine the order of the second page. And exactly as the pioneer's version in the 70's and 80's, this interpretation is also imbued with a stereotypical and archaic atmosphere. Men approach the structure of the piece in a mathematical and rational way, 'solid and sound', as it should be! Women, on the other hand, dig into the emotional narrative of the leading character, as though fulfilling an empathic stereotype, you know, as they should be!
These approaches, however, undermine one of Ferneyhough's most important instructions for the piece: total freedom of structure.

Cassandra in the 20th century

It is that 'total freedom of structure' that is of great interest to me. When a composer so explicitly writes down that the structure and order of the piece cannot be determined and rigidly fixed beforehand, it has indisputable consequences for the interpretation.
Strongly holding on to a gender-related – and thus rigid and binary – interpretation destroys every chance on flexibility in the structural course.

That is why I decided to consider the figure of Cassandra as an allegory, rather than a gender-determined figure. This led me to a psychological approach. The *Cassandra Complex* is a psychological phenomenon that has been used in specialized literature since 1949, ever since the French philosopher Gaston Bachelard referred to the term as '*events that can be known beforehand*'.

In 1963, psychologist Melanie Klein, explained the Cassandra metaphor by describing people suffering from severe physical or psychological pain, seen from a tormenting and personal point of view. When these people try to explain their suffering – and the cause of it – to people they trust, they are not believed (Klein, 2002).

In 1988, psychologist Laurie Layton Shapira researched the different possible causes of the *Cassandra Complex*. These were her conclusions:

1. A dysfunctional relation of the 'victim' with a 'Apollo archetype'
2. An emotional or physical suffering
3. Not being believed when one tries to explain the cause of their suffering

But actually, Shapira still confirmed the stereotyped image of a hysterical woman, by constantly describing the Cassandra archetype as the 'Cassandra woman':

What the Cassandra woman sees is something dark and painful that may not be apparent on the surface of things or that objective facts do not corroborate. She may envision a negative or unexpected outcome; or something, which would be difficult to deal with; or a truth, which others, especially authority figures, would not accept. In her frightened, ego-less state, the Cassandra woman may blurt out what she sees, perhaps with the unconscious hope that others might be able to make some sense of it. But to them her words sound meaningless, disconnected and blown out of all proportion (Shapira, 2006, p.65).

Where the previous psychologists still researched the *Cassandra Complex* within the well-known stereotyped gender specifications, Jean Shinoda Bolen – around the same time – introduced a non-gender specific explanation of the metaphor:

Women often find that a particular [male] god exists in them as well, just as I found that when I spoke about goddesses, men could identify a part of themselves with a specific goddess. Gods and goddesses represent different qualities in the human psyche. The pantheon of Greek deities together, male and female, exist as archetypes in us all... There are gods and goddesses in every person (Bolen, 2014, p.x - xi).

Bolen describes the Apollo archetype as someone who is dominant, rational and strictly analytical, regardless of his or her gender. When the Cassandra archetype – mostly unsuccessfully – tries to open someone's eyes, this person often reacts from an emotion of injustice and will therefore be seen as a hysterical person by the other party. Bolen also suggests that the Cassandra archetype is not hysterical by nature, but that the hysteria is triggered by a dysfunctional relationship with a negative adjusted Apollo archetype (Bolen, 2014).

Embedding in a present-day society

To include this psychological and metaphoric definition of Cassandra in my artistic and interpretational analysis, I searched for examples of this complex in our modern-day life, such as, for example, Chronic Fatigue Syndrome (CFS). Patients with CFS are often extremely tired and suffer from chronic muscle pain (Hellinckx & Hellinckx, 2010), but it can

take years before these patients are believed by their physician and before they receive an official diagnosis. Their physical suffering is emphasized by an emotional battle, whereby most patients will hear that the cause of their suffering is strictly psychological. This constant battle may cause frustration, depressive feelings and isolation, which only emphasizes the original symptoms and can cause an impression of hysteria.

Even though the *Cassandra Complex* freed itself from a gender-related context, this approach is still too binary orientated in order to develop a completely free structure of *Cassandra's Dream Song*. This still enhances a polarizing approach – the 'you against me'-story. Page one against page two. The Apollonian blind wall against the hysterical frustration of a Cassandra archetype.

A further derivative of the *Cassandra Complex* is the *Cassandra Dilemma* or the *Cassandra metaphor*, where the Cassandra figure is used as a conceptual symbol for all those who paint a realistic picture but are not being believed.

A known example of the *Cassandra metaphor* is Warren Buffet. Years before the disastrous Wall Street crash, Buffet warned investors and shareholders of the giant 'stock market bubble', that was about to burst. His warnings were of course ignored, since the *big guys* of Wall Street could not imagine a future without their beloved *big bucks*. Nevertheless, the bubble burst and the consequences were devastating. This gave Buffet the nickname of the '*Wall Street Cassandra*' (LaRocque, 2007, p.60).

Also, climatology is a crucial issue within the subject matter of the *Cassandra metaphor*. For decades, climatologists warn us of global warming and the related natural disasters. All these warnings have been ignored by world leaders and governments, for as long as they are being expressed. Why? Because the efforts will cost too much money? Because world powers can shift? Because this future perspective is too pessimistic?
In 1999, climatologist Alan AtKisson described this extreme complexity of the *Cassandra Dilemma* within the problematic field of climate change:

> The people who gave the warnings about the bad conditions of our environment and the possible occurring disasters are being blamed that their predictions set the disaster in motion (AtKisson, 2000, p.22).

That is the world upside down: experts who are capable of interpreting all these alarming signals are being held responsible for the disastrous consequences that will follow. This happens because the actual consequences are often more severe than originally predicted. The time span between a prediction and the occurring natural disaster is rather large. It is large enough for mankind to continue living the way they are used to, without giving up their modern-day comforts. The input (e.g. the energy waste) is increasing daily, therefore the expected output (the natural disaster) is also exponentially growing.

The conceptual version

The latter concept is an important factor in my personal, conceptual analysis and interpretation of *Cassandra's Dream Song.* The given input will determine the output. The

way an event is communicated (an action) and interpreted (a reaction), establishes the factual output at that particular moment (result/chaos).
I do not condemn one voice to one specific page, but both *action* (the sound world around 'A', marked in green) and *reaction* (the sound world around 'Bb', marked in purple) are represented on both pages and are constantly in conversation with each other. The way I execute the material on page one (the intensity, the technical (im)perfections, the failure or non-failure, …) will determine the material on page two (result/chaos, marked in orange). This is the key to total structural freedom (Vanoeveren, 2016). (fig. 4)

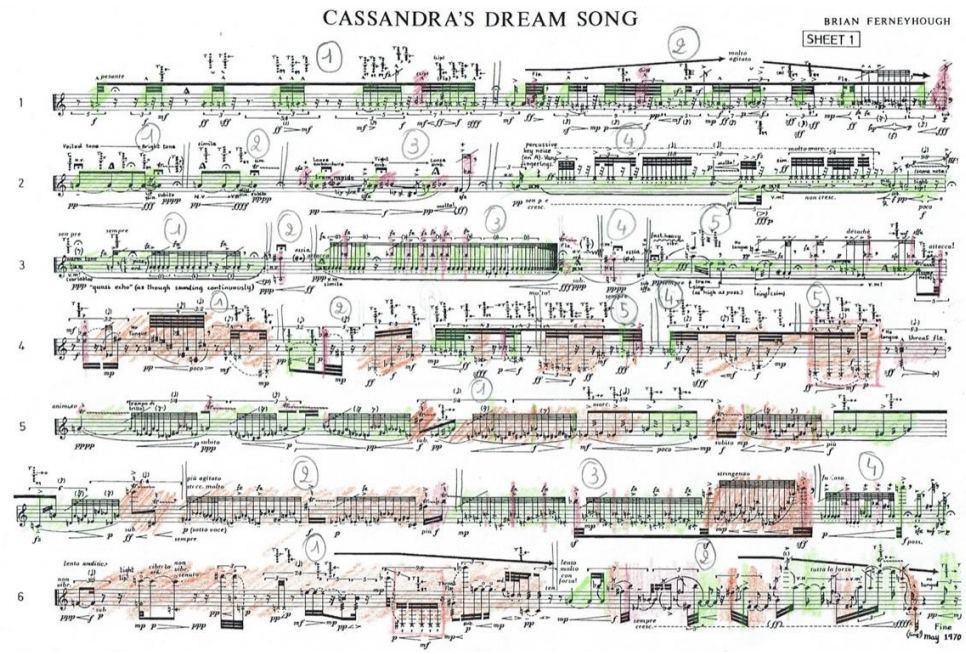

Figure 4 Cassandra's Dream Song for flute solo (1970) by Brian Ferneyhough, edition Peters, page 1 - conceptual analysis

The word *chaos* has been specifically chosen for this case. Since I embed the *Cassandra metaphor* in 21st century society, and we are not being spared from predicted or unforeseen disasters (nuclear threats, ISIS, global warming, polarization, etc…), I believe the word *'chaos'* is pretty accurate. But in Greek mythology, *Chaos* is also the *Nothing* from which the gods were born. Moreover, *Chaos* was gender neutral and cold, *nothing* as well as *everything* (Boyett, 2016).

The embedding within Greek mythology is strongly apparent in my interpretational analysis. I choose to process elements from the original myth, or Greek storytelling in general, within the micro layer of the piece: details and small motives are given meaning by linking them to mythological anecdotes.
As an example, I like to refer to the *pizzicati* in the first phrase of the piece: by specifically choosing the technique, where the tongue is catapulted forwards from the middle of the pallet, I imitate Apollo spitting into Cassandra's mouth on the moment where she received her gift.
At the end of line D, the performer has to sing in unison with the flute line. Instead of determined and confident singing, Ferneyhough writes *glissandi* in the voice line and

smorzando in the flute line, resulting in a trembling, undefined melody. This line, that starts with the development of the second voice (Bb sound world), focuses on the insecurity and fear of a young Cassandra, terrified by her visions and robbed from her self-confidence by a politically patriarchal society.
Line 4 is not idiosyncratically written, which is pretty rare in Ferneyhough's music for solo flute. The key-clicks can never be produced in the written dynamics – a fact the composer is absolutely aware of. This can be symbolically interpreted as Cassandra trying to be heard but being muffled by the hostile circumstances at the Trojan court.[7]

In order to determine the structural interpretation of the *middle ground*, I prefer to leave the rigid course of the myth behind and turn to the allegoric approach of Cassandra. The story of the myth is thousands of years old. Whether we look at it from an original patriarchal point of view, or from an emancipated point of view with the focus on the female protagonist, the result of the story will never change. For me, it seems impossible for a non-binary and non-gender related interpretation to be determined by a millennia-old *myth* – or as the word also implies: a fable.

To get rid of this pre-determined outcome – and with it a pre-determined structure of the piece – I apply a more fluid structure.

The *middle ground* of my conceptual interpretation is as follows:

Table1 Middle ground of the conceptual interpretation

Line 1	Line D
Line 2	Line A, C or E – with free order of the sections of line C
Line 3	Line A, C or E – with free order of the sections of line C
Line 4	Line A, C or E – with free order of the sections of line C
Line 5	Line B
Line 6	

The remarkable elements in this structure are the predetermined lines D and B and the free order of line C. This last line consists of 4 separate sections, where the performer not only has the freedom to decide the order of the sections, but also the dynamics and the tempo indications, which were not described by the composer.
I choose intentionally to play line D after finishing line 1. *Action* (the sound world around A) is very dominant in line 1. There is only a glimpse of a sounding Bb (*Reaction*) at the end of the line. In order to develop the dialogue between action and reaction, I choose to continue with

[7] For the complete analysis, please see: "Vanoeveren, Ine. *Confined walls of unity: the reciprocal relation between notation and interpretation in Brian Fernyhough's oeuvre for flute solo.* UC San Diego Electronic Theses and Dissertations. 2016, pp. 13-25.

line D, since that same sounding Bb is being developed beautifully at the beginning of that line. This will shape a strong foundation for the rest of the piece.

I follow the logic of the pioneers and Dr. Waterman to choose line B as the last line of the second page. As I described before, the line ends with the highest note of the piece (D7) and this indisputably establishes a climax-feeling. Within the concept of the *Cassandra Dilemma* it can also be interpreted as the final hammer blow before the melancholic and reflective character of line 6 sinks in.

Indeed, I also plead guilty to predetermining a small part of the structure. The big difference is that I, many years and countless performances of *Cassandra's Dream Song* later, can leave this logic behind and choose a more impulsive path, because I am not stuck to a rigid structural analysis. Since the input is constantly changing (together with me as a person and as a performer), the output will always be determined by new turns and twists, evolutions and changes. I truly hope that, in 30 years, I will have a completely new interpretation of the piece, because that would only confirm the conceptual course of the *Cassandra Dilemma* and emphasize the timeless character of Ferneyhough's composition.

Darmstadt 2016

On numerous occasions in 2015 and 2016, I talked with Ferneyhough about this piece and his music in general. In the summer of 2016, during the *Internationalen Ferienkurse für Neue Musik* in Darmstadt, we gave a joint presentation about *Cassandra's Dream Song* and all his other solo works for flute. That would be the first time he would hear and read my final interpretational analysis and I was more than a little nervous to hear his comments. I knew he never fully agreed with the feminist version of Dr. Waterman – although he voluntarily contributed to her research – since he never had the conscious intention to write a gender related composition. The performances and analyses afterwards gave *Cassandra's Dream Song* a negative gender stereotyped connotation.

Fortunately, he agreed with this interpretation and analysis. Although the *Cassandra Complex* and the *Cassandra Dilemma* were not yet developed when he wrote the piece in 1970, he immediately felt a strong connection with the metaphor. He was visibly relieved that I didn't repeat the general misconception of him being a solely cerebral composer, since he would consider himself as a very impulsive artist – however unbelievable that may seem looking at his specific notational style. On the one hand he is a very analytical and thoughtful person, on the other hand he is also very emotional, intense and impulsive.

For him, *Cassandra's Dream Song* is a piece in continuous motion. He described his compositional process as 'an internal conflict between structure and artistry', which inevitably resulted in a binarity in his composition, without having the intention to stigmatize a certain, or any, gender.
To emphasize his creativity and impulsiveness he brought two art works to the lecture (fig. 5): *his* interpretation of *my* analysis of *Cassandra's Dream Song*.
And with a wink he added that 'these [art works] will probably look completely different tomorrow than they look today.'

