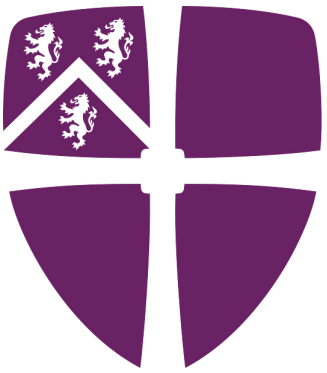
Music for controlled bodies: bodily integrity as a compositional theme

ROBERT GRAHAM KING

Music for Controlled Bodies:

Bodily Integrity as a

Compositional Theme



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Abstract

How can the pressing contemporary theme of bodily integrity be mapped to new music? A portfolio of pieces and this accompanying commentary are presented in answer to this research question. Each piece interrogates aspects of bodily integrity, and its potential for new musical stimulus. Given the role of the artist in reflecting on societal issues, an awareness of such contemporary themes and their implications is paramount.

This commentary analyses the portfolio of original compositions alongside works from other composers, using relevant taxonomies to provide a theoretical justification for the techniques employed. The results of these analyses demonstrate how compositions can carry traces of the central theme through the manipulation of compositional elements and techniques. The commentary concludes with reflections on future directions that compositions in this vein could take.

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Commentary on Portfolio of Compositions

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The hyperlinks in the table below link to archives of audio/visual recordings of works. Due to the indeterminate nature of some of the works, timings of recordings may differ from intended durations. Some works (marked *) are presented with recordings from workshops, and their final form is somewhat different from the recording presented. The score is the 'true' version in all cases; recordings are presented to demonstrate principles when marked *.

Title	**Instrumentation**	**Duration**
to project inwards	Voice	c.4'00"
i dissociate*	Viola da gamba	8'30"
Say you love me / "you love me"*	Violin (two players)	c.8'30"
5 TENSe minutes	Cello + TENS machine	6'20"
contingency*	Timp. + trombone	6'00"
Three Head God	Open trio (vl., cl., pno.)	6'00"
Fabric Seas	Chamber orchestra	20'00"
Blood-Bloom (with alternative recording)	Vl., vla., vc.	4'30"
Midnight Immolation	Bfl. + electronics.	7'10
Migrance	Laptop	12'30"
klaT	Voice + electroacoustics	8'20"
Total duration:		**c.92 minutes**

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- The friends I've been lucky enough to make over the course of my many years of studies at Durham University – if you're reading this, then know that I remember you with great fondness, and think of you often.

To Fro. Thank you.

1. Introduction

This portfolio explores the theme of bodily integrity by invoking various sociological, psychological, or musical theories and classifications, which are used to influence, describe, or otherwise inform the compositions described below. The main means by which these theories inform the compositions is through form, gesture, and interactive musical systems.

The first part of this commentary identifies the contributions to research around these areas. The second section defines and examines the central theme of bodily integrity and how it applies to music, and gives a general view of the compositional landscape in these areas. The third section discusses the individual pieces of this portfolio, the techniques they use, the techniques in others' works, and also offers brief reflections on the efficacy and validity of the techniques used. Justifications for modes of implementation are also offered, so as to illustrate the relationship between the composer's intention and outcome.

1.1. Contributions to research

This project reaches 'beyond the score', in that its results are not purely the 'artefacts' of the compositions (i.e. their scores), but also investigates the surrounding musicking. In the case of this project, an environment for novel expression or interpretation is explored. Certain of the project's constituent scores propose or define a plastic environment for the performer(s) to explore forms, systems, and musical gestures in real-time. This is critical in exploring the musicking agents' responsibility for the sounds generated.[1]

Music – specifically performance – can be an interesting way to experiment with bodies. An instrument, for instance, is usually 'joined' to the body by repetitive practice of granular actions and motions leading to mastery of complex sequences.[2,3] The instrument and body, through this action, are no longer conceived of as separate; they have become the 'body object',[4] described by Foucault. Although the project is not designed as a Foucauldian study of this relationship, the basic principles of the phenomenon are nonetheless used as a conduit for musical experimentation (expressed through, for instance, the forms the compositions take).

Another Foucauldian idea explored through the compositions presented here is the 'temporal elaboration of the act'.[5] Here, a desired action from a body is broken down into constituent, measurable parts, so that each can be corrected if wrong, and to ensure a consistency of outcome regardless of performer, or conditions in which the act is performed.[6] Although Foucault highlighted types of military marching drills, it is easy to see how the principle could apply to musical technique - specifically gesture, explored in 2.1. Both Foucauldian ideas are invoked by 'mapping' certain aspects or qualities to musical features (discussed below).

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[1] Shelly Anne Knotts, 'Social Systems for Improvisation in Live Computer Music' (University of Durham, 2018), p.12. <http://etheses.dur.ac.uk/13151/> [accessed 28th April 2023].
[2] Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. by Alan Sheridan (Harlow: Penguin Books, 1991), p.153.
[3] Katie Zhukov, 'Effective Practising: A Research Perspective', Eric.Ed.Gov <https://files.eric.ed.gov/fulltext/EJ912405.pdf> [accessed 6th September 2023].
[4] Foucault trans. Sheridan (1991), p.153.
[5] Ibid., p.151.
[6] Ibid.

The main thrust of the project, however, is in exploring how the central theme of bodily autonomy can be articulated through music, in answer to the research question 'how can the pressing contemporary theme of bodily integrity be mapped to new music?'.

The music presented is metaphorically representative of the theme (in the broadest possible terms). Using music as metaphor is nothing new,[7] and is not the focus of this project. However, given that a metaphor is a mapping 'across perceptual domains',[8] the work of a commentary such as this is to analyse the means by which the works function as effective mappings.

This project explores the theme of bodily integrity through such musical mappings. Very basically, this involves taking real-world features (such as freedom of physical movement) and embodying them in musical devices (like freedom of musical gesture, for instance; this is discussed later). It is important to remember that, whilst mapping cannot preserve all characteristics of (for instance) a social network that is being portrayed, this is not the objective here.[9] Instead, the designing of spaces for reflection gives listeners the opportunity to reflect from within the space, and attain a kind of self-actualised knowledge.[10]

The listener is therefore given an 'immediate demonstration' – they are 'shown' phenomena.[11] In this model, 'one is not provided with an argument. Instead, one is put (and sometimes prodded) into a position where some perspective on an object becomes apparent.'[12] For instance, 'Austen demonstrates that, for example, flattering toadies are contemptible' in *Pride and Prejudice*. This is accomplished not by setting out a rational argument,[13] but by *showing*, through mapping phenomena to music. The pieces each deploy the following different mappings by which they articulate the central theme of bodily integrity:

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[7] Lawrence M. Zbikowski, 'Metaphor and Music', in *The Cambridge Handbook of Metaphor and Thought*, ed. by Raymond W. Gibbs Jr. (Cambridge, UK: Cambridge University Press, June 2012), pp.502–24 (p.502) <https://www.academia.edu/download/51202476/gibbs_raymond_w_jr_the_cambridge_handbook_of_metaphor_and_th.pdf#page=518> [accessed 6th September 2023].

[8] George Lakoff and Mark Johnson*, Metaphors We Live By* (Chicago, USA: University of Chicago Press, 2003), p.3.

[9] King (2019), p.107.

[10] Jeanette Bicknell, 'Can Music Convey Semantic Content? A Kantian Approach', Journal of Aesthetics and Art Criticism, 60 (2002), 253–61 (p.254).

[11] Ibid.

[12] Ibid.

[13] Ibid., p.258.

1) Some take a conceptual approach, applying theoretical or philosophical concepts to the design of pieces, so that audiences can experience these concepts through the lens of a performance scenario as a metaphor for the underlying concept. Knotts's work involving networked laptop musicians in a 'hub' falls into this category, as it explores a wider social concept through a musical setup, distilling salient aspects of the concept so that participants and audiences can experience and examine these through the lens of the piece.[14] Works such as this will be described henceforth as metaphorical mappings.

2) Others take a slightly more literal approach, applying a philosophical or psychological phenomenon to a physical body or performer(s), experiment-like, with the resultant sound forming the basis of the piece. For example, a piece might take a principle, such as physical constraint as punishment, and realise this in a piece by not allowing a performer to execute a particular motion.[15] This is called quasi-literal mapping here.

3) Others still take an even-more-literal approach, mapping quantitative data to musical parameters. For instance, the location of bright spots on an image can be mapped to musical time, and their brightness to amplitude.[16] This is a 'literal mapping' in the table below.

[14] Knotts (2018), p.2.
[15] Pieces in this vein include Shrapnel's *Houdini Rite*; Michael Nyman, *Music in the Twentieth Century: Experimental Music: Cage and Beyond:* Series Number 9, 2nd ed. (Cambridge: Cambridge University Press, 1999), p.135.
[16] This is a specific reference to a sonification of NASA/Hubble Telescope images; although the purpose of this project is not to display data, as discussed elsewhere, this technique will still yield musical results; 'NASA', SYSTEM Sounds, 2020 <https://www.system-sounds.com/nasa/> [accessed 15th November 2023].

The ways pieces use these mapping methods are given in table 1 below:

Title	Mapping
to project inwards	① Metaphorical
i dissociate	①
SYLM/‘YLM’	② Quasi-literal
5 TENSe minutes	②
Contingency	①
Three Head God	②
Fabric Seas	②
Blood-Bloom	①
Midnight Immolation	②
Migrance	③ Literal
klaT	②

Table 1. Pieces and their mappings.

2. Bodily Integrity

It is a fundamental right for humans to have inviolable control over their bodies, and to exercise that control without coercion.[17] This notion is known as bodily integrity or bodily autonomy – these terms are used interchangeably in this project. In spite of the general public perception that extreme violations of bodily integrity are reprehensible and in the decline,[18] and the successive outlawing or sidelining of extreme political views and groups,[19] there are still those whose bodily integrity is denied or violated on a routine basis.[20,21,22] Bodily integrity is therefore chosen as the basis for this project.

[17] In this context, this model of autonomy is closest to Piaget's (1948), rather than Nietzsche's, as the latter focuses the locus of responsibility on the individual; Ken Gemes and Simon May, *Nietzsche on Freedom and Autonomy* (Oxford, UK: Oxford University Press, 2009); Bernard Reginster, 'Review: Nietzsche on Freedom and Autonomy' in *Notre Dame Philosophical Reviews,* 2011.<https://ndpr.nd.edu/reviews/nietzsche-on-freedom-and-autonomy/> [accessed 20th January 2022]). Piaget, rather, maintains that autonomy is decision-based. These decisions are embodied in the musicians' responses to scores in this portfolio.

[18] Nancy Kelley, Omar Khan, and Sarah Sharrock, 'Racial Prejudice in Britain Today', September 2017 https://cdn.prod.website-files.com/61488f992b58e687f1108c7c/61c209424ce8cec640976cfb_racial-prejudice-report_v4.pdf [accessed 1st February 2023].

[19] Many nations ban Nazi symbolism and proscribe membership of extreme groups, for instance.

[20] United Nations Population Fund, *My Body is My Own – Claiming the Right to Autonomy and Self-Determination,* ed. by Arthur Erken (UNFPA, 2021), p.8.

[21] Nina Totenberg, 'Supreme Court Affirms Police Can Order Blood Drawn From Unconscious DUI Suspects', NPR (NPR, 27th June 2019) <https://www.npr.org/2019/06/27/732852170/supreme-court-affirms-police-can-draw-blood-from-unconscious-drivers> [accessed 1st February 2023].

[22]John W. Whitehead,, 'Missouri v. McNeely: The Loss of Bodily Integrity in an Emerging Police State', HuffPost, 2013 <https://www.huffpost.com/entry/loss-of-bodily-integrity_b_2471880> [accessed 1st February 2023].

2.1. Gesture

As discussed in the introduction, bodily integrity is mapped onto various musical features. One which this project uses frequently is musical gesture. 'Gesture' by itself is difficult to define, as it has a range of identities "from purely functional to purely symbolic."[23] This project's definition is taken from Delalande's "three level gesture classification":[24] the 'effective gesture'. This is movement 'necessary to mechanically produce the sound - bow, blow, press a key, etc.'[25] Henceforth, this definition is called a 'musical gesture' for ease of reference, and to position it against the other 'species' of gesture Delalande classifies.[26]

In assembling an analysis of the mechanical, sound-producing musical gesture, it is important to analyse its temporal features as well, so that the movement can be categorised according to space *and* time. A precise sense of the temporality of musical gestures can be understood by cross-referencing features of musical gesture against analyses of different musical time scales, to identify the musical processes present in gestures which apply most closely to defined time intervals. Leaving aside affective qualities, musical gestures have four common features (according to the model described by Ben-Tal): it is in the foreground; it is repeated; those repetitions preserve salient characteristics; and, it is inherently complete (not requiring extension, which would hinder its sense of completeness).[27]

This can be refined further by cross-referencing these features against descriptors from Roads's time scales.[28] Analysis of the 'meso scale' reveals Ben-Tal's definition of musical gesture exists at precisely this magnitude, with Roads's descriptions of 'sequences, combinations, and transmutations'[29] on a 'local as opposed to global time scale'[30] affirming Ben-Tal's analysis. This is

[23] Delalande, F. (1988). La gestique de Gould: Élements pour une sémiologie du geste musical. In Cadoz, Claude and Marcelo M. Wanderley, 'Gesture-Music', in Trends in Gestural Control of Music, ed. by M. M. Wanderley and M. Battier (Paris, France: IRCAM, 2000), pp. 71–94 (p. 77) <https://www.researchgate.net/publication/281419029_Gesture-Music> [accessed 11th January 2025].
[24] Ibid.
[25] Ibid.
[26] Namely 'accompanist gesture', involving body movements such as elbow or chest movements, associated with producing 'effective' gestures, and 'figurative gesture', such as "melodic balance" (i.e. not corresponding with a physical movement, but purely affective). Ibid.
[27] Ben-Tal (2012), p.254.
[28] Curtis Roads, *Microsound* (Cambridge,., USA: MIT Press, 2001), p.14.
[29] Ibid.
[30] Ibid.

further justified by Roads's invocation of Varèse's highly directional description of 'sound masses.'[31] Hatten also gives a duration that corresponds with this categorisation (although he does not articulate the other durational strata as precisely as Roads).[32]

This musical gesture is useful in two ways: firstly, the composer can control it very accurately through notation (in a way that the affective or sympathetic movements of the performer cannot necessarily be controlled). Secondly, it can be made to lie in parallel between nonmusical *communicative* gestures. These are those made by a person as "vehicles of social interaction",[33] and is how the term is used in the fields of linguistics, psychology, social anthropology, and so on.[34] Henceforth, this is given the shorthand reference 'communicative gesture', delineating between it and the musical gesture. A simple example of a parallel between physical and musical gesturing might be the shaking of a fist in frustration and a string player's tremolo.

This mapping between physical and musical gesturing is undertaken in the image of Lakoff's description of the metaphorising power of expressing one thing in the terms of another. Mapping bodily autonomy to abstract musical gesture is difficult, as they are not homomorphic. Besides, this level of metaphor relies on a shared frame of reference by (in this case, for example) composer and listener; "[t]his would explain why music can sometimes sound desperately meaningless when it crosses cultural boundaries."[35] All the same, composers can use these tools for composition, in the knowledge that the piece is still imbued with aspects of the subject matter about which it is written, regardless of listener perception.[36]

A composer whose work deals with the corruption of musical gesture for political ends is Tomás Laurenzo. His work *5500* is particularly relevant here as it is a metaphor. Composed for a

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[31] Ibid., p.15.
[32] Hatten (2004), p.94.
[33] Jensenius, Alexander, 'ACTION – SOUND Developing Methods and Tools to Study Music-Related Body Movement' (University of Oslo, 2007), p.36. <https://www.academia.edu/6656412/Jensenius_2007b> [accessed 11th January 2025].
[34] Ibid.
[35] Métois, Eric, 'Musical Sound Information: Musical Gestures and Embedding Synthesis' (Massachusetts Institute of Technology, 1991), p.14 <https://dspace.mit.edu/bitstream/handle/1721.1/29125/37444570-MIT.pdf?sequence=2&isAllowed=y> [accessed 11th January 2025].
[36] However, this is not the invocation of a 'who-cares-if-you-listen'-style debate - just an acknowledgement of the composer's intention. Babbitt, Milton, 'Who Cares If You Listen?', High Fidelity, February 1958 <https://artasillumination.files.wordpress.com/2015/02/who-cares-if-you-listen.pdf> [accessed 28th August 2023].

pianist whose movements are disrupted by a transcutaneous electrical nerve stimulation (TENS) machine, the title refers to the ≥5,500 migrants who died trying to reach Europe from Africa across the Mediterranean over a 12-month period.[37] Laurenzo recognises that the body (in the anthropomorphic sense) is a site for the destabilisation of traditional paradigms of representation, and that its inclusion lends the work an inherently political bent.[38] Specifically, Laurenzo draws the parallel between the body of the performer and those of the migrants (whose integrities are diminished in the media by their identification as 'illegal').[39] He problematises the inherent harm (and parallel loss of bodily autonomy) in the environment surrounding this type of migration, through the use of painful electric shocks from the TENS machine, which compel the body to move. Laurenzo himself states outright that this is the intention behind disrupting a traditional piano performance with digital interference.[40] Laurenzo literally *shows* us the tension inherent in the performance. In his work, as in the work here, the question of 'realisation' or 'understanding' on the part of the listener is less important than the reflective space the piece conjures.

This approach addresses the difficulty in translating between data and musical gesture; data is usually measured on a different time scale than musical gesture. Laurenzo's work does not span the 12-month period, nor is it written for c.5,500 performers – nonetheless, it is *about* the data that it describes, as the artistic representation need not be 'symmetric'[41] with the data. Laurenzo establishes an affective parallel between the 'uncomfortable, unnatural' gestures (both musical and physical) and the scenario he explores. This is the sort of representation explored in this portfolio; there may not be an explicit data mapping, but it is still important to establish an affective space in which there is an element of the phenomenon or scenario present in the musical gestures (and thereby the piece), per the model above.

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[37] Laurenzo Tomás, '5500: Performance, Control, and Politics', Proceedings of the International Conference on New Interfaces for Musical Expression, 2016, 26–40 (p.37) <https://doi.org/10.5281/zenodo.1176058> [accessed 4th February 2023].
[38] Ibid., pp.37-38.
[39] Ibid.
[40] Ibid.
[41] Craig Files, 'Goodman's Rejection of Resemblance' in The British Journal of Aesthetics, 36 (1996), 398–412 (p.398) <https://doi.org/10.1093/bjaesthetics/36.4.398> [accessed 6th February 2023].

2.2. Relationality

'Relationality' refers to the organisation and interconnectedness of members of a society, without any of them existing in isolation. Whereas bodily autonomy is largely regulated by law, social relationships are usually not.[42] Relationality is important in the information age. Social networks, for instance, existed before the information age,[43] but are now bywords for multibillion dollar sites, onto which users upload countless bytes of personal data. Some two-thirds of people engage in online social networking.[44] This technology is developing constantly and affects the young disproportionately.[45]

Rather than trying to identify and represent complex legal, technical, or theoretical methods of organisation (such as democracies, fascist states, or 'onlinified' social networks, for example) this project instead examines the balance and transfer of power between two or more relational 'agents', using imagined scenarios to illustrate ideas around social power (for instance).

A connection between two people, in anything other than a totally equal relationship, is a conduit for power, which is exercised disproportionately from the more socially powerful member to the less. In this way, hierarchies are established, and a network of social relationships is envisioned.[46]

The relative influence of people, and thus the flow of power through the gradient line between them, is governed by a complex patina of overlapping privileges and subjugations, applying both generally to entire groups of people, or at a very fine detail, to individual members of the network. This is intersectionality.[47] Intersectionality is a lens through which individuals should be viewed when assessing their relative power, as it enables a detailed, novel analysis of these constituent individuals.

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[42] Consider the difference between the legal status of kidnap, for instance, and of social hierarchy – the first is enshrined in law in most legislative systems, but the second is not.

[43] Kadushin classifies a social network as any more than two people - 'nodes' - interacting with each other. Charles Kadushin, Understanding Social Networks: Theories, Concepts, and Findings (Cary, NC, USA: Oxford University Press, 2011), p.14.

[44] Dave Chaffey, 'Global Social Media Statistics Research Summary 2022 [June 2022]', Smart Insights, 2023 <https://www.smartinsights.com/social-media-marketing/social-media-strategy/new-global-social-media-research/> [accessed 9th February 2023].

[45] Esteban Ortiz-Ospina, 'The Rise of Social Media', *Our World in Data* (2019) <https://ourworldindata.org/rise-of-social-media> [accessed 9th February 2023].

[46] This analogy is derived from the theory of social network analysis; Evelien Otte and Ronald Rousseau, 'Social Network Analysis: A Powerful Strategy, Also for the Information Sciences', *Journal of Information Science*, 28 (2002), 441–53 <https://doi.org/10.1177/016555150202800601> [accessed 28th January 2023].

[47] Brittney Cooper, 'Intersectionality', in *The Oxford Handbook of Feminist Theory*, ed. by Lisa Disch and Mary Hawkesworth (Oxford, UK: Oxford University Press, 2016), pp.385–406 (p.386).

This sort of interactive relationality is imbued in the forms of certain pieces in this portfolio. For instance, two people interacting might be imbued metaphorically in two performers, exchanging musical material, or altering each other's expressions of musical material, for example. Socially, such interactions are critical to the identity of the individual nodes they contain; 'identities of the actors involved are constructed in dynamic processes of attribution and negotiation within the network.'[48] Relationality is fundamental to the human experience - more so than many other aspects of society (such as "political power, money, law, and scientific truth"),[49] as it describes patterns of communication and knowledge-forming across all of these. Exploring relationality through shared or mutually-dependent forms, experienced by multiple performers, is therefore an important means by which composers can imbue their works with this critical element of the human condition.

How should one conceptualise such a form, then, in the context of this project? An answer can be found in Roads's *Microsound*. Historically, a 'top-down' approach was commonplace when composers conceptualised form, writing according to a preconceived plan (such as sonata form),[50] which would then define the deployment of smaller-scale musical materials such as gestures.[51] This is *not* the approach taken in the compositions presented here. Instead, a secondary conceptualisation of form is explored: 'bottom-up'. Here, meso scale materials (i.e. musical gestures) combine, interact, and transform over time. Thus, they generate novel perceptual events, imbued with the essential gestural characteristics from which they are constructed,[52,53] on Roads's 'macro time scale.'[54] This is aligned with Roads's discussion of Varèse and Cage,[55] and lies in parallel with the enmeshed web of interacting agents in a relational environment. This musical interaction of materials is an 'interactive musical system', based on the principles of relationality outlined above.