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Figure 5 Painting by Brian Ferneyhough (2016)

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Extended techniques on the traverso: The case of the *glissando* and the *flattement*

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Abstract The so-called 'extended techniques' have become an essential resource at the disposal of composers wishing to enlarge the possibilities of the flute's sound palette. Over the last four decades, a number of these techniques initially thought and conceived for the Boehm flute have gradually been adapted to the one-keyed flute as well, producing a brand-new set of sonic 'effects'. Composers such as Jukka Tiensuu, Hans-Martin Linde, Jacqueline Fontyn, Masahiro Arita, Jean-Marie Rens and Doja Cojocaru (to name but a few) have proved able to revive the sound possibilities of the traverso and exploit multiple sonorities, multiphonics, microtones, percussive sounds, whisper tones, jet whistles and singing and playing simultaneously, without forcing the one-keyed flute to become a caricature of the modern flute. Furthermore, the post-modernist composers' tendency and need to distance themselves from the strict rules of post-serialism and free their voices from any orthodox approach to music seem to find in the traverso sound and its Baroque legacy the best way of reconnecting contemporary 'effects' with the perennial 'affects' that this instrument is able to evoke.

Keywords traverso; extended techniques; postmodernism; one-keyed flute; contemporary music

Introduction

Following the Neoclassical and Modernist employment of musical instruments such as the harpsichord, recorder, viola da gamba and viola d'amore, the avant-garde and post avant-garde music scene has undertaken a further development of this phenomenon: the revival of several other period instruments from the Baroque era, including the one-keyed flute. Since the 1980s, contemporary composers have shown a new awareness of these orchestral period instruments, employing them with worthwhile and innovative results. Notably, the traverso offers an incredibly new soundscape, thanks to its rich palette of timbres and sound possibilities and its flexibility in producing microtones and embracing other extended techniques. A small group of eclectic and foresighted musicians (including Stephen Preston, Hans-Martin Linde, Carla Rees and Elissa Poole) have been capable of imagining and laying the foundation for a future of new sounds for the one-keyed flute. Their success is determined by the capability of taking distance from the modern flute's advanced achievements and, at the same time, by finding the courage to face new challenges in terms of performance practice, aesthetics and techniques on their early instrument. Within the contemporary music scene, the new composers' tendency and need to distance themselves from the strict rules of post-serialism and free their voices from any orthodox approach to music seems to find in the traverso sound and its Baroque legacy the best way of reconnecting the contemporary 'effects' with the perennial 'affects' that this instrument is able to evoke.

In the following article, I will shed some light on a couple of extended techniques – namely the *glissando* and the *flattement* - that frequently appear, amongst many others, in the contemporary repertoire for the one-keyed flute.

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There is a common understanding that all techniques that sound unconventional, unorthodox or not in line with tradition might be labelled as 'extended'. An inevitable question arises from this: what do we mean by conventional, orthodox and traditional?
If it is partly true that at the turn of the 20th century many pioneers found themselves radically pushing the boundaries of mainstream norms in music as never before, it is even truer that these innovative artists were not the first to seek special effects in the whole history of western classical music. A re-evaluation of the limits of musical instruments is an inherent feature of music at any time. For instance, earlier examples of 'extended' technique such as the striking the string with the wood of the bow, namely *col legno battuto*, can be already found in Haydn's symphonies, Mozart's concertos and later in Berlioz. [2] Furthermore, if we look at the history of the flute at the beginning of the 19th century, the Austrian flautist Georg Bayr (1733–1833) was already working on a method to address one of the techniques that would become so popular a century later: how to play more notes at the same time on the flute or, as we call them nowadays, multiphonics.[3]

Under these circumstances, the difference between what is 'extended' and what may yet be considered 'traditional' becomes questionable. If we take into consideration the extensive baggage of extended techniques that the modern flute carried with it throughout the 20th century, from Debussy to Sciarrino, we might ask ourselves: what still sounds unconventional or unorthodox nowadays? Perhaps not much.
What seems most important at this stage is the discussion on 'how' and 'why' a certain number of techniques – whether traditional or innovative – are favoured by contemporary composers.

I will clarify the 'how' by explaining the way in which to execute such techniques, highlighting the different results that can be obtained on the traverso in comparison with the modern flute. Regarding the 'why', I will explain the musical reason for their existence in an attempt to re-establish a connection between a plain and simple trial-and-error approach and the musical intention and meaning that lie behind them.
The objective of this article is to look at the contemporary 'effects' not just as a mere series of tangled and audacious musical tricks but rather as musical ideas and messengers of different musical motifs, following the Baroque *Figurenlehre* tradition. [4]

Glissando: the effects

The Italian term *glissando* derives from the French *glisser* and literally means to glide. It consists of a glide from one pitch to another. The similarities with *portamento* are many. Nevertheless, the latter usually refers to the carriage of the voice as with the term *portamento di voce* (Vaccai, 1832) or its emulation by string instruments and it is played as a sort of ornamental accentuation of the legato between two notes. The employment of *portamento* seems to relate more to performance practice than to a technique stipulated by composers. It is up to the performer to decide whether to convert certain legato markings into

[2] Namely: in the Fifth Violin Concerto by Mozart, in Haydn's Symphony no. 96 and in the *Symphonie fantastique* (1830) by Berlioz.
[3] For further information, see: Georg Bayr, *Schule für Dopplertöne auf der Flöte* (Wien: F. X. Ascher Antiquar, 18?)
[4] Musical rhetorical-figures are widely analyzed in Dietrich Bartel Lincoln, *Musica Poetica: Musical-Rhetorical Figures in German Baroque Music* (Nebraska: University of Nebraska Press, 1997).

glides in order to connect two different pitches. While *portamentos* do not follow any specific sign but the slur, *glissandos* always follow an actual symbol (usually a short diagonal line or a curve that describes the direction of the glide).

The *glissando* can evoke many different images. It might give a feeling of continuity and fluidity if slowly executed in order to connect two notes. Alternatively, it is capable of producing a sense of lament, especially if covers a long interval with a *diminuendo* effect such as in the opening violin gesture of *Dikthas* for violin and piano by Xenakis. It can graphically depict a human cry or moan as in the sex scene of Shostakovich's Lady Macbeth, [5] or be clownish and farcical as in his *Leningrad Symphony*. In addition, if the glide goes upwards at the speed of a hiccup, it can create a sense of levity and become sarcastic as often happens when Mahler marks '*molto portamento'* in some of his symphonies. [6] When slowly and gradually accentuated, it can produce excitement, as in the opening clarinet gesture of Gershwin's *Rhapsody in Blue* or sound like a volcanic eruption as in *The Rite of Spring* by Stravinsky. [7]

The *glissando* is one of the techniques most frequently employed on the one-keyed flute in the context of contemporary music. Due to the natural flexibility and the open-hole layout of the instrument, the technique shows extreme effectiveness if executed in one of the following ways:

- by rolling the flute in and out to lower or raise the pitch;
- by sliding the fingers off the rims of the fingerholes;
- by a combination of both the rolling of the flute and the sliding of the fingers.

The *glissandos* can be directed from the initial note either upwards or downwards and cover both small and large intervals, from quartertones to major thirds. Depending on the initial fingering, the amplitude of the *glissandos* will change: in principle, the more fingerholes remain uncovered, the larger the pitch bending will be. Sure enough, a glide from *C″* can descend easily to *A″* (covering a minor third) whilst it will be much more difficult to reach *C″* using the *D''* fingering even though it is only a major second. In the latter case, all the fingerholes are covered to execute the lowest note on the traverso, leaving little room for the motion of the airstream inside the tube.

As will be illustrated below, *glissandos* covering larger intervals can be broken down into a series of shorter *glissandos*. It is only by the rolling of the flute – while keeping the same fingering – that the flautist can control and produce a precise scale of quartertones.
Robert Dick in his *The Other Flute*[8] devotes an entire paragraph to *glissandos*. With a great deal of precision, he employs several charts to explain how to execute them, by sliding the fingers across the rims of the flute's fingerholes. This technique represents an option for the traverso as well. Nevertheless, the smaller and unequal diameter of its fingerholes makes the employment of this technique less effective. Furthermore, the difference between one

[5] In the third scene of the first act of *Lady Macbeth*, Sergei forces himself in Katerina's room and makes love to her.
[6] A few examples of "molto portamento" markings in Mahler's symphonies: the trumpet solo in the 5th movement of the Second Symphony and the horns' parts of the Third movements of both the Fourth Symphony and Fifth Symphony.
[7] Namely the string's effect in the *Dancing out of the Earth* section.
[8] Robert Dick *(*1975) *The Other Flute* pp. 72-79.

species of traverso and another makes the effect of this glissando technique different from one instrument to another: the copies of original one-keyed flutes still differ a lot from one to the next – the result of craft production and not of industrial mass production as with the modern flute –, not to mention the original instruments themselves dating from two to three hundred years ago. This is the reason why any explanation of how to produce *glissandos* by means of charts, as in Dick's book, would never be as precise and efficacious, in the case of the one-keyed instrument. For instance, in the case of a downwards *glissando*, the rolling of the traverso embouchure will be much more satisfactory than the sliding of the fingers. If, on the other hand, an upward glide is required, it is usually best to combine the rolling of the embouchure and the bending of the fingers, simply because the rolling of the embouchure will not result in sufficiently large intervals. The sliding of the fingers on the fingerholes can be executed in two ways:

1. by actually covering the holes and letting the finger come into contact with the flute;
2. by a tremulous motion of the finger just above the hole, without letting the finger touch the flute. [9]

The choice between the two options is left to the performer. Performers should be capable of determining which one fits better according to the musical effects they wish to express.
In order to show as many kinds of *glissando* as possible, a few practical examples will be selected from a number of contemporary pieces. Hence, it should be remembered that the instrument used as a model in this article is a Palanca dated ca. 1760 made by the German flute maker Martin Wenner. Therefore, these instructions might produce different results if other instruments are employed. Nevertheless, flautists should be able to adapt the given instructions to their own instruments with a certain degree of flexibility and find their way to eventually obtain similar results.

Last but not least, the *glissando* can be executed with the head-joint alone. After screwing it off from the traverso middle-joint and foot, the flautist is asked to blow into the embouchure and place one hand – or the fingers – along the rim of the head-joint or inside the tube. In this case, the range of the *glissando's* tone fade is quite big and the sound result can be very loud. Nevertheless, the fact that no fingering can be employed reduces the number of variables for the creation of a microtonal scale. Due to the completely different nature of this technique, an example of the head-joint *glissando* will be shown separately.

Short glissandos

The beginning of *Temps Illusoire* for traverso and harpsichord (1994) by the Belgian composer Jean Marie Rens (b. 1955) consists of a unisono played by both the traverso and the harpsichord that resolves onto a dissonance. As indicated by the *fermata* sign on the score, the dissonance has to resonate over its entire length, and eventually go back to the initial pitch: *laisser battre*. In order to build the proper tension, the flautist has to play the first

[9] Charles Nicholson in his *Complete Preceptor for the German Flute* (1816) describes the vibrato on the flute as follows: "the other way by which the same effect [the vibration]is produced, is by a tremulous motion of the finger immediately over the hole, without coming into contact with the flute by the same motion, and in some instances with the finger covering about one half of the hole."

note from an almost absolute silence *pppp* and increase its volume with a *crescendo*. Once the harpsichord joins the traverso, the latter keeps slowly getting louder. At the very end of the *crescendo*, the initial *G"* quickly glides upwards to A ♭ *"*, following the short curve that Rens marks on the score.

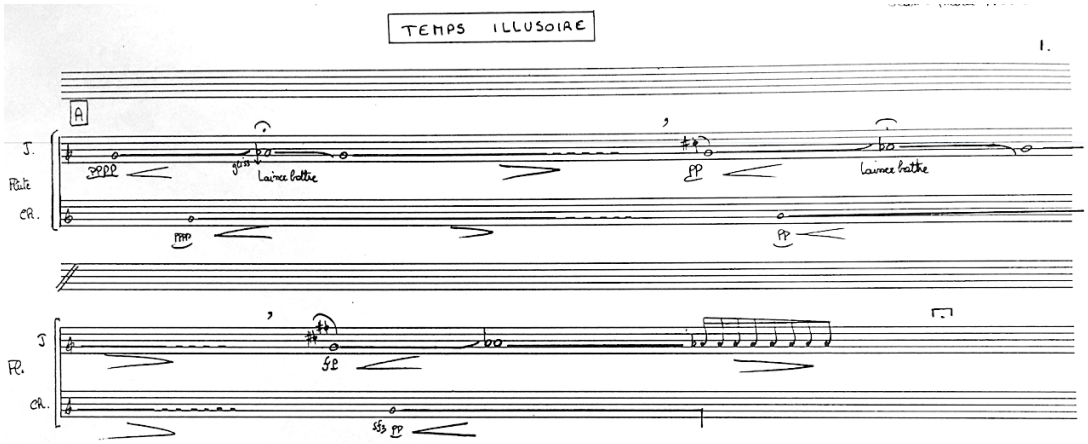

Figure 1 Temps Illusoire by J. M. Rens

The dissonance that is produced as a result of this has to last as long as possible – as marked with the *fermata* sign. After that, the dissonance resolves to *G''* with a *decrescendo.* There are two examples of *glissando* that appear here: the first that goes upwards and the second that goes downwards. They are both among the easiest to perform: they are fast, they cover a small interval, they have to be played with a *crescendo* if upwards and a *diminuendo* if downwards. Nevertheless, they should be played smoothly and accurately.

The first *glissando* goes to *G"* to *A* ♭ *"*. In spite of its ease, this simple glide presents a perfect example of the technique of rolling of the embouchure, and its limitation when solely relied upon. A new fingering should be introduced when the rolling motion is complete, following these instructions:

1. as the note is sounded with the usual fingering, the flute should be slowly turned out, away from the player, who should open the embouchure;
2. the lip opening is rapid and modest and consists of both upper and lower lip expanding and increasing the distance in two opposite directions;
3. letting the chin and jaw support the movement of turning out the flute;
4. controlling the air pressure in order not to increase the dynamics too abruptly and to avoid making the sound too breathy;
5. before cracking the note, rapidly change the fingering to allow the normal playing angle to be restored;
6. this last movement should be as quick and precise as possible.

Alternatively, this same *glissando* can be executed by the sliding of the fingers alone:

1. start by sounding the note with the *G"* fingering position, then slowly lift the right ring-finger and move it from its central position towards the edges of its fingerhole;
2. the left index, middle finger and ring-finger should be moved slowly at the same time to their fingerholes;
3. coordinating the air pressure with the sliding of the fingers in order to make a good crescendo.

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In comparison with the rolling of the embouchure, the advantage of this last technique is to leave the player free to keep the same playing angle during the whole glide.
The process of performing the second *glissando* from *A ♭ ″* to *G″* with the rolling of the traverso involves:

1. slowly turning the flute in, closer to the player while playing the first note;
2. moving the upper lip slightly downwards while moving out the lower lip and jaw out in the opposite direction to the rolling of the flute in order to give more space to the airstream directed from the upper lip;
3. controlling the air pressure in order not to decrease the *diminuendo* too abruptly or to make the sound too opaque;
4. before reaching the lower pitch, quickly changing the fingering and restoring the normal playing angle;
5. this last movement should be fast and precise.