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[48] Jan A. Fuhse, 'Theorizing Social Networks: The Relational Sociology of and around Harrison White', *International Review of Sociology*, 25 (2015), 15–44 (p.17). <https://doi.org/10.1080/03906701.2014.997968> [accessed 7th February 2023].
[49] Ibid., p.39.
[50] Ibid.
[51] Roads (2001), p.12.
[52] Ibid.
[53] Ben-Tal describes 'repetitions preserv[ing] salient characteristics'; Ben-Tal (2012), p.254.
[54] Ibid., p.11.
[55] Roads (2001), p.13.

It is useful to establish a continuum on which one can classify these interactive musical systems, so as to better understand them and their practical implications. One such categorisation is Rowe's 1993 taxonomy.[56] See the table below for a summary:

Dimension name	Paradigm	Description
Score/ performance-driven	Score-driven	• Predetermined event collections or stored music fragments for matching incoming music. • They employ traditional categories like beat, metre, and tempo.
	Performance-driven	• Does not anticipate specific musical outcome, and lacks stored representations (i.e. no traditional score, no 'ideal' realisation). • Use more general perceptual measures, like density and regularity, for describing music.
Transformative/ generative/ sequenced	Transformative	• Modify existing musical material, which may or may not be recognizable.
	Generative	• Use elementary or fragmentary source material and rules to create complete musical output.
	Sequenced	• Utilise prerecorded music fragments, such as samples, with some variations in performance through manipulation.
Instrument/player	Instrument	• Analyse human player's musical gestures to generate extended musical output. • Result in a musical output, akin to a solo performance.
	Player	• Aim to create artificial players with 'personalities' and behaviours. • The output, when 'played' by a human, resembles a duet.

Table 2. Classifications and descriptions of interactive musical systems (Rowe, 1993).

Note that pieces do not necessarily occupy the extremes of the continua; it is possible, for instance, to have a piece where a preordained series of events (in a traditional score) might trigger a non-fixed, 'performance-driven' element (such as a performer playing a piece into a granular delay effect).

[56] Robert Rowe, *Interactive Music Systems* (Cambridge, MA, USA: MIT Press, 1993) <https://wp.nyu.edu/robert_rowe/text/interactive-music-systems-1993/> [accessed 20th September 2023].

A composer whose work uses interactive systems is Stefan Prins. In the case of his piece *Piano Hero #1*, Prins creates a sampled avatar-player as a 'prosthesis'[57] of the live MIDI keyboardist. Prins does not set the avatar up as a realistic performer; he cuts the avatar into short samples, which remove it somewhat from a 'human' (in that the avatar cannot execute continuous musical gesture; also, given that its musical gestures are clearly electronically triggered and cut, due to the immediacy of the i/o signals). The MIDI data only 'work' one way (i.e. from the keyboardist to the disembodied avatar), ergo, the live performer compels the sampled performer. In that it is constructed from recorded material, the timeline of the avatar can be interpreted as a metaphor for the power of surveillance over individuals.

We can categorise this on the continua proposed by Rowe. This is supplemented here by a visualisation. As Prins evidently uses a timeline of events (a score), it occupies the 'score-driven' end of the dimension. Similarly, as the score triggers specific pre-recorded fragments in real-time, it neatly fits the 'sequenced' classification of response methods. Lastly, as Prins establishes a kind of atemporal prepared-piano-esque instrument – an 'elaborated output exceeding normal instrument response'[58] – *Piano Hero #1* belongs to an instrument paradigm. The placement of *Piano Hero #1* can therefore be visualised thus (overleaf):

[57] Tomasz Biernacki, 'Alien bodies. Stefan Prins' aesthetics of music', *Dissonance,* 125, March 2014, 34-39, (p. 35). <https://www.dissonanz.ch/upload/pdf/125_34_hb_bie_prins.pdf> [accessed 27th August 2022].
[58] Rowe (1993).

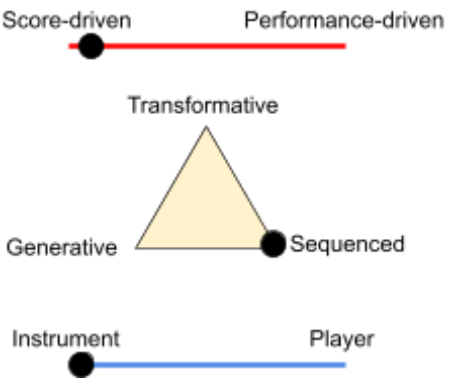

Fig.1. Visualisation of *PIano Hero #1* on Rowe's continua for categorising interactive music systems. Note that there has been a small shift towards 'performance-driven' on the top continuum. This is to accommodate the fact that the durations of the sampled musical gestures triggered by the keyboardist do not necessarily correspond to the durations indicated in the score for the keyboardist to play. In video recordings of performances of *Piano Hero #1*, sampled musical gestures (scrapes, hits and so on) can last for shorter durations than the depression of the MIDI keyboard's keys.[59]

In *Generation Kill*, Prins leaves us in no doubt that he is dealing with surveillance systems as a means of control. The material is marshalled by performers 'playing' controllers – computer game controllers, that is. These are used to speed up, slow down, reverse, and generally manipulate pre-recorded material, which is heard alongside four live instrumentalists. This is combined with a similar visual display as used in the *Piano Hero* pieces above, only the footage of performers is now edited to show close-ups, different players, and (as the piece progresses) video from unmanned military drones. The inferred statement about surveillance here is clear: that it imbues those who have it with power over those who do not. In combining multiple camera angles with drone footage, and live musicians with manipulated samples, Prins comments on the weaponisation of remote surveillance feeds, and its disorienting representation across many media.[60] Here, the manipulation of surveillance footage *is* the mode of operation which drives the form and the musical gestures, as without the fragmentation of materials, such a grammar could not have been generated.

[59] Jan-Holger Hennies and Stefan Prins, *Piano Hero #1 (Stefan Prins, 2011)* (YouTube/Stefan Prins, 2020) <https://www.youtube.com/watch?v=9s8WmP7CBik&ab_channel=StefanPrins> [accessed 20th September 2023].
[60] Tim Rutherford-Johnson, *Music After the Fall: Modern Composition and Culture Since 1989*, (Berkeley, CA, USA: University of California Press, 2017), p.110.

If categorised according to Rowe's taxonomy, *Generation Kill* might appear like this in a visualisation:

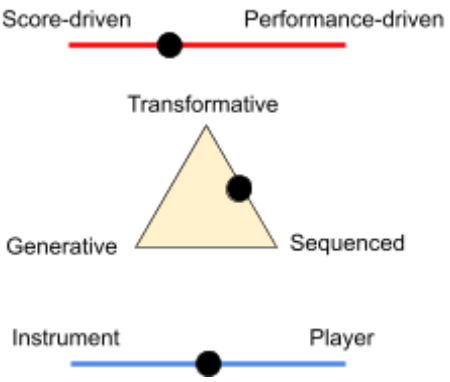

Fig.2. *Generation Kill*, categorised according to Rowe's (1993) taxonomy. The score contains some quasi-ad-lib. notations and occasional instructions to 'improvise'.[61] Therefore, in the above visualisation, the topmost continuum describes a work that is at least partially performance-driven. Whilst the controlling impulses from performers via game joystick *are* directed by a score, the sonic result is not. For these reasons, the piece occupies a place somewhere between transformative and sequenced on the generative/transformative/sequenced continuum. As the piece's setup is quite visual, and Prins makes the link between 'gamer'/player and on-screen audiovisual sample more or less obvious depending on the moment, *Generation Kill* is difficult to place on the last continuum. However, as the performers with game controllers are occasionally still, and drone footage plays on the projection, there is cause to give equal weighting to both instrumental and player paradigms. This is, of course, subjective.

Through clever use of interactive, surveillance-like systems, Prins allows his audiences to see into the mangled lives of the avatars, and thereby leads the audience to the sort of reflective space where they can attain a sort of self-actualised knowledge.[62] Interactive musical systems, as explored by Prins and in this portfolio, are a powerful means by which a composer can access this self-actualising space, where viewers might experience the metaphorising power of perceiving one thing in terms of another. Here, it is Prins's reconfiguration of interactive surveillance systems that allows reflection on their use *outside* of the composer's musical context – and that is precisely the sort of technique deployed in the pieces of this portfolio.

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[61] For instance, at (and shortly after) figure J. Stefan Prins and Nadar Ensemble, reMusik.org, *Stefan Prins – Generation Kill – Offspring #1 [m/ Score]* (YouTube/Score Follower/reMusik.org, 2020) <https://www.youtube.com/watch?v=TeANA00h9qY&ab_channel=ScoreFollower> [accessed 20th September 2023].
[62] Bicknell (2002), p.254.

2.3. Literature Review

2.3.1. Bodily Autonomy

Composers challenging performers to use their bodies in increasingly unnatural ways is nothing new. For instance, the development of 19th century pianism demanded performers play ever more technically challenging material.[63] By the same token, when thumb position was introduced to mainstream cello repertoire in the first half of the 18th century,[64] it presented the performer with the added challenge of learning how to use a new digit (or rather, a digit in a new way). Whether by adding more notes or more digits, the progress towards a more challenging performance is an established route by which composers exact control over a performer's body.

More nuanced is Simon Steen-Andersen's opera *Buenos Aires*. Here, one of the characters offers a sort of meta-reflection on the perceived artifice of opera, by suggesting that characters only sing diegetically, or that the story be in another reality, where singing is an accepted way of communication. Finally, they suggest not using the voice at all, instead using various tools such as dentists' vacuums, bicycle pumps, and even blown air from other characters' mouths as sources of columns of air with which to articulate words.[65]

By writing *for* his characters, using artificially curtailed or restrained musical gestures, Steen-Andersen writes *about* his characters' bodily autonomy (and the wider theme of censorship, besides).[66] This is effective in that it forces them to seek other expressive pathways - by enunciating words particularly clearly, for instance, so that they can be heard when sounded by unorthodox techniques.

This approach is not taken in works presented here such as *to project inwards* or *i dissociate*. Their designs are such that the performer cannot deviate from what is being demanded, and their

[63] Zhou, Danny and Dorottya Fabian, 'Velocity and Virtuosity: An Empirical Investigation of Basic Tempo in Contemporary Performances of Two Large-Scale Works of Chopin and Liszt', Empirical Musicology Review: EMR, 16 (2023), 176–204 <https://doi.org/10.18061/emr.v16i2.8114> [accessed 17th December 2024].
[64] Walden, Valerie, Cambridge Musical Texts and Monographs: One Hundred Years of Violoncello: A History of Technique and Performance Practice, 1740-1840 (Cambridge: Cambridge University Press, 2004), p.126.
[65] 'Simon Steen-Andersen - Projects', Simonsteenandersen.com <https://www.simonsteenandersen.com/projects/buenos-aires> [accessed 17 December 2024].
[66] Ibid.

expressive qualities are dictated in minute detail. Whereas *Buenos Aires* might be read as being about censorship, *to project inwards* could similarly be about authoritarianism, or *i dissociate* about a loss of control; both offer reflections on situations in which performers' bodily autonomy is violated by the demands of the music.

Where else, then, are such strong demands made of a performer by the music that their bodily integrity might be considered to have been violated? Turning to New Complexity for an answer to this question could yield an answer. Ferneyhough's *Time and Motion Study II* shares a number of parallels with works presented here, particularly those whose bodies are interfered with to produce a novel sonic result (such as *i dissociate*, in a metaphorical sense per table 1, or *5 TENSe minutes*, more literally). Although *Time and Motion Study II* (*TaMSII*) has implications in the section below this one, on technology's interfering role in bodily autonomy, it is considered here on a purely notational basis.