If made with the sliding of the fingers, it involves:

1. sounding the note with the usual *A ♭ ″* fingering position, gently placing the left ring-finger around the edge of its fingerhole and slowly covering the hole completely with it;
2. coordinating the right index, middle finger and ring-finger, making sure these three fingers are sliding away from their fingerholes, all at once;
3. coordinating the air pressure with the sliding of the fingers in order to make a good diminuendo.

Long glissandos

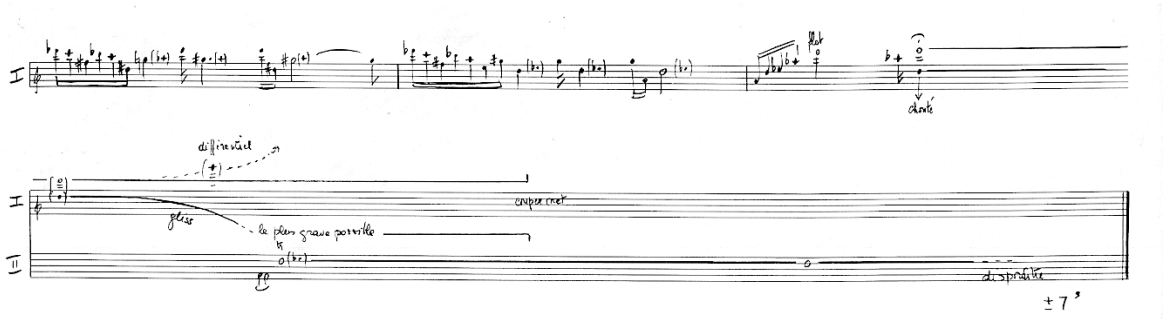

Figure 2 Mémoires by J. M. Rens

Mémoires is a duet by Rens for two traversos.[10] The piece offers another example of *glissando*, this time longer and trickier to execute than the previous one. The initial chord consists of a multiphonic on *D‴*, with the highest *D⁗* sung by the first flautist. The glide goes downwards from *D‴* to ‘*le plus grave possible*’ (as low as possible).
To cover a large interval, a combination of the sliding of the fingers and the rolling of the flute is required. As marked in the score, Rens suggests switching the fingerings on the way down to the lower pitch, from the initial *D‴* to *G⁗*:

[10] As the composer marks, following the tradition of the basso continuo: *pour traverso et traverso obligé*.

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1. while playing, start executing the *glissando* simply by turning the embouchure downwards as low as possible (usually *C #‴* should reachable before the sound cracks);
2. at the very last moment before the sound cracks, slowly slide the left index on its fingerholes and let the right index and annular lift rapidly up in order to switch fingerings from *D ‴* to *G″*;
3. once *G″* is reached with the new fingering, continue with the rolling down of the embouchure as far as *F ″* (or, with some practice, *E ♭ ″*);
4. if not satisfactory, first slide gently the right index, then the right middle finger and eventually the annular before the sound cracks (this last fingering in combination with the rolling of embouchure should lead to *C″*).

Evidently, the whole *glissando* will not sound perfectly homogeneous over its length especially before the *G″* fingering is applied. As mentioned at the beginning, this is due to two physical factors:

1. the more fingers cover the fingerholes of the instrument, the less room there is for the airstream to bend without cracking the sound;
2. the higher the note, the more difficult the downward glide;
3. a fork fingering (such as the Hotteterre *D‴″*) will only increase the risk of cracking the sound.

Shake glissando

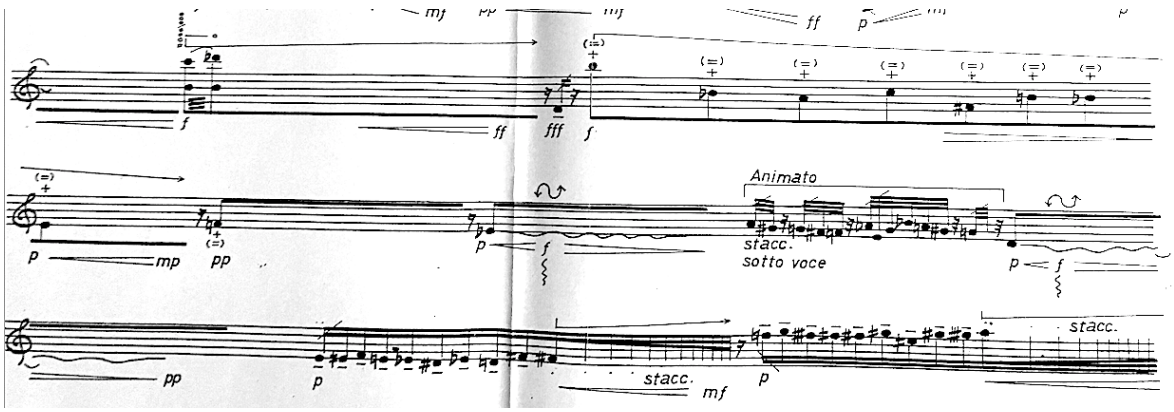

Figure 3 Legende by M. Arita
Audio sample: from *Legende* by M. Arita – Matteo Gemolo, traverso
https://soundcloud.com/matteogemolo/excerpt-from-legende-by-m

In the tangled and meditative *Legende* for traverso, the Japanese composer and flautist Masahiro Arita employs several extended techniques, including the shake *glissando*. This consists of an undetermined variation of the pitch produced by shaking the flute.

The acoustic result lies somewhere in between a vibrato effect and an actual *glissando*, depending on the speed of the airstream and on the length of each glide. The choice of this particular kind of *glissando* is based on a very simple fact: to play *E ♭ ″* and *D″* (the last fingerhole for the latter is covered by the key) each fingerhole is covered, leaving no option other than to shake the flute to produce a variation in pitch. As Hotteterre explained with

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regards to the *flattement* on the low *D‴, D♯″* and *E♭″*: "I would say that it can be done only by means of artifice because ´this is the lowest note on the flute, and since you have no finger left unemployed to do it with, it must therefore be done by shaking the flute, which imitates a softening [...]'[11]

Therefore, to execute a *glissando* on that note the only two remaining possibilities are either the rolling of head-joint up and down or the shaking of the flute, as the composer prefers to call it. The difference between the shaking of the flute and an actual *flattement* is very subtle. With the latter, the pitch of the note can only be flattened. As Tromlitz states: 'the note must tend alternatively a little towards the low side and back up again and keep fluctuating'[12] On the other hand, the shaking of the flute should be performed in much the following fashion:

1. while playing with the selected fingering, make sure that the lower lip is in a firm but flexible position;
2. to start rolling the embouchure, make sure the movement starts gently from both the wrists and allows the opening of the mouth hole as a consequence of this;
3. once half tone above is reached, turn back to the normal playing angle;
4. having reached the normal playing angle, roll the embouchure downwards, by turning the wrists in the opposite direction;
5. ensure that the lower lip and jaw start a counter-motion outwards in order to give enough room to the airstream directed from the upper lip;
6. once the lower semitone is reached, turn back to the normal playing angle;
7. repeat the same process up and down, adding the dynamics written by the composer.

There is no specific speed at which to correctly execute this kind of *glissando*. This choice is in the hands of the performer. Nevertheless, it should be carefully considered in order to balance the downward and the upward motion in a satisfactory manner.

Headjoint glissandos

In the fourth movement of *La Fenêtre ouverte*, op. 85 (1996), trio for traverso, viol and harpsichord, the Belgian composer Jacqueline Fontyn (b. 1930) asks the flautist to unscrew the traverso's head joint and execute a number of glissandos with it.
The first *glissando* '*avec le bec*' can be executed by rolling the flute up and down, following the curves the composer has drawn on the score. With the exclusive use of the head joint, the flautist should be able to cover a major third, from a low *F″* to *A″*.

[11] Translation from "Principes de la flute traversière, ou flute d'Allemagne, de la flute à bec ou flute douce, et du haut-bois, divisez par traitez" (Amsterdam, 1701): "je diray qu´il ne se peut faire que par artifice. Comme l´on ne peut se servir d´unucun Doigt pour le faire, (puis´quils sont tous occupez à boucher les trous,) on ébranle la Flute avec la main d´enbas, ensorte que l´on puisse imiter par ce moyen le fftement ordinaire."
[12] "Der Ton bey der Bebung sich wechselswerte ein wenig unterwärts und wieder aufwärts ziehen und schwebend erhalten muss," Tromlitz Unterricht 240 transl. 214

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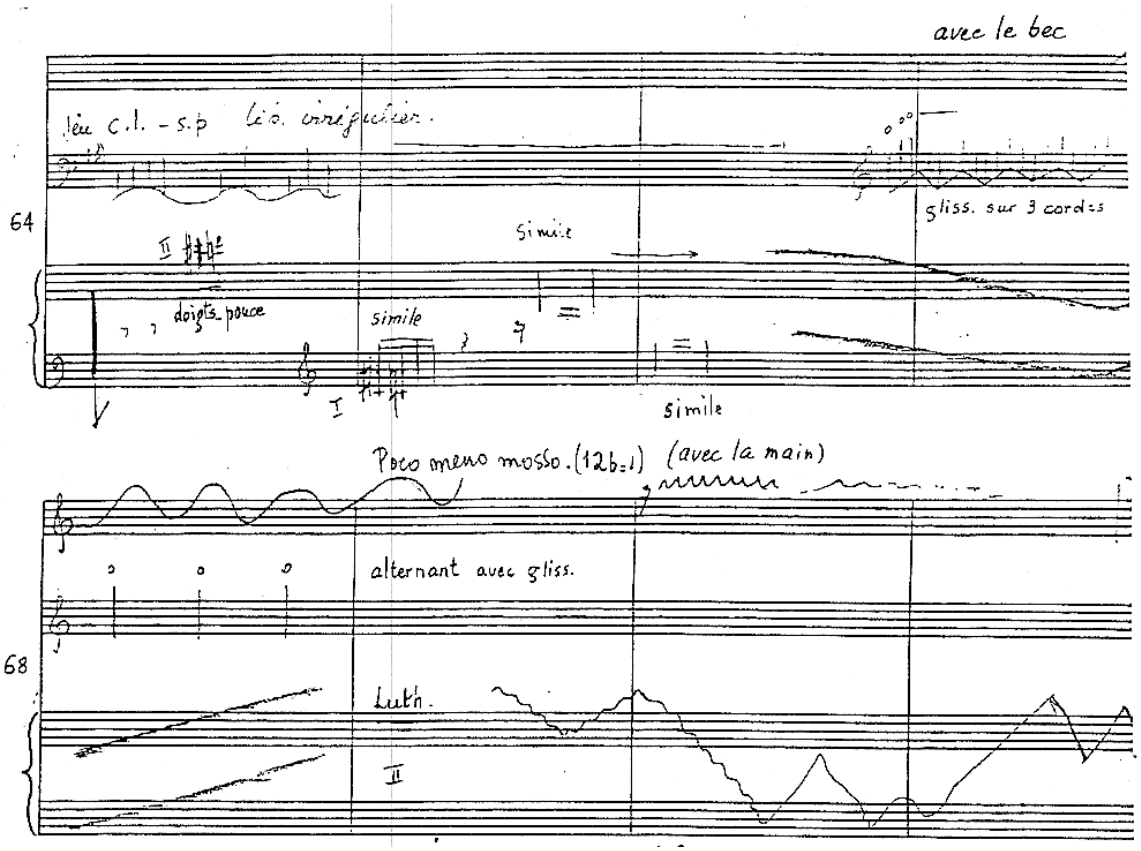

Figure 4 'Un peu timbré' (*La Fenêtre ouverte*), by J. Fontyn
Audio sample: from 'Un peu timbre' (*La Fenêtre ouverte*) by J. Fontyn – Europa Ritrovata, Matteo Gemolo tr.
https://soundcloud.com/matteogemolo/excerpt-from-un-peu-timbre-la

The second *glissando* 'avec la main' can be performed with the help of the right hand. The use of one hand enlarges the interval down to *E"*, enabling the flautist to reach a much larger interval, namely a tenth: by placing the right hand alongside the rim of the head joint, the natural length of the tube is increased, allowing the flautist to reach wider intervals. In order to reach even greater intervals, a combination of the rolling of the flute and the placing of the right hand around the rim of the head joint is favoured. As Dick explains in his *The Other Flute*:

> The first technique is to place the end of the head joint in the crook of the right hand (between the thumb and forefinger). By closing the right hand one finger at a time, the length of the head joint is increased, and the pitch is lowered. When the right hand is tightly closed, the head joint is effectively stopped. (Dick, 1975 p. 79)

An alternative means of executing the *glissando* on the head joint consists of 'placing the edge of the heel of the right hand on the rim of its open end, and then moving the right hand towards the embouchure' (Dick, 1975, pp. 79-80). In such a way the *glissando* can be executed at faster pace, for instance as a rapid tremolo. Nevertheless, its range will be slightly smaller (an octave down to *G #"*).

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Glissandos: the affects

As seen throughout a variety of examples, different kinds of *glissando* demand different techniques. Their meanings, within their musical context, change too.
In *Temps illusoire*, Rens wishes to create a two-dimensional soundscape that consists of a simple and primordial tension between sound and silence. Hence, the glissando is employed as a sonic bridge between these two dimensions. A glide initially allows the sound to arise out of absolute silence; and again another glide, this time in reverse, retreats into silence. The tension between the stillness of the harpsichord's long note and the traverso's slow *glissando* – up and down – creates a sense of continuous motion within the same circular sound mass.

Compared with those in *Temps illusoire*, the *glissandos* in *Mémoires* seem to have a different meaning. Instead of being the hidden engine that sets into motion the primordial sound mass from silence to sound and vice-versa, the last glide placed at the end of *Mémoires* suggests the idea of eternity: in fact, this *glissando* – performed by the first flute – ends with a long note played by the second flute, *pianissimo*. This last note is left resonating as a sort of echo of the previous note. Compared to the latter, however, this note lies still, lifeless as a sonic consequence of the previous motion. In this case, the *glissando* represents an opportunity to trace a connection between two voices that merge and become a single unity, in much the same fashion as in 'Mierontie/Beggary', second movement from *Tiet/Lots,* quartet for traverso, baroque violin, viol and harpsichord, composed by the Finnish composer and harpsichord Jukka Tiensuu. [13]

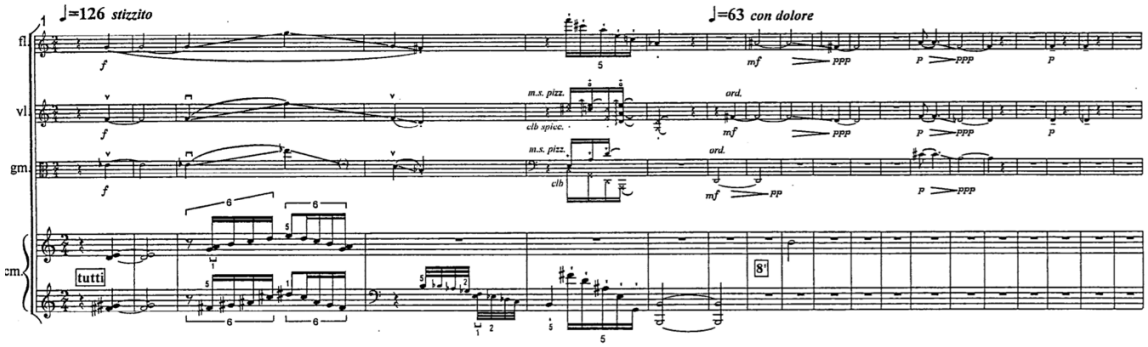

Figure 5 'Mierontie/Beggary' (*Tiet/Lots*) by J. Tiensuu
Audio sample: from 'Mierontie/Beggary' (*Tiet/Lots*) by J. Tiensuu – Europa Ritrovata, Matteo Gemolo tr.
https://soundcloud.com/matteogemolo/excerpt-from-mierontie-beggary

Throughout the whole movement, the composer makes extensive use of *glissandi* for both the string and the flute parts, conferring a strongly plaintive nature on the piece. Along the lines of Xenakis, these *glissandos* embody the idea of continuity of matter; but in this specific case, serve to quite ironically express the shaky and limping walk of a beggar, as the title itself suggests. In order to render this impression of instability, the four instruments employ a variety of different combinations of rhythmical patterns. Thanks to the use of large *glissandos*, bow vibratos and descending arpeggios or scales, these sections can efficiently mimic the tragic fall of the beggar, who seems to lose constantly his balance, trying to walk straight and eventually collapsing on the ground.

[13] For more on this subject see Matteo Gemolo, 'Jukka Tiensuu's new music for the traverso' *The Flutist Quarterly*, Winter Issue 2018, pp. 26-31.

The shake *glissando* written by Arita in *Legende* has little to do with the two previous ones. In Rens, both *glissandos* served the purpose of connecting either silence with sound or two different voices. Therefore, their trajectories were precisely predetermined by the composer. They were meant to bring unity within a dual system. On the contrary, in the case of *Legende*, Arita employs the shake *glissando* in order to break any possible connection between opposites. There is no direction either. The main thing here is not the *glissando*'s destination but its journey. There is no trajectory, but just a flow.

Following this line, Fontyn employs the head-joint *glissando* in much the same fashion as Arita but with a more radical outcome. The rapidity and intensity of the *glissandos* in *La Fenêtre ouverte* suggest the idea of a wild turbulence pervading the surrounding space. While in Arita, the shake *glissando* was still kept inside the system, Fontyn's *glissando* triggers the outside and lets it travel beyond its boundaries. The explosion of the traverso *glissandos* does not leave the surrounding space without consequences. Both the viol and the harpsichord react to it. A spatial notation is employed by Fontyn to depict a series of punctual events, such as a cascade of scales in the harpsichord part and *glissando* arpeggios for the viol. In this scenario, the continuous matter is fragmented and broken up into a discontinuous soundscape.
Here we can sum up the four different meanings that *glissandos* are able to evoke:

1. A sonic bridge that interconnects two opposite dimensions in a dual circular system such as silence and sound (ex. *Temps illusoire*);
2. A trace of eternity that is left reverberating into silence (ex. *Mémoires*);
3. A random and spontaneous motion within a system, without direction or trajectory (ex. *Legende*);
4. An eruption of vibrations that travels beyond its natural boundaries and pervades the outside from the inside, in a motion that goes from continuity to discontinuity (ex. *La Fenêtre ouverte*).

Flattement and vibrato: the effects

The finger movement on the edge or above a tone hole can produce a gentle or rapid pitch fluctuation called *flattement*. It can vary in amplitude and speed according to the effect the performer wishes to produce. The same result can be obtained with vibrato: the motion of the airstream produced by the movement of different muscle groups such as the diaphragm, the abdominal wall and the throat.
The *flattement* is traditionally regarded as an ornament and frequently employed in the French Baroque repertoire. J. Hotteterre describes its use on long notes in his *Principes de la flûte traversière* (1707). In P. D. Philidor's *Suites à flûte traversière seule* op. 1, 2 and 3 (1717-18) the *flattement* is explicitly marked as an embellishment with a horizontal wavy line.[14] Its function is to arouse a different number of affects in much the same way as vibrato does. Due to its expressive purpose, it is often considered a sort of finger *vibrato*. The gentle effect that the *flattement* produces, is 'extremely touching in tender pieces' as M. Corrette observed in his *Méthode Raisonnée pour apprendre à jouer de la flûte traversière* (1773).

[14] This is one of the rare examples in which the *flattement* is marked on the score. Usually its employment depends on the personal taste and style of the flautist.

Although conceived as an ornament for centuries, only very recently has vibrato become an integral part of the flute tone production technique. Since the time of Marcel Moyse, its extensive use has made it a fundamental expressive component of modern playing:

> Moyse in particular shows a very flexible approach to vibrato and phrasing, and his vibrato is quite moderate in speed. [...] Pre-war recordings of French orchestras show that vibrato was in general use by French flautists in the 1920s and 1930s [...] about 1930 several flautists in America had developed a style which distinguished them from most flautists in France [...] Marcel Moyse was active as a player and teacher in America from the 1930s onwards, but despite the great flexibility and more moderate speed of his vibrato, American flautists have continued to favour a faster and more constant vibrato than European flautists of the French school (Philip, 2004 pp. 113-4).

While this kind of vibrato in modern times has become a persuasive feature in the tone production technique of modern flute players, in the contemporary repertoire the employment of both finger and regular vibrato seems to look back in time by favouring its pre-modern function as a temporary effect in much the same manner of a Baroque ornament. For this reason, the use of flattement and vibrato are often carefully marked on the score and selectively classified by speed and amplitude.

The absence of vibrato

Following the line of the early music revival and historically informed performance practice, an increasing number of contemporary composers have begun to rediscover the beauty of a straight and pure tone when it comes to the traverso. The presence of a vibrato or *flattement* is carefully marked in the score, making of it the 'exception' rather than the 'norm'. As early as 1996, the Swiss composer Robert Strizich wrote the following preliminary performance notes for his *Tombeau*:

> The notation 'Vb' indicates a pronounced vibrato (with pitch fluctuation). Whenever this notation is found, a Baroque-style *flattement* (or finger vibrato) should be performed if at all possible. However, in the few instances where a true *flattement* is not possible, the necessary vibrato should be produced by varying breath pressure. Where no indication occurs, the performer may apply – with discretion – a small amount of breath vibrato, as long as it is not too pronounced (Strizich, 1996 p.2)

Tombeau (1996), for baroque flute and harpsichord, represents one of the first examples in which a contemporary composer clearly stated how the traverso tone production should be purified from the continuous vibrato so typical of modern playing. This approach shows composers' increasing awareness of one of the most important features that distinguishes performance practice on the one-keyed flute from the one on the modern Boehm model: the employment of the vibrato as a passing effect.

Only a year before, the American composer John Thow (1949–2007) made no reference whatsoever to the traverso tone production in his *To Invoke the Clouds* (1995) for two traversos. On the contrary, still in line with modern flute playing, Thow marked a single 'non vib.' sign (no vibrato) at the very end of his piece, as if the presence of the vibrato up to this point had simply been taken for granted.
It is interesting to note how the calling into question of one of the major features of performance practice on the traverso has begun to have an impact on the way of playing the modern flute too: as early as 1972, at a time when it was still inconceivable to write a modern

piece for the one-keyed flute, the Finnish composer and harpsichordist Jukka Tiensuu composed his *Ouverture et Cadenza* for (modern) flute and harpsichord. In the performance note of this piece, he carefully indicated three different ways to vary the vibrato, according to its speed and micro-tonal amplitude. His expertise as a harpsichordist and true connoisseur of the early music repertoire surely influenced him on this matter. In his later pieces dedicated to period instruments Tiensuu never failed to mention that 'vibrato should be avoided in general'[15] or that it should be 'reserved only to emphasize the most passionate moments of the piece'.[16]

The presence of vibrato

Under these circumstances, vibrato has regained its function as a temporary effect. From now on, the presence of vibrato has to be marked on the score, if required by the composer.

In *Mémoire,* J. M. Rens mentions three approaches:

- *sous vibrato* for a very slow vibrato;
- *vibrato* for a regular effortless vibrato;
- *sans vibrer* for a straight tone.

The *sous vibrato* always appears on long notes and serves the purpose of destabilizing the otherwise straight tone quality of the traverso. This slow-motion way of producing this specific *sous* fluctuation of the pitch does not have the same expressive meaning as a regular vibrato. Compared to the latter, the *sous vibrato* is rather controlled and its pulse more regular. It does not suggest any positive connection to the 'sweetness of sound quality' ('lieblich')[17] as a regular vibrato would do.

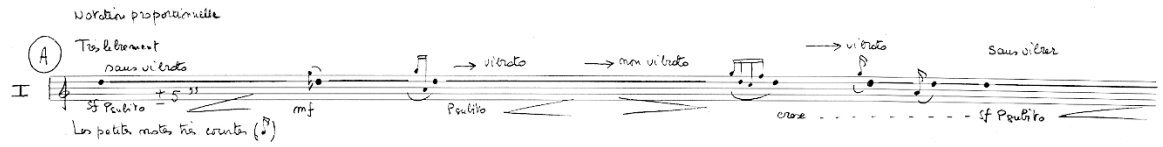

Figure 6 Mémoire by J. M. Rens

Contrary to what Rens does, in *Anspielungen* (1988), H. M. Linde does not diversify the use of vibrato according to its expressive function. He prefers to mention the muscle groups that are involved in the production of two different effects:

- diaphragm vibrato (marked with a wavy line);
- tongue vibrato (marked with a wavy line within a circle).

While the diaphragm vibrato can vary its amplitude and, with that, its expressive function, the tongue vibrato has a much tighter amplitude and a simpler effect: it results in a limited and rather noisy fluctuation of the pitch. Nothing of the sweet and tender quality of traditional vibrato is left here. This subtle movement of the tongue produces a variation in the timbre that is much closer to the roaring effect so typical of the flutter tonguing rather than to

[15] Jukka Tiensuu, *Mora* for tenor voice and Baroque Orchestra (Helsinki: Finnish Music Information Centre, 2012).
[16] Jukka Tiensuu, *Tiet/Lots* for Baroque flute, Baroque violin, viol or Baroque cello and harpsichord.
[17] Greta Moens-Haenen, 'Vibrato' In *Grove Music Online*

tenderness of regular vibrato. Tongue vibrato could be regarded as a flutter tonguing in its primordial state.

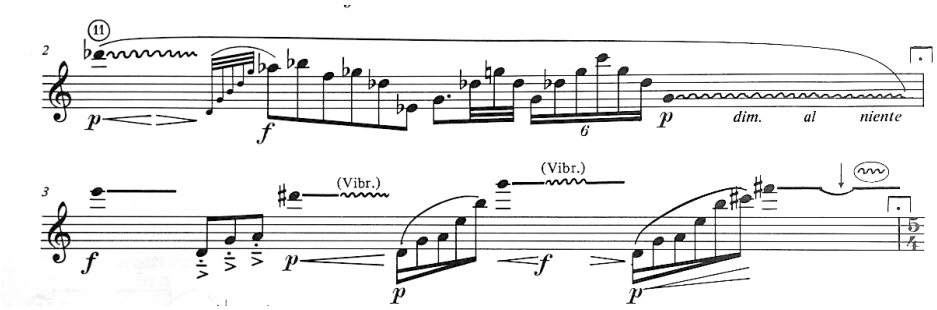

Figure 7 Anspielungen by H.M. Linde
Audio sample: from *Anspielungen* by H.M. Linde –Matteo Gemolo, traverso.
https://soundcloud.com/matteogemolo/excerpt-from-anspielungen-by

The finger vibrato or flattement

In the eyes of many contemporary composers, *flattement* is often employed as a sort of hallmark of 'Baroqueness'.

Compared to regular vibrato, *flattement* can produce a much wider fluctuation of pitch. The fingers that put in motion this special kind of vibrato can vary its amplitude and speed with a greater degree of precision than the traditional vibrato produced by the contraction of the inner muscle groups such as the diaphragm, the abdominal wall, the throat or the tongue, as shown earlier.

A beautiful use of *flattement* is made by Linde in *Anspielungen.* The composer employs this effect on long notes when played *ppp*, in contrast with a regular vibrato on loud tones (*ff*). The *flattement* is therefore able to create a very gentle and intriguing fluctuation of the pitch that gives a more meditative character to the second section of this piece. In contrast with it, Linde places a more expressive and proactive vibrato on loud notes.
Audio sample: from *Anspielungen* by H.M. Linde –Matteo Gemolo, traverso,
https://soundcloud.com/matteogemolo/excerpt-from-anspielungen-by-h

A completely different approach to *flattement* is undertaken by the Canadian composer and flautist Owen Underhill (b. 1954) in his *The Celestial Machine* (1988) for traverso, baroque violin, viola and harpsichord. In line with his eclectic style, Underhill builds up a few interlude sections in which he allows himself to go back to the good old days of tonality, by creating a strong contrast with the harsh atonal character of the rest of his piece. It is in these two tonal sections, marked *Pesante impietoso* (heavy and merciless), that *flattement* can finally re-establish its potential for expressiveness as a reminder of a lost Baroque time. Within a more singing melody, on top of a few tonal chords played by all the instruments (with little microtonal fluctuations), the traverso is able to create a dramatic and dynamically rich melody, by employing a wide and slow fluctuation of the pitch. Underhill employs finger vibrato instead of a regular vibrato as a sort of tribute to the Baroque time, capturing its true essence of ornament.