Ferneyhough's notational approach (in describing in minute detail the parameters in which the performer must express his music) is, debatably,[67] a means by which composers can "generate the pressure and tension that would result from [performing a piece at the extremes of their ability]".[68] Works in this vein, in this project, however, follow a different path. Instead, here as in the Ferneyhough, "the notation represents a tool more for the performer than for the receiver. [It] expresses more closely the [physical] gestures that a performer is expected to make to allow the sounding result of the piece to come into being."[69] It is in this mode that notational processes in pieces like *i dissociate* and *TaMS II* share a similar platform, whilst neither must be necessarily intended to "make a performer feel that they are at the extreme boundaries of their abilities".[70]

It is clear, then, that a score is a meaningful and useful vehicle for control of a performer - but Ferneyhough's approach is not used here. Instead, graphic-inspired scores defining physical motion are used in certain pieces (such as *to project inwards* and *i dissociate* for instance), supplemented by extra notation-derived information to define sonic outcome. These are in the vein of works by Aaron

[67] Iddon, Martin, 'On the Entropy Circuit: Brian Ferneyhough's Time and Motion Study II', Contemporary Music Review, 25 (2006), 93–105 (96) <https://doi.org/10.1080/07494460600647493> [accessed 16th January 2025].
[68] Ibid.
[69] Ibid.
[70] Ibid.

Cassidy. Cassidy's writings for strings (especially in his Second String Quartet) emphasise physicality, presenting a highly-choreographed series of musical gestures. By demanding an exact - and exacting - physical ritual, Cassidy effectively controls the body. In his own words, this allows classification of "physicality as material."[71] This is the approach taken in works such as *to project inwards* and *i dissociate*, thereby inviting reflection on physicality through experiencing the material.

Cassidy does this by using a system of notation with a number of unambiguous parameters, all of which can be read simultaneously so as to produce the complex musical results required. Thicknesses of lines being proportional to bow pressure (and Cassidy's acknowledgement that this is roughly responsible for dynamic) is similar to the proportionality of line weight to 'finger-smear' pressure in *i dissociate*; line gradient corresponding with bow direction is less closely related to - but nonetheless conceptually aligned with - breathing in or out in *to project inwards*. Both of these techniques are discussed in more detail in 3.2.2. and 3.1.2. respectively.

Cassidy's reasons for using notation like this - as a "simpler, more direct, more immediate presentation of materials"[72] - are the same as the reasons these techniques have been used in certain pieces in this project. On the other hand, some of the scores presented here exceed Cassidy's. His notation does not account for the use of the bodies of stringed instruments as sounding objects, for instance,[73] and therefore *i dissociate* requires an expansion of the staff over that which Cassidy provides in his scores. This is what necessitates the whole-body schema of the viol in *i dissociate*, whereas a simple scale, standing in for the length of the sounding string, is apparent in most of Cassidy's string works.[74]

Cassidy's notational systems are also useful to bear in mind when analysing *Say you love me / 'you love me'*, and its forebear, *i loved you when you loved me*. As Cassidy says, using novel, physically-precise notation "turned into a new way of thinking about the roles of instruments and

[71] Cassidy, Aaron, 'Second String Quartet', Aaroncassidy.com <https://aaroncassidy.com/product/second-string-quartet/> [accessed 18th January 2025].
[72] Ibid.<https://doi.org/10.1080/07494467.2013.808410> [accessed 18th January 2025].
[73] As far as deductions from his website can demonstrate; Cassidy, Aaron, 'Second String Quartet', Aaroncassidy.com <https://aaroncassidy.com/solo-strings/> [accessed 18th January 2025].
[74] Ibid.

ways of experimenting with cross-instrument communication and mirroring".[75] This kind of notation works particularly well when shared across multiple instrumentalists, as it gives them a clear expectation of where to find the other in space and time, which is desirable when mirroring musical gestures. Traditional musical notation cannot do this accurately as it does not account sufficiently for physical location, a vital factor when two or more instrumentalists must coordinate physically.

[75] Cassidy, Aaron, 'The String Quartet as Laboratory and Playground for Experimentation and Tradition (or, Opening out/Closing In)', Contemporary Music Review, 32 (2013), 305–23 (312) <https://doi.org/10.1080/07494467.2013.808410> [accessed 18th January 2025].

2.3.2. Technology's Interference in Bodily Autonomy

The interplay between technology and humanity has long been a source of music-making. The invention of increasingly long fingerboards on stringed instruments, designed to enable higher and more technical playing, is related to the point made in section 2.3.1. However, once again, there is a more nuanced angle, especially considering the dawn of the information age (which, by this point, has already undergone numerous generations of technology/human integration - consider the huge range of integrated devices, from cochlear implants, to wearable, biosignal-tracking smartwatches, for instance).

A composer to deal explicitly with the interface between humans and technology is Marco Donnarumma. His work 'XTH Sense' uses biologically-produced, inaudible sounds (such as the heart beating, or muscles contracting), which are then treated electroacoustically, amplified, and can be further altered by physical gesturing on the part of the performer.[76] Here, Donnarumma is creating a 'cyborg' human/computer-based instrument, which can be 'played' by flexing the muscles and so on.[77]

Approaches taken in this project are linked, but differ somewhat, because of the intentions of their design. For instance, the role of XTH Sense is to augment the human performer's physical gesturing with musical gesturing. *5 TENSe minutes* was designed so that the performer's natural musical gesture would be interfered with - albeit in a way which augmented it beyond their physical capabilities.

A more closely-related work is Stelarc's *Amplified Body*. *5 TENSe minutes* is, in some ways, its mirror - with a few key differences. In *Amplified Body*, Stelarc's muscle contractions (or, rather, their electromagnetic signatures) trigger sound samples;[78] *5 TENSe minutes* uses electric current to trigger muscular contractions, which themselves have a sonic result (interfering with a cellist's bow). Indeed, Stelarc himself might further delineate between *Amplified Body*, *XTH Sense,* and *5 TENSe*

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[76] Donnarumma, Marco, 'Marco Donnarumma', Marco Donnarumma, 2011 <https://marcodonnarumma.com/works/xth-sense/> [accessed 17 December 2024].
[77] Ibid.
[78] Stelarc, 'Prosthetics, Robotics and Remote Existence: Postevolutionary Strategies', Leonardo, 24 (1991), 591-595 (591-592) <https://doi.org/10.2307/1575667> [accessed 17th December 2024].

minutes - the first two being human augmentations, the latter being 'body-piercing' in that the technology infiltrates the performer's body.[79] It is in this way that *5 TENSe minutes* demarcates itself among related technology-infused musical works. Generally, the 'nastiness' of technology enacting inhuman (and perhaps inhumane) limits, conditions, or mandates on performers' human bodies is the focus of technology-based works presented here, such as *5 TENSe minutes*, *klaT*, *midnight immolation*, or *Migrance*.

Ferneyhough's *TaMS II* is again relevant, specifically with regards to *5 TENSe minutes*, but also those others concerned with the non-metaphorical (i.e. corporeal) bodily autonomy of the subject of the piece. In *5 TENSe minutes*, as in *TaMS II*, "the sounding image draws into question disparities between creator and created." A 'cyborg' is created, where a performer imbues their technologically-generated counterpart with their essence. Prins does this through the human performer triggering footage of themselves with a gaming controller (in *Generation Kill*, analysed in 2.2.). Similarly, Ferneyhough's cellist in *TaMS II* is recorded to tape and played back into the live performance environment.[80]

Whereas in Prins's and Ferneyhough's pieces the cyborg is confined to their audiovisual and audio platforms respectively, there is a different process at play in *5 TENSe minutes*. Although it uses a video representation of the performer, played back at them, this has no sonic identity. It is not a cyborg in the sense above, then. Instead, the TENS machine and cellist are one entity - one which cannot produce the final sonic result without either machine or human component. In this model, "it is not clear who makes and who is made in the relation between human and machine. It is not clear what is mind and what body in machines that resolve into coding practices". This is an important aspect to bear in mind when considering the role of technology in pieces like *5 TENSe minutes, klaT*, *midnight immolation* and *Migrance*.

[79] Ibid (592).
[80] Iddon (2006), 99.

2.3.3. Interactive Systems and Relationality

One composer to address relationality through interactive musical systems is Shelly Knotts. Knotts (invoking Ostertag,[81] and citing the explosion of social networking in the first two decades of the second millennium) draws the parallel between diversifying relationality within social networks and a proportional increase in musicians exploring 'the possibilities of networking in music making.'[82]

In doing so, Knotts signals the way out of the imbalanced composer-performer-listener triumvirate. Specifically, the 'Hub' model;[83] laptop ensembles (taking after bands) generating and organising material at a 'molecular' level, organising as a non-hierarchical collective around a centralised data-exchange network. Whilst much of the work Knotts cites is, necessarily, at least partly improvisational in nature,[84] the principles can be applied to any composed or improvised music whose creator(s) and performer(s) are in some kind of relationship. Knotts contends that 'building non-hierarchical music systems is impossible.'[85] This can be explained by the overlapping privileges inherent in an intersectional society.[86] Musical form also features hierarchical points in an interconnected structure.[87] As such, it can help contextualise a relational, social network in musically experiential terms.

Works in this project such as *Blood-Bloom*, *Three Head God* and *Say you love me / "you love me"* inhabit a similar space. These are rules-based pieces, but because those rules focus around interactions between musicking agents in the confines of the piece, they are categorised here as interactive systems, per Rowe (1993).

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[81] Bob Ostertag, *Creative Life: Music, Politics, People, and Machines,* (United States, University of Illinois Press, 2009), p.11; Shelly Anne Knotts, 'Social Systems for Improvisation in Live Computer Music', (Durham, UK: Durham University, 2018), p.1. <http://etheses.dur.ac.uk/13151/> [accessed 3rd September 2022].
[82] Knotts, (2018), p.2.
[83] Ibid. Here, the 'Hub' refers to the 'The League of Automatic Music Composers', latterly 'The Hub', utilising such a centralised network.
[84] For instance, John Zorn's 'Cobra'; John Zorn, *'Cobra Notes from David Slusser',* (1984). <https://web.archive.org/web/20130128204544/http://www.4-33.com/scores/cobra/cobra-notes.html> [accessed 3rd September 2022]
[85] Knotts (2018), p.3.
[86] Brittney Cooper, 'Intersectionality', in *The Oxford Handbook of Feminist Theory,* ed. by Lisa Disch and Mary Hawkesworth (Oxford, UK: Oxford University Press, 2016), pp.385–406, p.386.
[87] Bruce Benward, Marilyn Nadine Saker, *Music in Theory and Practice,* Vol, 1, 9th edn (Columbus, USA: McGraw-Hill Education, 2015), p.87.

James Saunders uses a similar 'game-like' approach across many of his works (in which performers generate material and form through contingent interaction), with perhaps the most similar collection being *things to do*. Here, Saunders says, "[t]he differences in each piece, and the relationships between the players, are determined by constraints which govern who each player responds to and who gives instructions. It creates modes of interaction between individuals, allows group behaviours to emerge, and reveals the personal characteristics of each performer in an immediate way."[88]

Striking, though, are the differences between this and the rules-based pieces (especially *Three Head God* and *Blood-Bloom*). Whereas Saunders's work "reveals" certain aspects of the performers, and their agency, there is a more covert, secretive, or even devious aspect to the works presented in this portfolio. For instance, the performers of *Three Head God* are not allowed to read the instructions for any part other than their own, and the relationship between parts is never properly revealed, only to be guessed at if the performers choose to do so.

This is explored more in 3.6. In *Blood-Bloom*, too, there is an element of the mischievous or deceitful, in that players are only allowed to play certain materials if other materials are played simultaneously. Whereas *things to do* is similar (in that players are only allowed to sound the instruments arrayed in front of them on receipt of an instruction from other performers), it represents a more direct line between instruction and action, whereas *Blood-Bloom* represents a more three-dimensional set of contingencies and conditions. Excitingly, instructions in some of the constituent pieces may not be followed (*sometimes we do what you say, but occasionally we don't* being an obvious example, given the title),[89] but never is a sonic outcome contingent on aligning conditions, as in *Blood-Bloom*, and it is here that the interplay of performers and their relative plans for the piece's form become most interesting in the context of this project.

[88] Saunders, James, 'Things to Do', James Saunders, 2014 <https://www.james-saunders.com/things-2/> [accessed 18th January 2025].
[89] Ibid.

3. Case Studies/Pieces/Techniques

Here, the pieces of the portfolio are analysed relative to related works by other composers, to situate them in the literature on a piece-by-piece basis. They are also evaluated according to various criteria (given per piece - among which were the efficacy of notation, to steps taken in response to feedback from workshops, to a personal reflection on whether the pieces were effective in expressing the musical ideas that they were supposed to). Where possible, some are categorised according to taxonomies or timescales introduced earlier, or have aspects described in respect of the phenomena they portray in metaphor. Rather than establishing grand theories, or acting as a compositional treatise, this section guides the listener through the compositional process of each piece. Where the previous sections deal with theory, this section describes praxis.

3.1. to project inwards

3.1.1. Background

This piece examines bodily autonomy through the relationship between the performer and their voice. The piece was designed to explore how a mostly-subconscious process – breathing – could be disrupted and used to generate musical material. This was seen through the lens of prior thoughts surrounding the Foucauldian body-object.[90] Rehearsal, practice, or prior performance experience would have a vocalist break down their technique to a granular level, with each movement carefully defined. Here, the 'temporal elaboration of the act'[91] is deliberately invoked to overwhelm standard Western Classical technique. In so doing, the forceful undoing of the vocalist's practice and experience is attempted, thereby violating their bodily integrity,[92] and offering an examination of a central theme of the project.

There is semantic information included here that is absent from all but the titles of the other pieces presented in the portfolio – text (in the form of lyrics). In that regard, musical gestures (specifically, sharp fillings or emptyings of the lungs, and the respective sonic results) are coordinated with natural stresses of the poems, and with a subjective interpretation of the relative importance of the lines. The semantic information with which this project is interested, though, is to do with metaphor. What is the metaphor here, then? By placing the solo vocalist in a performance space, priming the audience for a mimetic embodiment of the piece,[93] the intention here is that the audience will comprehend that the musical gestures are difficult to execute. In increasing the difficulty – and desperation – of the musical gestures, the piece constrains the performer in a very real, bodily fashion. This is, therefore, a piece designed to encourage reflection on restraint, by its examination through the performance.

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[90] Foucault trans. Sheridan, p.153.
[91] Ibid., p.151.
[92] Considered unusual or even undesirable at either extreme; *Cambridge Companions to Music: The Cambridge Companion to Singing*, ed. by John Potter (Cambridge: Cambridge University Press, 2012), pp. 72 & 234.
[93] Arnie Cox, 'Hearing, Feeling, Grasping Gestures', in *Music and Gesture*, ed. Elaine King and Anthony Gritten (Abingdon, Oxon., UK: Routledge, 2017), pp.45–60 (p.46).

3.1.2. Score

The score is necessarily divergent from standard Western notation, whilst containing familiar elements. This is for two reasons: firstly, to define the body's movements at a given moment in space/time so precisely that the score 'assures the elaboration of the act itself'.[94] Secondly, to allow the musical gestures to 'penetrate[] the body and with [them] all the meticulous controls of power.'[95] Although Foucault used time as the means by which the body is penetrated with controlling power, the score extends this by combining the temporality of familiar Western rhythmic durations with directionality (as in the in/out breath gradient line), in the series of musical gestures that comprise the piece.

In order to effectively communicate this directionality, a Lachenmann-style symbol-set is used, whereby the performer can see both the movements required of their body, and the parts of the body required for those movements. Highly directional, physically-gestural scores were studied – *Pression* in particular – whose peculiarities for their respective instruments had to be adapted for a vocalist. A modified bridge symbol, such as the one found in *Pression*, allows the performer to see the musical gestures' locus on the cello, with classical note durations (along with a traditional 'left to right, down the page' manner of reading). *to project inwards* does the same. See fig.3 for a comparison.

[94] Foucault trans. Sheridan, p.152.
[95] Ibid.

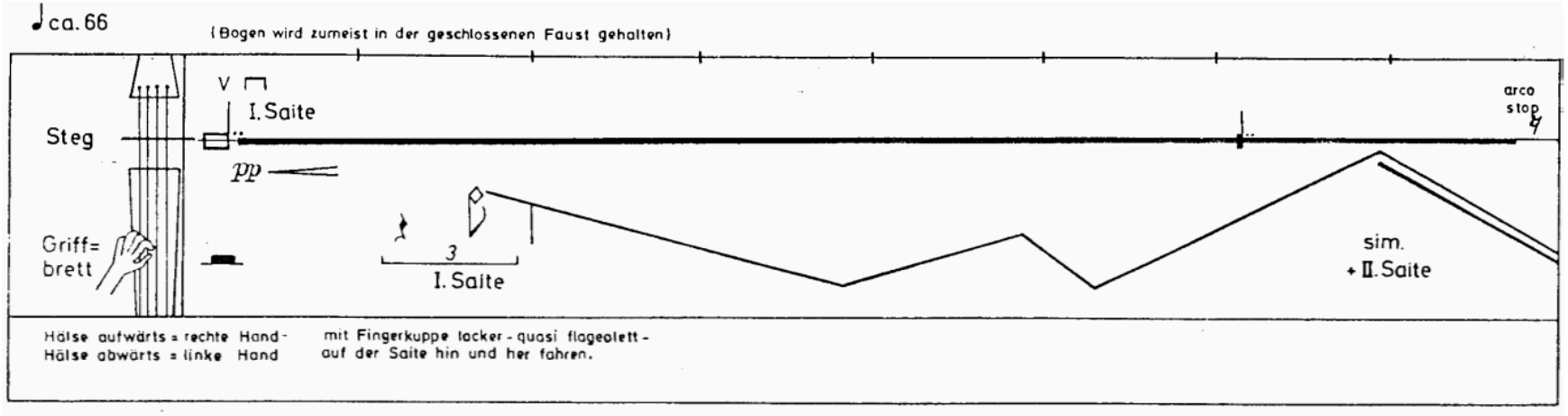
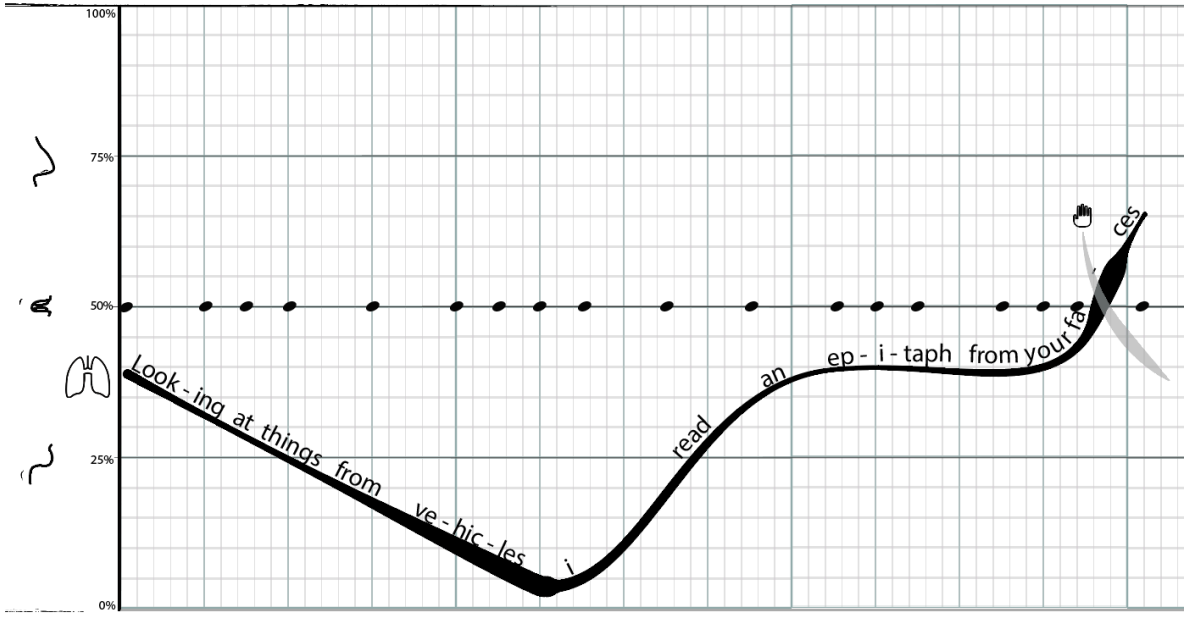


Fig.3. Extracts from *Pression* (top) and *to project inwards* (bottom), showing the similar technique of establishing relative positions of musical gestures by using a symbol describing location.



Whereas the cellist is directed, in the Lachenmann, to execute up- and down-bows with the usual signs (Lachenmann sometimes directing the cellist to change bow ad lib.), the breaths are indicated by a rising and falling grey line, in the area indicated by the pair of lungs in the score. This line, if falling, indicates the breath should be outwards, and vice-versa. This has the effect of further disrupting the singer, and their facility with the lyrical material; the medium of non-standard singing integrates with the musical and lyrical content of the work. Guidelines and lung-filling percentages are given to precisely articulate the level of precision required of the vocalist.

3.1.3. Materials/Structure

The disruption of the vocalist's musical gestures is also imbued in the word-setting. Two companion-poems by the same author are presented, enmeshed, with stems up and down reflecting the poem to which various lyrics belong. The structure of the piece outlines a roughly linear decrease in the clarity with which the lines of the poems are enmeshed, i.e. the piece starts by alternating lines from the poems, but by the end this has broken down to phrases and sometimes individual words. Sharp changes in breath direction, and interference in the mouth from the performer's hands, are also increased as the piece progresses. By the piece's end, the performer should have given themselves over to the Foucauldian temporal elaboration of the act, and thus acquiesced to the power of the piece. This is the metaphorical 'first-species' mapping at play – the piece is a particular expression of aspects of the Foucauldian concept, in a hypothetical environment.

3.1.4. Reflection

Using a score with precisely-measurable diagrammatic elements decreases ambiguity about (for instance) the degree to which the lungs are to be filled at a given point in time, or the shape in which the fingers are to be held. As there is no ambiguity in a temporal elaboration per Foucault, there should be as little as possible in the score. Articulating musical gestures in relation to the musicking body (in the vein of Lachenmann), along a precise time continuum is paramount in eliminating

ambiguity. The use of quantitative measurements achieves this (where graphic approaches would have implied an element of performer interpretation).

As with all music, practice and familiarity have an effect on the piece. However, here, the 'learning curve' might 'flatten' as performers get used to the piece – practice meaning that once-unfamiliar techniques (designed to separate the performer from subconscious, trained processes) lose their intended effect. After all, even though it may not be taught at the conservatoire, wiping a hand over one's face is hardly contortionism. This misses the point, though – if the performer is prone to plotting a course through the piece by 'joining the dots' between familiar, less familiar, and unfamiliar techniques, they are not properly engaged in the temporal elaboration of the act. The piece, at this point, should be abandoned, for as long as it takes for the score to be forgotten. It may be taken up again at such a time when the processes are effective.[96]

[96] Hypothetical future directions could involve writing a constellation of many such pieces, designed to override previous practice, so that there is a constant 'conveyor belt' of new information to the performer.