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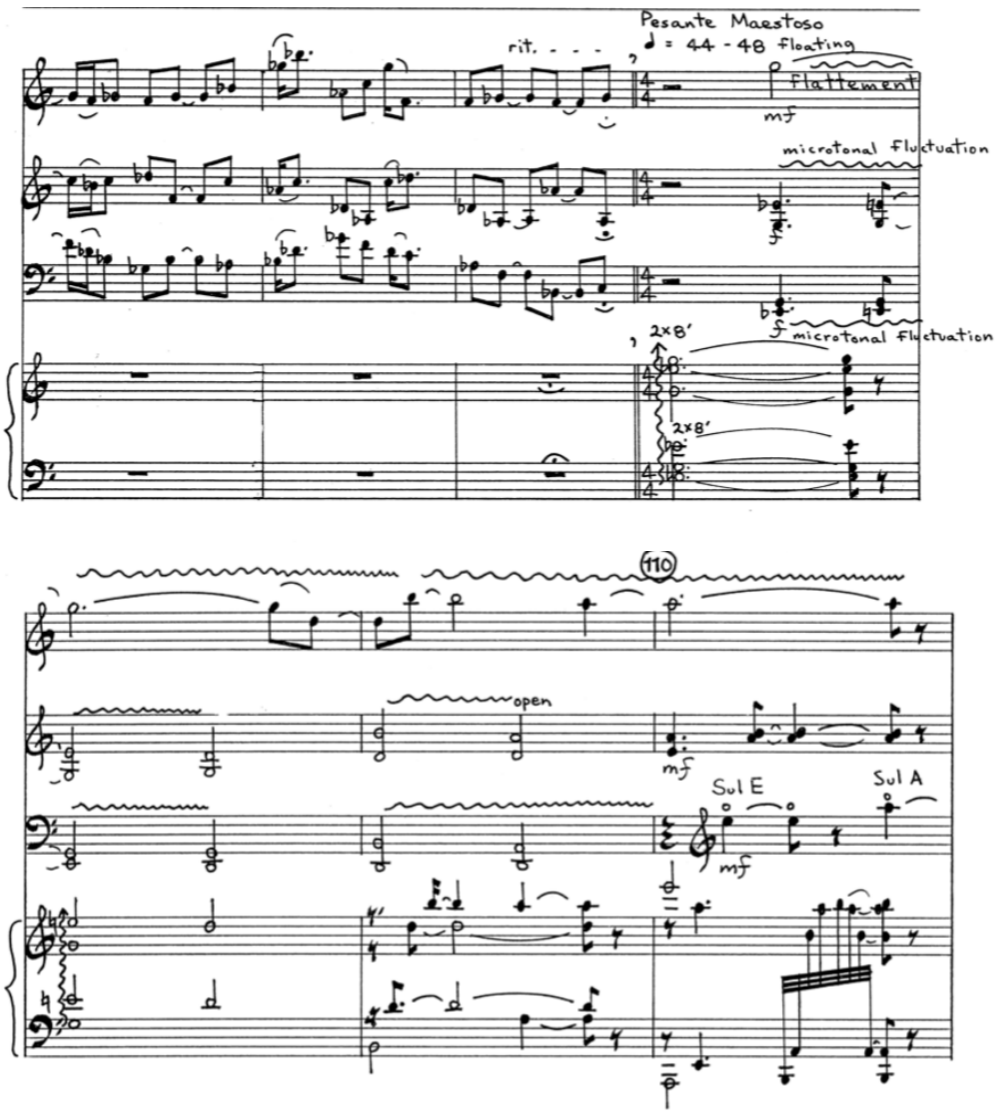

Figure 9 The Celestial Machine by O. Underhill
Audio sample: from *The Celestial Machine* by O. Underhill – Les Coucous Benevoles, Elissa Poole tr.
https://soundcloud.com/matteogemolo/excerpt-from-the-celestial

For Robert Strizich, the employment of *flattement* also seems to be a better fit to the traverso than regular vibrato. In the performance notes of his *Tombeau*, he carefully classifies four different types of *flattement* according to the speed:

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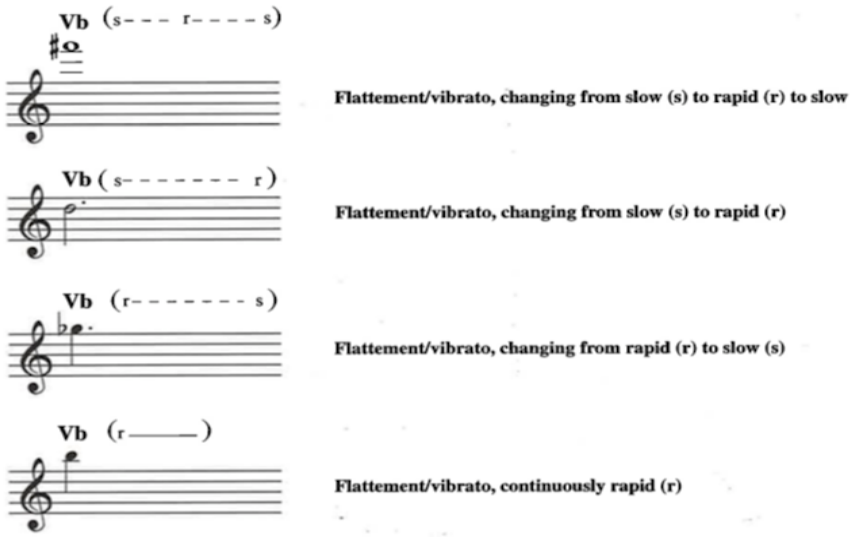

Figure 10 Tombeau by R. Strizich

The importance of this subdivision is central to understand the variety of effects that Strizich wishes to experiment with using this technique. Less concerned than Underhill about its expressive quality, Strizich employs the finger vibrato here as a tacit and approximate means of creating a microtonal soundscape. It is not by chance that Strizich makes copious use of it in the atonal solo flute passages and replaces it with a regular vibrato in the more singing-style passages when the traverso is accompanied by the harpsichord. Nevertheless, while the oscillation of the pitch is strictly controlled in its speed, Strizich completely ignores its amplitude. It is in this ambiguous use of this technique that lies the double meaning that the *flattement* has in the contemporary repertoire:

- on the one hand, due to its expressiveness, it is a reminder of the past where affects could still be played rhetorically by a proper employment of ornaments;
- on the other, a brand new tool to try out new effects on a microtonal level.

Flattement and vibrato: the affects

The employment of flattement or finger vibrato, even in the most atonal pages, can hardly be separated from its expressive function. At the same time, regular vibrato is often replaced by finger vibrato and regarded as a temporary ornament.

The different uses of such techniques can be summed up as follows:

- *sous vibrato*, very slow motion vibrato, to be executed with the contraction of the abdominal wall or the diaphragm. Its controlled and rhythmical nature is in total opposition to the free and expressive traditional vibrato (*Mémoire* by Rens);
- traditional vibrato, to be controlled by the contraction of the abdominal wall, the diaphragm or the throat. Its expressiveness tends to be restricted to fewer episodes and is not widespread as the modern flute technique would suggest (*Mémoire* by Rens, *Anspielungen* by Linde);
- tongue vibrato, a disturbing and noisy tiny fluctuation of the pitch, much closer in effect to flutter tonguing than to the gentler traditional vibrato.
- *flattement* on long and soft notes that creates a meditative and almost imperceptible fluctuation of the pitch (*Anspielungen* by Linde);

- *flattement* on loud notes, with wide amplitude and slow speed to produce an evocative but rather distorted *memento* of a Baroque expressiveness much lost in time (*The Celestial Machine* by Underhill)
- *flattement* with controlled speed to be employed as a tacit and approximate means of generating a microtonal soundscape (*Tombeau* by Strizich).

Conclusion

The range of extended techniques is quite wide and constantly evolving. Techniques such as multiple sonorities, multiphonics, microtones, percussive sounds, whisper tones, jet whistles and singing and playing simultaneously represent valuable resources at the disposal of any composers wishing to enlarge the possibilities of the traverso's sound palette. Nevertheless, the physical differences between the Boehm and the one-keyed flute should always help us to bear in mind that their sonic outcomes are different too. For instance, the whistle tone technique will produce less and much feebler individual partials of notes when applied on the traverso compared to what a modern flute could achieve. This is due to the simple fact that the diameters of finger and mouth-piece holes on the one-keyed flute are much smaller than the ones on the Boehm flute. We will be likewise disappointed to hear the weak percussive sound effects can be produced on the traverso when compared to those obtainable on a modern flute, thanks to its heavy duty material and set of efficient and noisy keys.
Other techniques can be surprisingly efficient on both instruments, such as speaking and playing at the same time. Besides its use in folk and jazz music, one of the first examples of this technique in modern playing can be found in *The Shape of Silence* for modern flute (1969) by American composer and harpsichordist Joyce Mekeel (1931–1997) in which, as described by John Heiss in an article on extended techniques, 'spoken words, sharply enunciated, are used both to articulate and to sustain low-register pitch with a predominantly wind-like sound, which are obtained by blowing rapidly *across* rather than into the blowhole' (Heiss, 1972, p.153).

Later on, in 1988, the same technique was employed by Hans-Martin Linde in *Anspielungen* for the one-keyed flute sharing the same intent as in Mekeel's piece: by pronouncing nasal consonants ('n') in alternation with short syllable ('mo' and 'nu') the flautist is able to create rhapsodic and mumbling effects that help to sustain the low-register pitches.
Nevertheless, the acknowledgment of the different nature of these two instruments is essential to avoid misjudgments. This is the reason why, on one hand, players should be encouraged to experiment with techniques that have been borrowed from the modern flute's contemporary techniques baggage in order to find out how differently they work on an earlier instrument; on the other hand, we should not forget to look back at the past and rehabilitate those techniques that were in used in the Baroque time such as the *flattement* or the different use of enharmonic, diatonic and chromatic scales to produce quarter-tones.
These two ways of considering the traverso's extended techniques could help flautists to stop considering the one-keyed flute as a defective prototype of the modern flute and, instead, to look at it as a different musical instrument with its own features and peculiarities to be fully explored.
Composers such as Jukka Tiensuu, Hans-Martin Linde, Jacqueline Fontyn, Masahiro Arita, Jean-Marie Rens and Doja Cojocaru have proved able to revive the sound possibilities of the

traverso and exploits a certain number of extended techniques without forcing the one-keyed flute to become a caricature of the modern flute.

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The interaction of the flute with the Sampo device in the performance of mixed electro-acoustic music

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Abstract This article discusses the flute's interaction with the Sampo device in the performance of mixed electroacoustic repertoire with sound files or in real time in light of the experience of presenting a lecture recital at the international conference "Flute: Hands on Research 2017". Three pieces were adapted for flute and Sampo for the performance. The intention was that each piece should define a different mode of interaction with electroacoustic resources, with the objective of demonstrating the variety of its characteristics. The device was created in 2014 by Alexander Mihalic (composer and member of Musinfo in Saint Étienne, France), in order to facilitate the interpretation of electro-acoustic repertoire without requiring a technical assistant.
The article will also approach the processes of preparing, constructing and performing this repertoire, focusing on important aspects that include: the possibility of changing the parameters of the effects, stopping and starting the electronics with sound track and in real time, using the pedals (up to 7 pedals per device). The requirements of the sound production which arose throughout the preparation of the pieces and the interaction of an acoustic instrument with the Sampo device will also be discussed, in order to provide the performer with a greater involvement in the process of performing works which include electroacoustic elements.
Keywords mixed electro-acoustic music, flute, Sampo, interaction

Interpretative requirements in performing mixed electroacoustic musical compositions

Mixed electroacoustic music (a combination of acoustic and electronic instruments with a sound file or in real time) was developed in the early 1980s as a response to a certain dehumanisation and techno-cratism with which electro-acoustic music was beginning to be associated. At the same time, the increasingly user-friendly, high quality recording technologies established a high quality level of sound production. Works for acoustic instruments adopted some of these sounds (wind and percussion sounds, for example, in the case of the flute) and began to require a true virtuosity from the musician, who needed to be aware of these tendencies.

In the 21st century, 40 years after the advent of mixed electroacoustic music, it is fundamental for instrumentalists to know the repertoire of this 'tradition' and to develop the rigorous technique for the execution of this repertoire. The "relation" of the sound of acoustic instruments with electroacoustic sounds, which were created or modified through electronic equipment and instruments, such as synthesizers, digital recorders, computers or compositional software, require the instrumentalist to be especially careful of the sound and also, the technical skills for the pieces to be performed. The objective is that the performer develops the capacity to adapt to electroacoustic resources on stage as though in "synergy" with another musician such as during a chamber music performance.

The work of the musician is, at times, hindered by the lack of instructions regarding the process of interacting with the electroacoustic material. The indications are not always included in the performance notes of the score and the performer thus needs to invest a great deal of their time in the decodification of the material in order to construct a fluent interpretation with a high level control over all details – both musical and technical.

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> In electroacoustic music, there is often no score and if there is a score, as it is in the case of mixed electroacoustic music, it represents only partial aspect of the piece. In this case, the score reveals information mostly about instrumental part, the electroacoustic part is sometimes ignored (the score includes only time lines for synchronization or is represented by schematic graphical notation (time lines and graphical representation of some sounds and musical events important for synchronization). (Bachratá, 2010. p. 32)

The Sampo device and the advantages of its use for the instrumentalist

The Sampo device was specifically constructed in order to facilitate the preparation of mixed electroacoustic repertoire. The scores of these pieces, adapted to be performed with the Sampo, also include additional indications regarding the interaction between the device and the instrumentalist.
According to Finnish mythology, the Sampo was a magical object that could make its owner rich. “Today, Sampo is an object that produces sound transformations of acoustic instruments and contains the composers' wealth inside of it.” (Mihalic, 2015, para. 2nd Sampo - Mythology)

The Sampo is an electronic device created by the composer and inventor Alexander Mihalic for all instrumentalists and composers wishing to expand the sound of their acoustic instrument. It is designed to play all genres of music. Sampo can perform the repertoire of mixed music of the twentieth and twenty-first centuries. Sampo is aimed at professional musicians as well as amateurs (Mihalic, 2016, Mixed Music Distribution Network – Réseau pour la Distribution de la Musique Mixte).

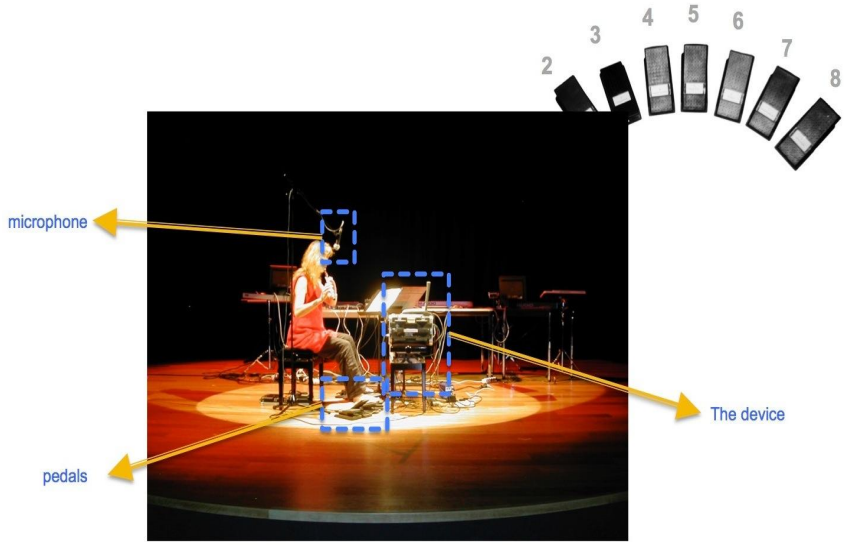

Figure 1 Sampo, the electronic device created by Alexander Mihalic in 2014. Photo from www.sampo.fr

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Figure 2 Composer Alexandre Mihalic - The composer Alexandre Mihalic studied at the Conservatoire of Košice and later at the Academy of Performing Arts, specializing in composition under Ilja Zeljenka. In 1988, he trained at IRCAM in Paris, under the supervision of F. Donati. In 1988-1989, he attended lectures by Iannis Xenakis at the University of Paris. He later studied at the University of Paris VIII, beginning at the Academy for Scenic Arts. In 1990-1991, he studied at the Ecole des Hautes Etudes en Sciences Sociales and at IRCAM. In 1991, he began to lecture at the University of Paris VIII and, from 1992 to 1997, at the École de Musique et de Danse in Vanves. In 1998, he gave lectures on new technologies and music at the Department of HyperMedia at the University of Paris. In 1998, he interned at La Londe. From 2000, he has taught technology and music at the Conservatoire of Dugny. Since 2001, he is the head of the IT department at the musical institution IMEB Bourges.
(Taken from: http://rfiea.fr/fellows/alexander-mihalic)

The simplicity and intuitive use of the device also allow for younger students to experiment with a variety of sonic transformations (reverb effects, echo and transposition, for example). The students listen to their own sound, modifying it through the simple movement of the pedals. Thus, from an early age, students can experience interactions with new technologies in a fun and creative manner. We consider this process extremely motivating as an introduction to the learning of contemporary musical language.