3.2. i dissociate

3.2.1. Background

This is a piece about the body, and, more specifically, the separation of the violist and their viol into two distinct bodies. The process by which the violist is obliged to play their instrument divorces them from subconscious, entrained processes, and invokes similar questions about bodily autonomy as *to project inwards*, central to this project's theme. It does this by divorcing performer from traditional – more practised – techniques, and placing a high degree of specificity in front of the performer. In so doing, the piece invokes the Foucauldian body-object,[97] and involves the removal of the instrument from that pairing by means of temporal articulation of the act of playing.[98] In doing this, the practiced granular physical movements are disrupted, and the body-object pairing divided.

The piece's materials are a set of historical variations – *folias*.[99] Anchoring the piece in popular 'violistic' material was a way of imbuing the piece with an essence, or an imagined 'inherited characteristic' from the variations' 'DNA'.[100] Therefore, it is useful to conceive of *i dissociate* as a new set of *folias*; where others become increasingly complex as the violist plays through the variations, these become further removed from the Foucauldian 'body-object', player-instrument pairing,[101] through precise temporal elaborations, defined by the exacting score.[102]

What results, then, is the separation of viol and violist. The viol is 'disciplined' towards a new identity. The highly exacting oversight of the violist extracts from the instrument a specific set of outcomes, until the 'undesirable' former identity (that of the historical bowed chordophone) is totally surrendered unto the 'new': a viol reduced to its constituent parts.

Whilst this is not a 'literal' mapping – the viol is not conscious, or imbued with free will – a Foucauldian reading of the piece would not demand a direct, like-for-like metaphor. Foucault himself

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[97] Foucault trans. Sheridan, p.153.
[98] Ibid., p.151.
[99] Specifically, the 'late' *folias*: i V i VII III VII i V; i V i VII III VII i V i. Richard Hudson, 'The Folia Melodies', *Acta Musicologica*, 45 (1973), 98–119 (p.115) <https://doi.org/10.2307/932224> [accessed 12th August].
[100] Especially from the heyday of English playing to the end of the Baroque. Ibid., 98.
[101] Foucault trans. Sheridan, p.153.
[102] Ibid.

was critical of viewing any approach as an all-encompassing theory, understanding a complex patina of applications.[103] This application of a concept to the design of the piece classifies this work as a metaphorical mapping, per table 2.

3.2.2. Score

The score's pitched materials in variations 3-5 act almost as reciting tones, giving only pitch(es) to be held as a musical gesture is executed. These are applied all around the viol, using a numbering system to show the violist which pitch information to apply to a given gesture. In the theme and first variation, rhythm is defined (although the mode of execution introduces imprecision at figure 2). Later, rhythm is derived from the interaction of the body of the player and the body of the instrument, rather than a particular rhythmic pattern or device. This is intentional; it is representative of the divorce between the body and ingrained playing techniques through temporal elaboration.

There are other approaches which do not necessitate the distance between (semi-)traditionally-notated material and musical gesture. Lachenmann's approach in *Pression*, explored in 3.1.2., does not necessitate pitched gestures given its treatment of the cello. Some of Eric Egan's recent work joins musical gestures in space/time to notated material using a graphic link (replacing the need for a numbering system, as used here).[104] Other recent work adds pitch and duration information to Lachenmann-like gestural notation.[105] The work presented in *i dissociate* serves as a precursor to *say you love me / 'you love me'* (3.3.), and both explore explicit application of musical material to a site on an instrument.

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[103] R. A. Lynch, 'Foucault's Theory of Power', in *Michel Foucault: Key Concepts*, ed. by D. Taylor (Durham, UK: Acumen Publishing Ltd., 2011), pp.13–26, pp.15-16.
[104] Eric Egan, *in monochrome* (2017) <https://www.ericsegan.org/in-monochrome> [accessed 1st December 2023].
[105] Arshia Samsaminia, BEYOND THE AUTONOMOUS SENSORY MERIDIAN RESPONSE (YouTube/Incipitsify, 2020) <https://www.youtube.com/watch?v=Bi3s4vCyqm0&ab_channel=incipitsify> [accessed 1st December 2023].

3.2.3. Materials/Structure

The music is arranged into variations, each designed to be progressively more dissociated from an imagined 'prototypical *folia'* (numbered '1' in the score). This is loosely based on the theme as realised by Marin Marais,[106] which itself uses an arch-shaped melodic contour common to many *folias*.[107] See fig.4, below.

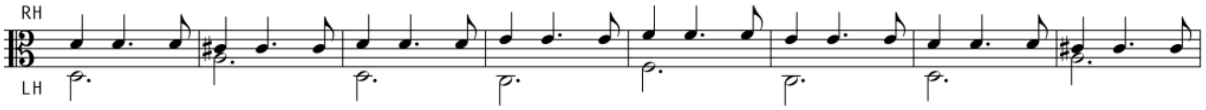

Fig.4. Extract from couplet 1 of *i dissociate*.

'2' is designed to divorce the violist even further from their relationship with their instrument. 'Pinching' of strings together, indicated by the Lachenmannian symbol in fig. 5 is a means of consciously sounding the parts of the string that would *not* usually sound. The sound is generated in two areas: the section between nut and violist's left hand, and the section between violist's right hand and bridge. The rhythms played derive from the first Maraisesque *'folia'*.

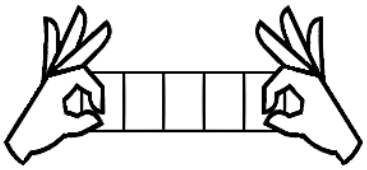

Fig.5. The Lachenmannian 'pinch' symbol in the second *folia*, used to articulate Maraisesque rhythms.

From '3' onwards, the viol is treated as an *independent* body. Echoes of pitched materials (embodied in chord tones of the late *folias*)[108] are quietly depressed (tapped)[109] on the fingerboard, whilst the right hand smears, slips, and squeaks on the varnished wood of the viol's body. The surface

[106] Marin Marais, *Pièces de viole, Livre 2* (Paris: Marais/Marais fils/Henri Foucault, 1701) <https://s9.imslp.org/files/imglnks/usimg/5/58/IMSLP39260-PMLP55706-Marais-PiecesDeViole-Livre-II-Solo.pdf> [accessed 21st August 2023].
[107] 'Tone series 7', according to Hudson (1973), p.98.
[108] Hudson (1973), p.115.
[109] Martin Lawrence Vishnick, 'A Survey of Extended Techniques on the Classical Six-String Guitar with Appended Studies in New Morphological Notation' (City University London, 2014) (273) <https://core.ac.uk/download/29017423.pdf> [accessed 30th May 2024].

of the viol is not normally a locus of sound production; the separation of the viol and its player forces the violist (and ideally listener) to appreciate the physical characteristics of the instrument anew – an *independent* body.

The fourth numbered *folia* is similar to the third, in that it utilises tapping of the left hand, and a right hand technique that is outside of the canon. However, this time, the left hand is similar only in that it stops notes; it is different in the way it does this (with the pad of the thumb, stopping two adjacent strings, with the fingerboard facing the player). The right hand must smear the back of the instrument, according to the paths defined in the graphic score. The hand tracking over the back, periodically slapping and knocking the *folia* rhythms, draws the viewer's eye to the back of the instrument. A case can be made that the instrument is not only metaphorically transformed, but is in fact reclassified – as a struck membranophone with sympathetically-resonating strings.[110]

The fifth *folia* represents a hybridisation of technique, echoing old and projecting new. The 'spidering' motion of the right hand is percussive on the body, but pizzicato-like on the strings. The reasonably traditional stopping in the left hand is certainly a step back towards the 'canon' (similar to a lute or guitar), and so the sonic result, and physical presentation of the viol, are both perhaps more 'conservative' or usual than the previous *folia.* However, this does not represent a step back; the placement of these techniques in the last *folia* is supposed to play on the distance the audience have experienced between usual sound production methods, and the physical identity and role of the viol. It asks whether the audience recognises and welcomes a move back towards established playing techniques and the reunification of violist and instrument as a singular expressive entity, or whether they now perceive the violist and viol as distinct. This is a moment to look back and reflect on the distance travelled since the beginning.

[110] Hornbostel-Sachs classification helps here; the viol (as a bowed chordophone) is usually classified as 321.322-71 (or -5 when plucked). Here, it might be better classified as a hand-rubbed membranophone with sympathetic pitched strings. This suggests a possible notation of 233x321.322+3 (hybridising two formerly-distinct categories with 'x', and adding sympathetic strings with '+'. Regardless of notation or classification, the important point here is that the instrument is changed in the way it is sounded, and also in visual presentation. See Stéphanie Weisser and Maarten Quanten, 'Rethinking Musical Instrument Classification: Towards a Modular Approach to the Hornbostel-Sachs System', *Yearbook for Traditional Music*, 43 (2011), 122–46 (p.126) <https://doi.org/10.5921/yeartradmusi.43.0122> [accessed 8th December 2023].

3.2.4. Reflection

Practically, the setup offered by the violist was very useful in realising a successful recording of the piece.[111] A closeup camera angle, twinned with a contact microphone (attached to the body between bridge and fingerboard) captured fine details of both musical and musical gesture appropriate to the intimate scale and performance of the piece. Furthermore, as the body of the instrument was not being excited in the same way as it would have been, under normal playing conditions, the addition of the contact microphone allowed for more sensitive articulation and careful gradation of the musical gestures. This was a welcome suggestion from the performer; without the microphone, the sonic result of the musical gestures were largely 'on' or 'off', in terms of dynamics (the swells in the middle of gestures in part '3', for instance, were harder to articulate carefully without amplification).

The prising apart of violist and viol is key to the work, and it is for this reason the small 'tuck' back towards more typical playing techniques was written in the fifth *folia*. The journey here is comparatively linear, so as to support the moment for reflection at the end. A similar final result is found in Cassidy's *String Quartet* (2002). Specifically, Cassidy's work expresses an unpredictability of sonic outcome due to highly focussed physical gesturing – but his 'journey' to this result is different. Cassidy totally immerses the performers in a disconcerting hubbub of gesturing (refracted through physical transpositions) to dissociate them from their more usual modes of playing,[112] whereas *i dissociate* is graduated to invite reflection on the degree of dissociation.

It should be noted that the performer did not follow all of the instructions, taking instead a more improvisational route (around the different parts of the instrument described by the coloured lines, especially).

[111] However, as highlighted in table 1, the violist diverged significantly from the score. The overall effect is roughly as intended; the gestures are not similar to those expressed in the score.
[112] Cassidy, Aaron, 'String Quartet', Aaroncassidy.com <https://aaroncassidy.com/product/string-quartet/> [accessed 14th November 2024].

3.3. Say you love me / “You love me”

3.3.1. Background

This piece is designed in a similar vein to later works (such as *contingency* and *Three Head God*), in that it explores relationality. The copying of musical gestures by both players is metaphorical of a shared, somewhat empathetic experience between two people - as if they were copying (consciously or unconsciously) communicative gestures. Where one player must play the prescribed musical gestures, the other must copy afterwards – however, both are holding different ends of the same bow. Therefore, there is always an element of direction imbued in the musical gestures by whomever is *not* playing them (as they are literally attached to the instrument, altering its ‘playability’).

The violin is the physical embodiment of the power gradient between the two players. This is the quasi-literal mapping of the concept – a near-fight over the bow and the link that constitutes the violin is certainly a highly physical metaphor for their relationality. One player plays normally, the other interacts with the instrument and bow upside-down (from their point of view); critically, although they play the *same* gestural material, it is applied to the instrument completely differently. This makes playing the piece extremely difficult for one of the players – the other player is impeded also, but has the advantage that the instrument and bow are held normally, and so exert greater power in the couple.