> Sampo is an innovative device meant for widening the sound field of an acoustic instrument. It is a device with several pedals (from four to seven) which allows the soloist to modify the sound of his instrument using simple gestures. Sampo is a very intuitive device. Every action affects the sound parameters of the instrument, allowing the musician to hear the results immediately. Its ease of use makes Sampo particularly interesting to teach electroacoustic music, contemporary music, jazz and improvisation at conservatories and music schools.(Mihalic, 2016, para. 14, Mixed Music Distribution Network – Réseau pour la Distribution de la Musique Mixte)

In 2017, the international pedagogical project Rédi-Musix, supported by the French Ministry of Culture through the “Services Numériques’ projects, that comprises the inclusion of this technology in music schools began in order to address the teaching of mixed electroacoustic music, which up until now has been scarce at best, and practically non-existent. In Portugal, this project is being developed in Porto, at the Curso de Música Silva Monteiro.

Software

> The management of Sampo is done by using a specific software. The musician and the composer each have their own interface to best suit individual needs. The software is used to set up the parameters for the composition and for the visualization of sound processing parameters. (Mihalic, 2016, Mixed Music Distribution Network – Réseau pour la Distribution de la Musique Mixte)

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Figure 3 Sampo display of the piece 'Dialog/No Dialog' by P. Jodlowsky
The display where all the Sampo configurations and their values are displayed. The performer can visually control the position of the pedals, the stage of the tape, the location, where the score is, and control the sound volume, the entrance and exit of the sound. The possibility of seeing the positions of the pedals is very practical, as is the possibility of identifying the markers with the numbers, identical to the score, sound files and time.
(Image from Alexandre Mihalic's archive)

Adaptation of existing pieces for flute and Sampo

For the lecture-recital presented at "Flute: Hands on Research 2017", three pieces adapted for flute and Sampo were selected for performance. The intention was that each piece would define a different mode of interaction with electroacoustic resources, with the objective of demonstrating the variety of its characteristics.

Table 1 Modes of interaction and technologies involved

	Mode of registering the electronics on the score	Adaption of the piece for flute and Sampo	Electroacoustic material involved	Interaction with the Sampo device	Control of the processo f performance/functions used
Petra Bachratá: Luminiscence (2016)	The electronics are registered in the score	Alexander Mihalic, Musinfo (2015)	One pre-recorded tape during the piece (sounds derived from the flute and the human voice	Start the tape at the beginning and stop at the end with pedal 2, balance the flute sound with the tape material with pedal 3	Employment of a chronometer incorporated in the Sampo device and visible on the display
P. Jodlowski: Dialog/ No Dialog (1997)	The electronics are graphically registered in the score	Alexander Mihalic, Musinfo (2015)	19 pre-recorded tapes started by musician during playing	Start the segments of the tape at the points marked in the score with the 2nd pedal and balance the flute sound with the tape material with pedal 3	Use of click track incorporate in the Sampo device
Ch. Bochmann: Cadenza (1982)	The electronics are not registered in the score (graphic score)	Monika Streitová, INET-MD, Musinfo (2016)	"DNA" patch, developed by A. Mihalic	"loop" effects, echos and transposition thorugh the use of pedals	x

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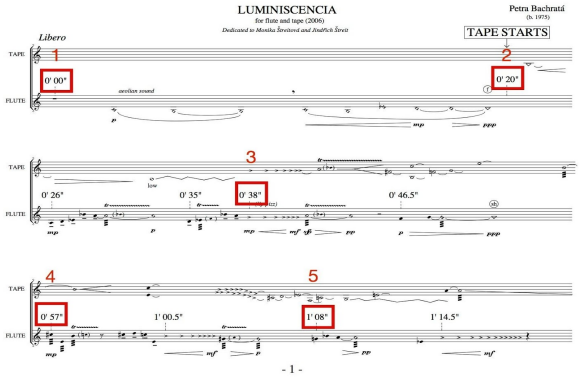

Figure 4 Petra Bachratá: Luminiscence for flute and electroacoustic sounds. (2006)
Excerpt from the piece
"The composition *Luminisence* for solo flute was inspired by the impulse of the photographer Jindrich Streit when preparing the exhibition entitled "People of the *Trinec* Steamworks which took place at the Václay Spala Gallery in Prague. Darkness, beams of light mixed with the shine of the lamps, the people – little lights, emerging from the darkness, dust, smoke and noise, all of this captured by the sensitive lense of the photographer...a piece of discovered poetry...this, but not only this, reflects Luminiscence. It was dedicated to Jindrich Streit and Monika *Štreitová." (Bachratá, 2006, p.15)*

Preparation of the piece

The score of "Luminiscence" by Petra Bachratá is exemplary in its organisation. It includes indications regarding all the symbols relating to the contemporary techniques used in the music, and also contains the tape material. The electroacoustic sounds blend perfectly with the sound of the flute in this piece, as many of the sounds are very close to those of the instrument or are derived from the flute sound. The possibility of being able to follow both voices in the full score also facilitates and orients the performer in joining with the tape. The original score also features time indications to coordinate with the chronometer.

The interpretation of this work requires all of the qualities associated with classical music – the production of sound with body, uninterrupted phrasing, control of the air flow, extreme dynamics, flexibility of the embouchure etc.

Specific sound requirements:

- to adapt the sound to the electroacoustic effects (wind sounds, *smorzato* vibrato and percussive sounds);
- to be mindful of phrasing, despite the numerous changes of sound colour within individual phrases;
- to adapt to the intonation of the pre-recorded material;
- to control the volume (using the microphone) and to always ensure a dynamic level that allows the best balance according to the structure of the piece and the musical gesture.

Interaction

Flute (an amplified acoustic instrument) with tape (electroacoustic sounds on a pre-recorded tape). The interaction of the flute with the electroacoustic material is similar to chamber music. Click tracks are not used, hence the synchronisation is more fluent and intuitive. The

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tape material is begun by the flautist at the beginning of the piece and is stopped at the end with the help of the 2nd pedal of the Sampo. The flutist follows the chronometer on the device's display. The 3rd pedal serves to increase the volume of the flute's sound, should the electronics become too loud. The volume of the tape is controlled by the movements of the 4th pedal. Registering the levels of the pedals in each piece before each concert is highly recommended, to ensure the same balance as in rehearsal.

Working with an adapted score

The score of piece, adapted by Alexander Mihalic (2015), contains rehearsal marks that serve to orient the performer. The numbers of these marks correspond to the rehearsal marks on the tape material, which in similarity to the score, is divided in parts. During the performance, these markings can be displayed on the Sampo. The adapted tape material is installed on the device in such a way as to allow the musician to go back and forth within the tape material as required, according to the rehearsal markings and using the 2nd pedal. This function is extremely useful, in order to allow for the repetition of certain passages and the possibility of altering the parameters of the effect in addition to the ability to stop and start the recorded electronics. https://www.youtube.com/watch?v=bDaRv13ZRj4

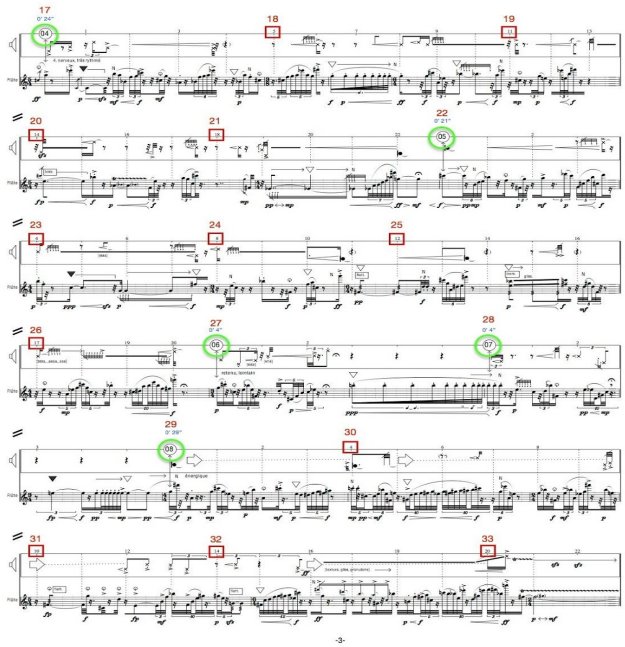

Figure 5 P. Jodlowsky Dialog/No Dialog para flauta e sons eletroacústicos. (1997)
Excerpt from the piece *"Un peu comme un duo au théâtre, deux situations, deux acteurs.*
Dialog : deux personnages sur scène. Figures, entrelacs, jeux de séduction et rapports de force. Tensions et réconciliations dans l'espace des gestes et des timbres. Nous pouvons parler ensemble, à condition que l'on s'écoute !

No dialog: renfermement sur soi, dialogue intérieur. Simultanéité fragile, la longue observation des adversaires, étendards et couleurs au poing, non loin du champ de bataille...

Les protagonistes:
• La flûte, sur scène. Véloce, bavarde, attendrie ou violente. Jeux de timbres, du son au souffle, jeux de registres et de vitesses, tension de l'écriture et transformations électroniques pour une projection dans l'espace.

• La voix, virtuelle. Dans ses apparitions dans les haut-parleurs, elle est chuchotée, chantée, parlée et articulée par l'intermédiaire des manipulations effectuées en studio ; elle se démultiplie, se métamorphose en phénomènes dynamiques, induit un champ (chant) harmonique et cherche, plus que tout, la rivalité et sa propre autonomie.

Cette œuvre est dédiée à Elise Caron (enregistrements du matériau vocal) pour son énergie, sa patience et ses idées, à Catherine Bowie qui en est la première interprète, et à Véronique, pour son courage, son soutien et sa confiance…" (Pierre Jodlowski, programme des concerts du Cursus de composition de l'Ircam, 29-30 septembre 1997 Espace de projection de de l'Ircam). Retrieved from: www.pierrejodlowski.fr/site/index.php?post/Dialog-/-No-Dialog

Preparation of the piece

The score of "Dialog/No Dialog" by Pierre Jodlowski, also contains indications regarding the symbols of the contemporary techniques used in the score, as was the case of the previous piece. The tape part is included in the score. The author used all possible sound colours to musically describe the two opposing characters. According to the composer, the contrasts are not only between the flute and the "virtual voice" but are also within the flute part itself: aggressive (*sforzatos*, slap, high register) and intimate (*pianíssimo*, wind sounds, low and medium registers, rests).
Before beginning the task of joining with the tape, the musician needs to have studied the instrumental part with rigour, in order to fully understand the complex rhythmic proportions. It is also important to have studied the electronic material, correctly deciphering the graphic writing and all the symbols used by the composer. I recommend dividing the work in segments, and then considering the musical characters and the sound colours employed in each, while always adopting a steady pulse in order to develop maximum independence from the click track.

Specific sound requirements

- to master the quick changes of dynamic levels and of character while performing the work;
- to achieve a stable and homogeneous sound in the low and medium registers which permits the audibility of all the notes in the rhythmic passages and in the leaps between registers;
- to clearly distinguish between the two types of wind sounds (just air, a mixture of air and sound and the passages between one type of wind sound and another);
- to adapt to the use of the Alt Flute and to dedicate oneself to exercises which facilitate the execution of the low register;
- to execute the percussive sounds with a greater sound projection in order to maintain the necessary balance with the magnetic tape:
- to create fluid, coherent phrases.

Interaction

Flute (amplified acoustic instrument) with tape (electroacoustic sounds registered on the pre-recorded tape). The interaction of the flute with the electroacoustic material is similar to chamber music. The original version does not include a click track. I propose that the click should be used in order to achieve better synchronisation, and since 2016 the Sampo has also included this function, with an incorporated click track. The taped material is controlled by the flautist, with the use of the 2nd pedal of the Sampo in certain passages. The flautist follows the process of performing the piece not just by following the score, but also by

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following the device's display. The 3rd pedal serves to augment the volume of the flute, should the electronics dominate. The tape's volume is controlled by the movements of the 4th pedal. Registering the levels of the pedals in each piece before each concert is highly recommended, to ensure the same balance as in rehearsal.

Working with an adapted score

The score of the piece adapted by Alexander Mihalic (2015), also contains rehearsal marks to orient the performer. The rehearsal marks correspond to the rehearsal marks on the tape, which in similarity to the score, are divided in parts. These markings can be displayed on the Sampo during performance. The adapted tape material is installed on the device so that the performer can control the tape material using the 2nd pedal, going backwards or forwards as required. https://soundcloud.com/monikastreitova/dialognodialog-p-jodlowski

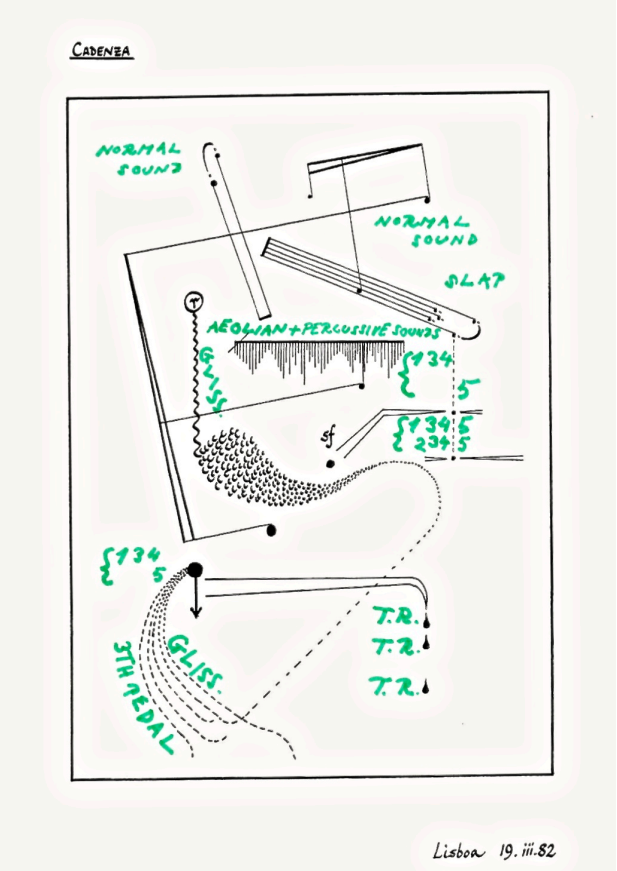

*Figure 6 Christopher Bochmann: Cadenza (1982) "*Originally, the graphic page Cadenza was part of the piece Gestures II. The work itself is for choir but can (evidently!) be performed by any instrument. The whole piece, and this page in particular, is the resulto f a profound reflection on musical notation and its function. Here, the notation avoids the established code and focuses on the suggestive/psychological aspect. This aspect has its beginnings in the works of Beethoven (quaver = darker; minim = lighter). It can be seen very clearly in the works of Max Reger and of Webern, among others. The experience recognises that notation is the form of communication between the composer and the performer; not "a work" in itself. (Ch. Bochmann)

Preparation of the piece

"Cadenza" by Christopher Bochmann was not originally written idiomatically for flute, as the composer explains "it can be interpreted by any instrument". As it is a graphic score, the

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performer needs to create their own methods for deciphering the images. The work "avoids traditional codes", although we tend to attribute to the images the durations, dynamics and gestures equivalent to graphic classical music. The piece can be played from left to right, but the page can also be read on the horizontal, from the right. We opted for the simultaneous reading from both directions. Apart from the classical sound used at the beginning of the piece, we opted for the inclusion of contemporary techniques which were chosen to enrich the interpretation through effects that we considered most appropriate for some of the gestures.