The second half of the piece requires the ‘less’ powerful, reversed violinist to play musical gestures, followed by the ‘normal’ violinist’s copies. In this role-reversal, some power is given back to the disenfranchised musician, but theirs is always a losing battle. Even in copying their gestures, the violinist playing the instrument the ‘right way up’ is still more empowered than the other. This resentful acceptance on the part of the ‘inverted’ performer is the angle from which the piece was written.

3.3.2. Score/Materials/Structure

The score uses pitched material focussed around the open G string of the violin, and harmonics from it, or notes of the G major triad. These form the fundamental musical gestures on which the process of the piece is built, which are passed back and forth along the 'continuum' of the violin. Generally these follow an arch shape (from less complex and convoluted, to more fractured and shrouded, and back again). In the middle of the piece (i.e. after the eighth musical gesture) there is a 'mirror', meaning that gestures 9-16 must be led by the second violinist, and copied by the first. The musical gestures are also mirrored somewhat; simple, single harmonics are explored at either end of the piece, whereas more complex, fluttering musical gestures are present at the centre. This is supposed to give the arch form more energy in the middle, emphasising the change in 'leading' violinist.

Furthermore, as well as having more directional and temporal energy (meaning that there is greater distance travelled from one pitch to others, with shorter durations between sound objects),[113] the musical gestures are also harder for *both* violinists to *physically* execute, given their sharing of the instrument. In laying difficult musical gestures next to a difficult physical setup, there is ample space made for inference about the relationship between the two nodes – instrumentalists – and the metaphorising power of the piece is primed.

The score uses Lachenmann-style markings at either side of the page (a stylised violin fingerboard/string/bridge configuration), to indicate the *y* position of the bow. The bow must be pushed and pulled according to the *x* position of the grey lines, with the leading violinist playing the notated material at the start of the line (i.e. at the relative 'frog' of the bow), and finishing at the point of the bow, at the end of the line. This is in a similar vein to *to project inwards* and *i dissociate*, but this time the object is not temporal elaboration. Instead, the decision here is purely practical: the grey lines demand that the violinists explore the whole length of the vibrating string, in a way that writing 'molto sul pont', 'molto sul tasto', and so on, could not communicate.

[113] Sound objects as in the sub-gestural sounds according to Roads (2001), p.3. A 'long' sound object would be found at either end of the piece, with shorter ones (the rapidly-trilling gestures) at the centre.

3.3.3. Reflection

A result from the workshop of the piece was that the musical gestures are extremely difficult to realise by the supplicant violinist, whereas the dominant one has almost complete control. This is not undesirable from a composer's point of view; it may be for performers, depending on the violinists. However, the piece was written for a couple, and indeed, written with this closeness in mind. Practically, though, this difficulty led to quite 'choppy' changeovers of playing/copying musical gestures between the violinists; having the two playing on the same string, and imitating in real-time could be an avenue to explore, to avoid memory errors or changeover ambiguities obstructing the intentions of the piece. As it stands, the piece has a pleasing frailty; a begrudging, turn-taking courtesy is awkwardly alighted upon by the partnered violinists, indicative of the enforced imbalance between the two nodes.

3.3.4. i loved you when you loved me

Say you love me / "you love me" started life as another piece – *i loved you when you loved me* – whose design was similar. Two cellists, facing each other, had to copy each others' musical gestures as if sitting at a mirror. This piece was difficult, as it required some imagination on the parts of the cellists – playing is not mirrored when two instrumentalists sit opposite each other. Therefore the cellists had to imagine they were holding two ends of the same bow. Not impossible, but not without a certain disconnect, which undermined the connection between the players as nodes of a network.

The pitched materials in *i loved you* [...] are only notated on the first page, and then the players are instructed to improvise on previously-played material. This is for two reasons – firstly, it is supposed to encourage the players to be more aware of each other, by not giving them notated materials to draw their focus. Secondly, it is also intended that the improvisatory element, alongside the players copying each other's movements, might incline them to copy materials from each other as well.

Reflection on the piece led to the recognition of certain difficulties, principally in understanding the hurdles the players would have to overcome in realising an effective performance.

Firstly, the cello as it is traditionally played (with the head passing over the cellist's left shoulder, and the bow appearing asymmetric as it is drawn across the strings, frog-in-hand) did not present the opposing player with an image they could perfectly mirror. This is addressed in *Say you love me* [...] by the placing of the violin between the players. The problem of the plane of symmetry required by *i loved you* [...] (the vertical) is therefore negated by the approximately horizontal plane of the violin strings. Indeed, when redesigning the piece for violin, it was thought to instruct the performers to play their instruments on their knees – in this way, at least the problem of the instrument's neck having to pass over the shoulder (as occurred in *i loved you* [...] with the cellists) would not present itself. On reassessing this plan, the solution of the plane of symmetry occurred, and the opportunity to have the violinists use the same bow and strings was a more direct, physically-connected (and therefore more appealing) application of the metaphor of the continuum the players share.

Additionally, the abrupt removal of notated (in favour of improvised) material in *i loved you* [...] was not a particularly elegant solution to the question of how to get the players to focus on the physicality of their opposite number. The idea was that their focus would shift from notes to players' musical gestures, but this shift was not guaranteed, nor was it something that a composer can control. The sharing of the bow in *Say you love me* [...] comes at this issue from another direction: that it is the other player being on the other end of the bow that will constantly interfere with the first player's bowing, and vice-versa, which will cause a constant and unpredictable distraction. The composer can control this much more tightly, in that they only have to know two things: that making another person hold a violinist's bow will have a distracting effect, and that this effect is unpredictable in its timing. In these ways, whilst the pieces are related, *Say you love me* [...] offers a more direct and controllable musical environment in which to explore players' relative autonomies than is created in *i loved you* [...].

i loved you [...] is presented in appendix 6.A., as it is not a 'standalone piece' but rather one from which *say you love me* [...] grew. It has no recording.

3.4. 5 TENSe minutes

3.4.1. Background

The development of the internet, and especially the 'internet of things', has expanded our means of creating networks immensely; it is possible to communicate with somebody on the other side of the world instantly, or to manipulate AI devices verbally. This opens new channels of control – a novel device (or device applied in a novel way) can act as a mode to influence behaviour or gather information. The price of convenience is information; one's autonomy, in relation to 'smart' technology, is reevaluated.[114]

Exploring this dimension through the literal application of technology to the body is the aim of *5 TENSe Minutes* (hence the quasi-literal application of the idea articulated, per table 1). It follows the work of artists such as Stelarc, whose body has been the site of exploration of machine and electrical manipulation (by a range of devices).[115] In the same sense that Stelarc's works explore the limits of the body (often in relation to technology),[116] this work limits the body to explore autonomy. Its application of electricity to sites on the body is similar to the work of Dani Ploeger; where the body controls electrodes (and thereby musical synthesis) in his work,[117] in *5 TENSe Minutes*, the electrodes override and control the body, and thereby the music.

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[114] Jathan Sadowski, Yolande Strengers and Jenny Kennedy, 'More Work for Big Mother: Revaluing Care and Control in Smart Homes', Environment & Planning A, 2021, <https://doi.org/10.1177/0308518x211022366> [accessed 9th November 2023].

[115] Stelarc, 'Zombies, Cyborgs and Chimeras', in *Modified*, ed. by Chris Hables Gray, Heidi J. Figueroa-Sarriera, and Steven Mentor (Abingdon, Oxon. UK: Routledge, 2020), pp.225–39 (p.225) <https://doi.org/10.4324/9781351107839-29> [accessed 9th November 2023].

[116] Eyal Amiran, 'Proprioception of the Hand: Stelarc's Object-Oriented Relations', *TDR/The Drama Review*, 63 (2019), 102–16 (p.103) <https://doi.org/10.1162/dram_a_00837> [accessed 2nd January 2024].

[117] Ploeger, Daniël, 'Sounds Like Superman? On the Representation of Bodies in Biosignal Performance', Interference: A Journal of Audio Culture, 1 (2011) <http://www.interferencejournal.org/wp-content/uploads/2011/09/Interference-Journal-Issue-1-Sounds-Like-Superman.pdf> [accessed 29th November 2023].

3.4.2. Score/Materials/Structure

Five TENSe Minutes... is a text piece. The original instructions are given below (since revised; see score reproduced in section 7).

Set the laptop, running video delay software, facing you (on a low stand, box, or on the floor). It should be far enough away from you that the audience can see your cello/bow, but close enough that you can see at least the movements of the wrist on the screen. Set the delay on the software at c.10 seconds. Attach the two pads of a TENS machine on the outside forearm of your bow-arm. It should be a TENS machine equipped to deliver a preprogrammed pattern of shocks, for a set duration. Select one programme, and initiate it. The piece has now started.

Timing your stroke to the beginning of a video loop on the laptop, play an open C lasting c.10 seconds – the duration of a video loop. When the first of these loops is over, the video will replay the gesture that you have just made. You must copy it. You must copy the successive loops, including any imperfections introduced by the shocks, for the duration of the TENS programme. You will know the piece is over when the pain stops.

No matter what decisions the cellist makes in executing it, the first musical gesture is artificially distorted and disrupted, as the muscles in the cellist's arm are subjected to repeated/short and sustained shocks from a TENS machine, alternately (each of which is rather painful, the longer shock more so). The machine delivers the short, repeated shocks at such a frequency that, not only are the muscles in the cellist's arm forced to contract (in such a way that they lift their bow from the string), they do so at a rate quicker than they would have been able to achieve 'organically' (without the machine's interference). The longer shocks, by contrast, keep the muscles in the forearm contracted, so that the cellist may not bow with traditional technique. The jittering bowstroke is a result of the short shocks, and is not an artificial introduction from the cellist.

Instead of a philosophical concept, exploited by the composer to control the body, the TENS machine (embodying machine interference) is foregrounded. In a sense, then, the shock regime is part

of the materials, as the resultant sounds depend as much on the machine as they do on the text score. What matters is not the precise pattern of shocks (or the rhythmic impulses these generate); simply introducing the disruption through electrical stimulation, muscular tension, and pain tolerance is the object here, and the TENS machine provides an effective vehicle for doing so. The physicality of the performance (i.e. its chaotic physical, electronic, and visual elements, and the arising sonic output) are the foci of *5 TENSe minutes* for the performer. The "sound-outcome is not simply a by-product of playing the instrument, but brings the player into recursive engagement with materiality",[118] and thereby an exploration of "indeterminacy that can emerge from this physicality and its processes of interplay."[119]

3.4.3. Reflection

Early performances of the piece were conducted over networked video calls. This introduces another layer of technological interference. This provides two possible opportunities for reflection. The first is a basic point about whether the artist should be responsible for this technological interference – after all, it is necessitated by the performing environment, and it has a sonic effect. Reflecting on the outcomes from these online performances, though, the piece inhabits these spaces well. Introducing technological interference and relinquishing most of the control of the precise sonic result is a purpose of the piece; it misses the point of the piece to attempt to delineate between different 'species' of interference as desirable or undesirable, or composer/technology-invoked.