Specific sound requirements

- to accurately perform the multiphonics, wind sounds, glissandi and percussive sounds (such as tongue ram);
- to quickly change the sound colours
- to adapt the dynamic levels in order to achieve a balanced sound (the balance between the sounds modified in real time).

Interaction

Flute (amplified acoustic instrument) with Sampo (electroacoustic sounds in real time). The interaction of the flute with the electroacoustic material is similar to a walk in the forest. Click tracks are not used. In order to achieve the effects of the various "layers" of sound, the DNA patch, created by Alexander Mihalic is used. The functioning of this patch is begun by the 2nd pedal of the Sampo, turned on at the beginning of the piece. The flautist also turns on the 6th and 7th pedals that allow for a "loop" effect. This permits the creation of various "layers" of sound, recording and repeating the material. The 3rd pedal, which transposes, serves to achieve the glissando effect. The execution of this piece that involves the Sampo device ends with the 6th and 7th pedals in the "off" position.

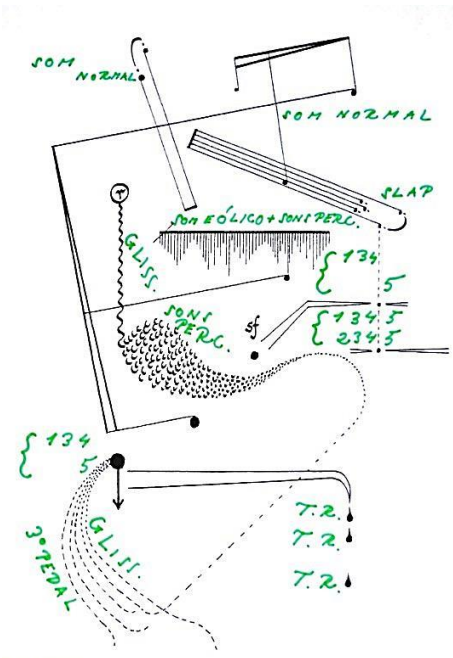

Figure 7 Adapted score. The graphics were attributed musical gestures using contemporary techniques which from our perspective correspond to the image. We introduced: normal sound, slap tone, glissandi, multiphonics,

key sounds (key clicks, Jorge?) and tongue ram. The performance is based on free improvisation and has a duration of approximately 35 seconds. The duration depends on the distance of the gestures developed in a certain amount of time. We sought clarity of sound and avoided a mixture of effects and excessive reverb. https://soundcloud.com/monikastreitova/cadenza-chbochmann

Benefits of the interaction of the Sampo device throughout the preparation of the repertoire

Throughout this work on the repertoire, namely on the three pieces adapted for flute and Sampo and electroacoustic sounds, we have verified the following benefits:

- the interaction with the Sampo device is very intuitive and creative;
- the musician is more involved in the process of interaction with the electroacoustic elements;
- the musician can control the tape material during the performance;
- it is possible to rehearse chosen passages; it is possible to gain audio feedback in relation to the gestures;
- the musician can immediately hear the results;
- each action affects the parameters of the instrument's sound;
- the musician becomes independent from the technical assistant;
- it is of particular interest for the teaching of electroacoustic music and contemporary music in conservatoires and music schools;
- it can be used in jazz and improvisation performances
- it is portable and can be used anywhere;
- it is possible to perform existing works.

Conclusion

The experience of preparing the three pieces was very special for me. The possibility of controlling the entire process of interaction with electroacoustic elements was extraordinary, but also very demanding. It required greater attention to detail (control of the interpretation of the pieces, the necessity of following the progress of the tape material on the device's display throughout the performance, while controlling seven pedals). The combination of these factors and the need to react correctly at any given moment, requires, in my opinion, intellectual and motor skills that should be developed and regularly practiced. The capacity to interact with technology during the performance of electroacoustic/improvised music not only represents a challenge for the musician or the teacher, but also provides us with an opportunity to go beyond our limits.

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A ética da performance musical

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Resumo Este artigo propõe uma reflexão sobre a dimensão ética da performance musical. Nesse sentido, a ética é tomada enquanto a prática de um conjunto de valores que constitui um *ethos*. Partindo dos postulados aristotélicos, serão pontuados os desdobramentos que o filósofo deu ao *ethos* retórico, que são objeto de reflexão aqui dentro do discurso musical. A ética é, portanto, o estudo e a ação de se constituir um ethos, mais do que uma ciência de se apontar o certo e o errado em sentidos absolutos. Essa superação faz com que a Ética seja entendida menos como uma moral e mais como uma relação de responsabilidades, dando espaço à proposição de níveis de responsabilidade, subsidiados pelo pensamento de Kierkegaard. Por fim, são propostos meios de se colocar em prática esses valores de maneira adequada aos pressupostos estabelecidos, residindo no conceito de gesto musical uma síntese desses particulares, aqui tomados pelo termo de origem grega frônese.
Palavras-chave Ética; Filosofia da performance; Performance musical; Música contemporânea

Abstract This paper proposes a reflection on the ethical dimension of musical performance. In this sense, ethics is taken as the practice of a set of values that constitutes an ethos. After Aristotelian postulates, it will be punctuated the unfolding that the philosopher gave to the rhetorical ethos, that are object of reflection here within the musical discourse. Ethics is, therefore, the study and the action of constituting an ethos, more than a science of pointing out right and wrong in absolute senses. This overcoming makes Ethics less as a moral standard and more a relationship of responsibilities, giving space to the proposition of levels of responsibility, subsidized by the thought of Kierkegaard. Finally, means are proposed to put these values into practice in a manner appropriate to the established assumptions, residing in the concept of musical gesture a synthesis of these singularities, here taken by the term of Greek origin phronesis.
Keywords Ethics; Performance Philosophy; Musical Performance; Contemporary Music

Existe tal coisa na música como significado? Esta questão tem sido perguntada várias vezes na história da música ocidental, mas a questão, finalmente, é que diferença isso faz? Qual é a consequência dessa resposta para a performance musical? Esta breve reflexão visa trazer algumas referências para orientar a pesquisa sobre formas de fazer música que incorporem valores metafísicos como significado e afetos. Por toda a história do pensamento humano, a ética tem sido a disciplina em que os valores e as crenças são postas em prática. O pressuposto da existência ou não de algo na realidade leva necessariamente a uma ação consequente. Assim, a Ética não lida tanto com a justiça de uma ação, mas com a responsabilidade de fazer a ação. É assim que se pode sugerir algo como uma ética da performance musical; não tanto no sentido de uma performance certa ou errada, mas como uma performance responsável em relação a um conjunto de valores. Este assunto será considerado principalmente a partir de dois campos da obra aristotélica: retórica e ética, mas de maneira expandida, ao relacionar esses postulados a outros referenciais contemporâneos. Finalmente, a reflexão termina com a proposição de uma frônese na música, a 'razão prática' de Aristóteles, que consiste em uma superação da dicotomia entre teoria e prática para dar lugar a um pensamento dependente da ação.

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Do *ethos* à Ética

A ética deveria ser do total interesse de nós, *performers*; isso porque ela é definida pelo próprio Aristóteles, em seu seminal tratado, Ética a Nicômaco, como o exame da "natureza dos atos" a partir de sua prática (Aristóteles, 1893, p. 35). A prática musical, sendo assim, constitui em seu conjunto de ações uma realidade passível de exame pela ética. Não apenas isso, mas a ética visa o exame da prática enquanto hábito e caráter ou, para o usar o termo grego original, em seu *ethos*. Se, na retórica, Aristóteles parece se preocupar mais com a dimensão em que o discurso outorga um valor ético a quem o pronuncia, persuadindo o ouvinte devido à autoridade ou credibilidade do enunciador, no tratado dirigido a Nicômaco faz parecer que o exame se refere mais ao valor ontológico das ações do sujeito. Todavia, as duas aplicações não estão tão desconectadas quanto parece. Isso, por conta da questão: de que afinal se constitui um caráter? Ou, em nosso caso, o que constitui a natureza daquilo que fazemos quando interpretamos música: apenas notas pretas em um papel? Apenas oscilações de ar jogadas no tempo e no espaço?

Aristóteles define o *ethos* enquanto um conjunto de valores ou crenças; sendo assim, a ética nada mais é do que a prática desses valores e crenças que subjazem a existência e a prática humana. É reconhecendo essa natureza da ética enquanto prática de um conjunto de crenças ou valores, mais ou menos passíveis de serem acessadas e conhecidas que o filósofo Baruch Spinoza (1632-1677) desenvolve seu sistema ético, dando seu próprio passo ao encará-la como a prática de valores metafísicos advindos da própria natureza e existência humana. Todavia não é de metafísica nem de epistemologia que se trata este artigo, mas do aspecto ético do discurso musical, como prática desses dois anteriores; faz-se necessário, entretanto, definir-se rapidamente o que pode haver de metafísico no discurso musical.

Primeiramente, define-se a própria ontologia da música eticamente quando, frente à infinidade de definições já cunhadas na história, assume-se como sendo música "o que pessoas fazem ao realizarem ações musicais" (Teixeira; Ferraz, 2017, p. 11). Enquanto ética, a música supera assim a categoria de objeto ou produto e encontra sua própria existência no fato de que ela é *feita*. Pessoas fazem música e, portanto, pessoas agem adequadamente ou não. Enquanto ação, a música passa assim a ser passível de exame por meio de seu aspecto ético ou de seu *ethos.* Como um conjunto de ações, a música encontra seu significado menos em uma referencialidade linguística (leitura equivocada das *Figurenlehre* ou das tópicas musicais) e mais naquela categoria denominada pelo filósofo da ciência Michael Polanyi como "significado existencial" (Polanyi, 1962, p. 60); retomando a Ética de Spinoza, esse significado talvez não possa ser exaurido em análises ou papers, como costumamos tentar em nossos esforços acadêmicos, mas é possível se ter um "conhecimento adequado" do significado musical e de seus afetos quando ele é feito; não porque a música seja a performance, como queria John Cage (Cage; Duffie, 1987), mas porque quando a música é feita o significado finalmente se atualiza, adentra o plano do real; quando a música é feita, ela *é.*

Um aspecto final da ontologia da música que necessita ser mencionado aqui, devido a sua implicação ética, é sua própria natureza, como aquilo que o filósofo Paul Ricoeur denomina como uma "arte de dois tempos", que a faz única, guardando semelhança, talvez unicamente ao teatro dentre todas outras artes. A própria natureza da música implica uma partição, essa divisão entre sua concepção e sua realização ou entre sua composição e sua performance, partindo nesse processo os domínios das *poiesis* a da *práxis.* Seja por meio de um ritual, uma

transmissão oral, uma linguagem de improvisação ou até mesmo uma partitura, a música em todas suas tipologias demanda como tal um meio que transmita o registro normativo necessário para que ela se realize e para que ela seja *A* e não *B*, em uma ocasião *X* e também em uma ocasião *Y* (Ricoeur, 1996, p. 2).

Igor Stravinsky coloca essa questão de maneira semelhante na sexta e última de suas palestras em Harvard, quando fala desses dois tempos enquanto "música potencial" e "música atualizada" ou "real" (*potential music* e *actual music*, no original) (Stravinsky, 1947, p. 121). Sendo assim, Stravinsky mostra a conclusão básica da própria natureza da música: é necessário um performer. Ou recolocando a asserção eticamente: o performer é necessário para a existência da música. Todavia, continua ele, o performer encontra nessa necessidade uma responsabilidade: não lhe basta ser um executor, mas mais que isso, ele necessita ser verdadeiramente um intérprete. Coloca-se assim a implicação retórica própria da ontologia do discurso musical, sua dupla interpretação. O performer é responsável não apenas por reproduzir uma informação musical qualquer, mas necessita interpretar essa informação, compreender-fazendo esta interpretação para que, posteriormente, a audiência faça sua própria interpretação da música. E é nesse ponto que Stravinsky afirma residir uma diferença de ordem ética.

O performer começa, assim, a ter mais definido seu *ethos*. Há um significado na música? É possível ter acesso a um significado no discurso musical? Como? Essas são perguntas que devem ser respondidas para que o performer conheça mais claramente seu conjunto determinante de valores. Ou não. Na verdade, essas perguntas são inevitavelmente respondidas por nós em cada ocasião em que fazemos música, a cada performance. A natureza ética da música acaba por evidenciar se nós interpretamos algum significado advindo do texto ou se desabamos em um dos extremos do espectro interpretativo: apenas executando notas assumindo que não há nada além delas, ou, por outro lado, criando nosso próprio e novo significado, como que ignorando aquele escrito e prescrito pelo compositor. Nessa relação, nem o potencial e nem o real podem ser reificados, mas apenas o devir implicado no fluxo de afetações entre a composição e a performance pode possibilitar a experiência do significado.

Ética como responsabilidade

A ética é uma necessidade para a vida humana, como apontado acima, mas poucos se interessam por discursos acerca dela; falar sobre ética parece necessariamente ter de se fazer uma pregação normativa, onde o objetivo é afirmar um conjunto de ações corretas para, assim, atribuir a outro conjunto o estatuto do erro. Tratando-se do âmbito da música, essa relação se agrava, pois seria o mesmo que possibilitar falar em acerto e erro, duas categorias absolutamente presentes na cabeça de qualquer músico em suas horas diárias de estudo e no próprio ambiente didático dentro da prática instrumental.

Entretanto, com o desmoronamento das instituições normativas no século XX, o que sobra de um discurso sobre a ética? Se não há Igreja, nobreza ou uma escola interpretativa unívoca, o que referencia o debate sobre o dilema de ordem ética? A imposição de um espectro ético se afasta da ordem do razoável e cede seu trono a um relativismo que se transveste de tolerante, mas que não se sustenta frente à realidade; professores de música continuam a apontar caminhos interpretativos em detrimento de outros, instrumentistas continuam a gastar horas em

busca de uma certa interpretação. E assim são erigidos novos altares institucionais, da banca de concurso ao gosto do mercado, sorrateiramente tomando para si um caráter normativo das decisões musicais.

Nos anos que antecederam à Segunda Guerra Mundial, um teólogo alemão chamado Dietrich Bonhoeffer (1906-1945) regressa dos Estados Unidos a seu país, justamente por se ver responsável em trazer à tona essa discussão: se a autoria das ações pode ser finalmente imputada a um partido ou uma ideologia, o que sobraria do indivíduo? O teólogo realiza então uma série de palestras e conferências, postumamente publicadas, em 1949, como a *Ética,* sua grande obra do período, discutindo o papel da escolha individual como o movimento básico e intencionado da ação humana. O próprio Bonhoeffer seria executado alguns anos antes da publicação, devido a seu envolvimento com a Operação Valquíria, um famoso plano elaborado para assassinar Hitler.

Bonhoeffer pensa a Ética como uma configuração existencial (*Gestaltung*), um estado de ser no mundo construído não por padrões absolutos – ideais -, mas pela prática das ações no mundo. A ética é o processo de construção do *ethos* individual que, finalmente, leva à construção de um *ethos* comunitário. Como estudo da prática, a Ética só pode ser feita na prática, portanto. Não faz sentido uma ética teórica, tendo em vista o ser único que é o homem, além de qualquer dualidade platônica: em ser o homem age. *Ecce homo*: eis o homem, a encarnação da vontade no agir em um ser único, indiviso. (Bonhoeffer, 2000, p. 63-68). É nesse sentido que a ética não é nada menos que um valor figurando-se; é a configuração final no *logos* e do *logos*, por meio da escolha, da agência voluntária.

Os fins apenas justificam os meios em uma “idolatria do êxito” (Bonhoeffer, 2000, p. 73), uma ética mais facilmente mercantilizável ou, no caso da didática musical, mais ensinável. O que um júri espera, uma banca quer ou o professor prefere. Todas as escolhas são tomadas a partir de um êxito pontual e assim a música segue sendo, uma sucessão de pontos, uma linha de utilitarismo onde nunca há tempo para a escolha própria baseada no próprio discurso e seu agente criativo. Ou ainda de maneira sutil, quando determinada interpretação ‘funciona’, cabe em um padrão técnico de habilidades já possuídas, não se abrindo a uma extensão da própria técnica. Diante disso, uma ética que escolha valores anteriores ou interiores a uma peça ao realizá-la só pode ser o contrário, uma ética do fracasso. Talvez seja essa a figura da configuração, a do *logos* fracassado, sem a exuberância que se esperaria de uma interpretação orientada para gostos mais imediatos, mas que luta e vence as dificuldades da realidade sem atalhos, muito distante da figura do solista, encarnação do gênio romântico na performance.

Umas das mais relevantes sistematizações desse conflito ético para a atualidade e a mais facilmente aplicável a nosso caso, na música, talvez seja aquela do filósofo Søren Kierkegaard (1813-1855), quando separa a condição humana entre um estágio estético e um estágio ético. O estágio estético é aquele que estamos mais habituados a vermos nós mesmos quando fazemos música de maneira irrefletida; um estado onde o que move a ação e a existência é o mero gosto ou preferência. Essas coisas não são más em si mesmas, mas uma vida e/ou uma performance pautadas unicamente nesses parâmetros pode se achar livre, mas vê-se, finalmente, presa em um enlace de volatilidade. Gostos e sentimentos mudam e assim as preferências. Sendo assim, a liberdade é enganosa; o que controla tal performance são as contingências, as circunstâncias, pois sempre há algo ou alguém no controle de nossas ações.

Uma performance guiada unicamente pela estética produz assim uma ética individualista, onde o valor implícito é apenas um: o eu.

A única maneira de se encontrar verdadeira liberdade interpretativa é quando nos colocamos presos ou, mais precisamente, alianças a uma responsabilidade. É o pacto interpretativo que temos com uma obra que nos dá a liberdade de sermos novos a cada execução, buscando um novo aspecto até então desconhecido, da obra e de nós mesmos. A performance ética é assim um exercício de alteridade; não se trata de uma performance egoísta, mas antes uma oportunidade de vermos o outro na peça e de vermos a nós mesmos no outro. Assumir que há um significado na obra musical que deva ser interpretado na performance musical é um comprometimento que, antes de nos prender, nos liberta para a multiplicidade de interpretações potencializadas no texto. Em negarmos momentaneamente o nosso eu, ganhamos a oportunidade de conhecer um eu antes desconhecido e que agora se atualiza a partir de um potencial que só o outro poderia oferecer.

Esse estágio ético é, finalmente, uma aliança com o outro que ouve e vive o discurso musical; o intérprete coloca-se, assim, a serviço do discurso, entendendo o discurso musical como “o ato comunicativo mediado por ações musicais em tempo delimitado” (Teixeira, 2016, p. 242). O performer assume a responsabilidade de mediar a existência da música entre o compositor e o auditório. Todavia esse estágio não faz parte da natureza da ação humana. Antes, coloca Kierkegaard, deve ser objeto da Vontade; deve ser escolhido.

Sendo assim, define-se a ética não tanto como um moralismo, que procura o certo ou o errado na performance musical, mas como a responsabilidade ou as responsabilidades que temos em nossos fazer musical. Antes de parecer um fardo, essas responsabilidades deveriam engrandecer nossa atividade. A performance musical é parte do que faz da música ser música. Parte da própria existência da música e, dessa maneira, da própria existência.

É claro que essa postura implica em um comprometimento muito maior com a música em suas manifestações individuais do que pareceria possível a, por exemplo, um músico de orquestra, que deve executar uma hora e meia de repertório novo a cada semana. Sem dúvida não é possível exigir esse senso de responsabilidade para com cada instante de música nesse tipo de situação. Mas a realidade das coisas não deve nos isentar de analisar essa realidade e questionar se essa é a melhor ou a única maneira de fazermos e vivermos a música. Essa ética utilitarista entra em jogo quando o que importa é o resultado, ou pior, o produto, muito mais do que o processo. Infelizmente essa ética se torna padrão quando somos formados a atender uma banca e não a identidade da própria obra. Quando somos condicionados a obedecer mestres possuidores de um conhecimento gnóstico, mas que, como demiurgos de uma tradição inventada, nos mantém distantes do rosto oculto do compositor que subjaz à obra e que anseia ser apresentado em seu discurso.

A performance musical não possui um imperativo categórico, um dever que pode condicioná-la a necessariamente atender aos preceitos do compositor e a cumprir com essa responsabilidade diante do Auditório. Quando se encara a ética não como um senso de dever, mas de responsabilidade, é outorgado ao intérprete exatamente o que o termo fala, a capacidade de responder (ao outro). É nesse sentido que a liberdade interpretativa pode coexistir e, na verdade, é necessária para a manutenção da identidade autoral. É nesse sentido

também que pode se reunir as acepções do *ethos* em Aristóteles e se integrar nesse conjunto de valores pactuados todas as instâncias lógicas e emocionais do ser, todas elas incluídas na resposta do intérprete às presenças que lhe antecedem e lhe sucedem, o compositor e o público. Não há espaço para uma interpretação puramente racional ou "fria", presa ao texto, orientada somente pelo papel ou pela história, como não há espaço para uma interpretação emocionalmente inflamada, mas sem fidelidade ao discurso em seu registro normativo. O gesto musical encarnado no performer é, finalmente, o significado tomando corpo na performance.

A ética musical

Movimento e som: os dois princípios materiais básicos da música. Entretanto, raramente o primeiro tem sido lembrado em análises e mesmo nas próprias interpretações que performers fazem do texto musical. Como bem discute Catarina Domenici, o intérprete foi, no Romantismo, reduzido a um porta-voz, que quanto mais próximo de um psicógrafo melhor seria (Domenici, 2012, p. 69). Compositor e performer foram colocados como figuras quase que antagônicas, tendo o discurso musical como campo de batalha: ora com o compositor ignorando o corpo daquele que toca e a fisicalidade do devir musical, ora com o performer arrogando-se ao papel de criador e ignorando as instruções que compõem o significado fixado no texto. A afirmação do teórico Henrich Schenker talvez seja a mais alarmante nesse sentido:

> Basicamente, a composição não requer uma performance para existir. Precisamente como um som imaginado se manifesta real para a mente, a leitura de uma partitura é suficiente para provar a existência da composição. A realização mecânica da obra de arte é, desta maneira, supérflua (Schenker, 2000, p. 3).

É, pelo contrário, na compreensão da duplicidade material que o performer pode ser responsável em relação ao fluxo discursivo intencionado pelo compositor e, ao mesmo tempo, seguir tal direcionalidade pelos seus próprios passos (ou dedilhados). Essa discussão conduziria, com certeza, à reflexão sobre uma ética da composição musical, mas este não é o objetivo aqui. O ponto em questão é compreender os *níveis de responsabilidade* que estão em jogo na performance: com o compositor, o público, os outros músicos que juntos interpretam; e mesmo a ética interna de uma peça, suas próprias gradações e adequações internas, isto é, o significado que o próprio discurso atribui a sua notação.

Talvez a grande dificuldade da reflexão atual sobre essa tensão seja justamente porque ela parte de uma divisão estanque entre composição e performance como entidades objetivas e subjetivas, respectivamente, mesmo que ambicione vias médias entre os dois âmbitos. A responsabilidade por criar e notar *Kottos* para o violoncelo solo é de Iannis Xenakis; a do violoncelista é tocar *Kottos* a partir da partitura criada pelo compositor; entretanto em nenhum momento um pôde existir a despeito do outro. O compositor escreve *em respeito* e *a respeito* do performer; a partitura não é a obra, mas a fixação de um diálogo com a entidade interpretativa, parte de seu devir. Da mesma forma, o violoncelista não toca quaisquer sons, mas aqueles prescritos pelo compositor; o gesto musical escrito traz em si uma realização potencial, uma *kinesis* própria que dirige os movimentos do performer e se realiza em sua própria gestualidade, entendida como um complexo transmodal de movimento, som e figuração escrita, isto é, a atualização da energia afetiva que atravessa a composição e chega ao performer. É a união entre o técnico e o mágico, dando origem à obra de arte (Simondon, 1988, p. 212).

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Uma saída constantemente adotada para esse impasse tem sido a improvisação como fuga da dicotomização romântica. Entretanto mesmo a improvisação acontece respondendo ao outro, seja outro indivíduo ou a um tema de outro (Benson, 2003; Warren, 2014). Dessa maneira a limitação sempre regressa, em diferentes formas, mas lembrando a própria finitude da existência humana em seus atos. Respeitar a ação do outro e responder adequadamente a ela parece ser a mais promissora solução diante da realidade. O respeito não é medo, nem submissão cega, mas uma atitude crítica de levar em consideração as proposições do outro ao agir; a responsabilidade também não é a obediência irrefletida ou a mímica surda, mas a resposta com suas próprias palavras (notas, atos, gestos) às questões levantadas pelo outro. Esta é uma ética possível, mas mais que isso, necessária. É uma ética onde indivíduos suspendem seu pré-julgamento *a priori* e se abrem ao outro. Em o fazer, colocam o próprio estatuto de indivíduo em jogo; não porque se anulem, mas porque se colocam como atributo de um todo do discurso musical. A configuração ética assim pode acontecer, com todos seus elementos agindo em respeito e responsabilidade aos demais, cada qual em seu próprio conjunto de ações operando em seus níveis próprios de responsabilidade. O indivíduo existe, como a sociedade e o coletivo existem. Mas suspendem a luta temporariamente ("kairóticamente") para se tornarem membros de um corpo maior, servindo a um propósito único.

Conclusão: por uma performance fronética da música

Disso resulta um tipo de conhecimento denominado por Aristóteles como a *frônese*, o conhecimento prático ou o "conhecimento na prática" (Aristóteles, 1893, p. 187). A ética da performance musical atinge sua consumação enquanto frônese, e o conhecimento musical deveria objetivar exatamente este propósito. A frônese não busca um conhecimento geral, uma teoria totalitária que explique tudo e todos. Antes, entende cada pedaço da realidade como único e, portanto, busca a ação mais adequada diante desta realidade. A frônese é, assim, um conhecimento liberto, uma teoria improvisada, constantemente, caso a caso, de peça em peça do repertório. Talvez essa não seja a maneira mais persuasiva de se encerrar um artigo sobre ética na performance musical, mas esse é o melhor que ética pode fazer pela música: demonstrar a complexidade da realidade e, ao invés de simplificá-la ou reduzi-la, tornar clara a riqueza da música e do processo de compartilhá-la, ou melhor, de torná-la real.

Isso não implica a negação da tradição ou de qualquer conjunto de conhecimento previamente construído, mas de uma atitude aberta em um movimento de expansão deste conhecimento técnico. Em expandir esse conhecimento local, no entanto, o que se abre não é apenas o momento, mas todo o ser que se abre (Wu, 2011, p. 100). Cada nova peça composta e cada nova interpretação se integram ao todo da existência por meio de suas ações musicais, pois, como afirmado, em existir o ser se move e em fazer música o ser existe, do compositor ao ouvinte, passando pelo performer. A performance fronética não pode, por definição, ser apenas técnica, nem no sentido motor e nem no sentido de um modo de realização pré-existente; em abrirmos nosso ser para a presença de um significado na peça, não nos abrimos para a peça apenas, mas a nós mesmos em nosso estado de ser-no-mundo.

A frônese do discurso musical toma o dado da performance como a encarnação do conhecimento musical e, portanto, parte dela como a realidade a ser interpretada. O gesto

musical e sua *kinesis*, seu movimento e vida, são a realidade da qual trata a música. Aliás, é esse o princípio material da música, som é movimento. Como intérpretes somos desafiados peça a peça a encontrar as maneiras mais adequadas a conhecer de qual realidade cada peça trata e de que maneira podemos acessá-la para fazê-la conhecida em nossa performance: realidades afetivas, sonoras, gestuais, enfim, musicais. Não há apenas um vibrato, um dedilhado, assim como não há um sistema harmônico, uma fraseologia ou uma abordagem formal. Devemos atualizar, tornar real a música nos abrindo para seu vibrato, seu dedilhado; sua harmonia e sua forma. Nos abrir ao outro que está lá e responder a ele; isto é, sermos responsáveis. E assim oferecermos ao público talvez não a melhor, a mais afinada ou mais bela; mas, com certeza, a performance mais responsável.

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