Secondly, as the interference introduced by the networked video-calling technology is somewhat parallel to the 'video-delay-software-plus-TENS-machine' setup of the piece, it immediately spawned a follow-up piece. That piece placed a cellist at either end of a video call, and asked them to mimic each others' communicative/extramusical *and* musical gestures (through copying visual and audio data, respectively, transmitted by the video call software). This generated a much more gentle decay, as neither cellist was compelled to move by anything other than this mimicking reciprocity (there was no electro-nervous stimulation). This was not as gratifying as *5*

[118] Scott McLaughlin, 'On Material Indeterminacy', Contemporary Music Review, 41 (2022), 216–33 (p.220) <https://doi.org/10.1080/07494467.2022.2080456> [accessed 22nd June 2024].
[119] Ibid. (p.216).

TENSe Minutes, either to perform or to watch, and was flawed for a few reasons. Firstly, it is more inconvenient than invasive; the piece presented here is actively painful.[120] Secondly, there is only a degree to which one can become habituated to the TENS machine;[121] unless very specific conditions are realised on a video call,[122] it appears as if the cellists are mimicking *each other*, and not any latency/'glitchiness' from the video call software.

[120] There was little 'schadenfreude' in this study, where there might be in *5 TENSe Minutes*…
[121] MI Johnson, CH Ashton and JW Thompson, 'An In-Depth Study of Long-Term Users of Transcutaneous Electrical Nerve Stimulation (TENS). Implications for Clinical Use of TENS', Pain, 44 (1991), 221–29 (p.221) <https://doi.org/10.1016/0304-3959(91)90089-g> [accessed 29th November 2023].
[122] Such as artefacts incurred by compression; Mei-Yin Shen and CC Jay Kuo, 'Review of Postprocessing Techniques for Compression Artifact Removal', Journal of Visual Communication and Image Representation, 9 (1998), 2–14 <https://doi.org/10.1006/jvci.1997.0378> [accessed 6th December 2023].

3.5. contingency

3.5.1. Background

contingency was borne of a desire to write a piece in which two instruments share a dependency in fully realising their shared musical gestures. Metaphorically, the piece maps a relationship in which agents rely on one another for a shared, mutually-derived identity. However, another narrative soon emerges. A dominant trombone exhorts whispered tones from a supplicant timpano, the trombone's utterances literally resonating through the drum, which acts as a vessel for the reverberating remnants of its musical gestures.

Such dependence and dominance imbues the two nodes of the social network with power; as the relative power of the nodes is different, the gradient of the continuum between them is unequal. The timpano is the instrument which can more easily be affected by the other, and it is for this reason that it was chosen for the submissive role. What is significant here is the context of that submission; the moments of 'rebellion' often form structural or expressive high-points in the piece, and these are explored more in 3.5.3. As such, more specifically than social networks and power structures, this is a piece about imbalance.

3.5.2. Score

Durations, pitches, and dynamics are all able to be realised in standard staff notation, with a few exceptions. Some require a departure from staff notation are depicted as such because they depict a glissando, with rhythmic impulses along its length at microtones (bb.17-18). As such, individual noteheads other than start and destination tones are omitted in favour of the glissando. The final bar, a quasi-coda, involves arrhythmic impulses from the trombone, designed to be played at temporal intervals such that the sympathetic vibrations from the timpano are maintained. As this is dependent on the performer's perception, this is explained textually in the score.

3.5.3. Materials/Structure

The piece is broadly narrative, and follows an approximate arch. The timpano enjoys brief flickers of freedom in its *normale* notes, in bb.30, 33, 39-40, and 50. Specifically in the latter third of the piece, this is a narrative device, designed to indicate a subtle rebellion against the ignorant trombone. The trombone's material responds, both harmonically (in the open major chords, bb.39-40), and in playing more musical gestures touching the skin of the drum. It is as if the instruments come to inhabit each other, rather than compelling/being compelled, as in the first two thirds of the piece.

Pitch materials are often derived from the harmonic overtone series (albeit using standard – as opposed to just – tuning). Usually, a trombone note will be chosen to excite an overtone in the timpano (for example, the notes in bb.5, 11, & 28). Equally as often, though, the timpano exhibits a desire to break away from its sympathetic vibrations at harmonic nodes (such as the passage bb.19-29). This is not fully realised, from a narrative standpoint (as the drum is still compelled to 'speak' by the trombone), but nonetheless signals the eventual reconciliation of the instruments, beginning around the A major chord in b.40. Indeed, in a sense, this reconciliation is carried forward into harmonic material from bb.40-50. Considering the A major chord as II of G major, there is a sense of a II-V-I progression (those chords belonging to bb.39-41, 43-45.2, and 45.3-50 respectively).

The final exploration of the relationship between instruments is designed to illustrate the 'death' of the percussionist's material, and the eventual extraction of the last whispers from the timpano by the trombone. The timpani plays one final impulse, as loudly as possible, and the trombone must 'top up' the sound from the timpano as it dies, in an attempt to keep the sympathetic vibrations resonating for as long as possible. This will require the trombonist to play louder and longer notes as the drum head resonates less and less, until the trombone is the sole source of vibration for the timpano (as opposed to the initial strike from the timpanist)."[123] Narratively speaking, it is designed to be the first (and last) point at which the trombone is dictated to by the drum.

[123] From the text at b.50 in the score.

3.5.4. Reflection

Feedback from a workshop on the piece focussed around the efficacy of the sympathetic vibration from the timpano. The pitch material in the percussion instrument was only sometimes excited correctly by the trombone, and this led to occasions where the performers were unsure that the sonic result was desired, given the specific pitches and durations given in the score. However, the performance illuminated a pleasing landscape of resonances and sympathetic vibrations, which 'bloomed' quite organically, corralled somewhat by the percussionist. This led to a much less 'corseted' performance than the score implies, and the drum (seemingly sounding on its own) did embody an identity distinct from that of its player – this was the intention all along. The player, therefore, had to moderate their impulses (from fingertips or mallet), the intention being that they were congruent with the sympathetic musical gestures. This change was made to performance notes.

3.6. Three Head God

3.6.1. Background

This is a piece about surveillance, and seeing oneself in another. Specifically, three players must observe one another, and play material when observing an act (such as breathing or moving, or – in the case of the third player – when they notice that their attention has wandered from the note they are playing). The application of surveillance is only quasi-literal, per table 2, however, as the piece only applies the basic principles of modern surveillance to its subjects (it does not record images, for instance). It keeps its methods a secret from the players, to ensure the players do not know that they are themselves being observed, and thereby controls the observer-expectancy effect somewhat.[124] Therefore, the piece is naturally imbued with elements contingent on bodily acts (breathing, blinking, attention holding). At its core, though, a link is drawn between bodily autonomy and surveillance by requiring players to surveil others or themselves.[125]

Of course, an audience has no way of knowing the design of the piece from one listening, and the instructions dictate that the players are subtle in their observations. This was always the intention; the piece is a closed system, just for the players, and the audience can only speculate on its mechanisms. This intentional lack of transparency removes analytical tools from the audience's grasp (listening for recapitulated material, or formal signifiers such as tonic/dominant relationships, modulations and so on). This fosters a sense of privacy that mirrors the increased autonomy of a surveilled body when its actions remain hidden.

[124] This is not a scientific experiment – and, reflecting on the setup, a little curiosity or scepticism on the part of the players adds a certain frisson to the piece. It also helps that this is close to a 'double blind' setup; the participants do not know the true design of the piece, and do not know what is being observed about them – or even *that* they are being observed, necessarily (although they might speculate).

[125] Dorota Mokrosinska, 'Privacy and Autonomy: On Some Misconceptions Concerning the Political Dimensions of Privacy', Law and Philosophy, 37 (2018), 117–43 (p.118) <https://doi.org/10.1007/s10982-017-9307-3> [accessed 22nd December 2023].

3.6.2. Score/Materials/Structure

This is primarily a text score, with only basic pitch materials given using staff notation, and basic shaping instructions given about those pitch materials. The structure is shaped somewhat by mandated breaks on the part of the third player, and another player is given two groups of material to move between based on these breaks, but otherwise all sounds (and perceived form arising from these sounds) is coincidental. That is not to say the piece is totally chance-based, in that there is an element of regularity included in the design (as there is a degree of regularity in blinking and breathing). However, the effect generated *appears* irregular all the same, as if the sound events are not triggered by a recurring cycle or similar device; this is desirable, because of the resulting obfuscation from the audience described above.

To tame some of this irregular appearance, the piece speaks a relatively peaceful, consonant language. Broadly, the second instrumentalist functions as the key-giver, playing notes from two pitch-sets. These were chosen to sit easily astride F major and C major, but to include elements of each in both sets, so that any tonic/dominant relationship was fleeting, softened, or undermined. The fluid stream of notes from the other two instrumentalists, in a tenor/alto range, only gives a very wavering sense of key – it is better to conceive of the piece as a consonant cloud of notes, rather than one which has a strict tonal or post-tonal organisation.

3.6.3. Reflection

The case of the third player – who is not observing another, but who is mandated to maintain as much attention as possible on their own material – is a curious one. There is an aspect of surveillance investigated, albeit by 'negative attention'.[126] For this third performer, knowing that they must *not* pay attention to the material of the other two generates a kind of secrecy; a 'wanting to look', or to touch the thing that is protected by a 'do not touch' sign.[127] This was noted after the first

[126] Ronald Gallimore, Roland G Tharp and Bryan Kemp, 'Positive Reinforcing Function of "Negative Attention"', Journal of Experimental Child Psychology, 8 (1969), 140–46 (p.140) <https://doi.org/10.1016/0022-0965(69)90035-6> [accessed 22nd December 2023.
[127] See 'Do Not Touch' by Christian Moeller, for instance. Christian Moeller, Do Not Touch (Science Museum: London, UK, 2004) <https://christianmoeller.com/Do-Not-Touch> [accessed 22nd December 2023].

performance, and – although it is a coincidence – is a desirable trait. It was not considered when writing the piece, however.

Practically, picking up on minute movements may not be possible by all players. There is also the question of physicality when playing (and when performing, for that matter, rather than 'just' rehearsing) – some performers noted that others breathe or blink very differently when playing, or that they could not see these actions because of performance lighting or staging. This was accounted for in a revision to the score, allowing a quasi-improvisando element when detecting another player's movements. This sparks interesting thoughts about reliability of surveillance, of witnesses, and so on – but these are not within the scope of this piece. Even given this consideration, the piece still requires intense concentration on the part of one player, and observation on the part of the other two, and is therefore successful in its overall aims.

The piece is, by design, very static – this is desirable, as it is a relatively short, self-contained piece, but it does ask questions about what the piece 'does'. Should it progress, or develop the roles of the nodes, or follow an arch-form as some of the other pieces do? The answer here is a firm 'no', from a compositional point of view. The stillness throughout the piece encourages reflection on what else, other than formal or motivic action, might be the driver of the music. This foregrounds the players over and above 'traditional' Western Classical ideas of musical hierarchies.

3.7. Fabric Seas

3.7.1. Background

'Fabric Seas' is a microtonal piece for chamber orchestra (with some modern additions: the superball cymbal, vibraphone, and mellotron). By using phenomena in perception of pitch as a metaphor for an individual's assessment of their own understanding, this piece comments on the tendency for humans to assume that we understand something more than we actually do.[128]

The piece is a reaction to, or uses techniques from, microtonal works of other composers in the field, but particularly *Gradients of Detail*, by Chiyoko Szlavnics. It is supposed to deceive the audience, at least in the first instance, by hiding a change in pitch. Later on, however, it aims to draw attention to its earlier deception, and make the audience question the reliability or validity of their own pitch-detecting faculties. It is a piece designed to explore the phenomenon of 'just noticeable difference' (JND), specifically regarding pitch movement. JND is "[t]he smallest difference between two stimuli that can be reliably detected."[129] Whilst not an inherently scientific examination of the subject, the piece seeks to exploit the psychoacoustic principles nonetheless.[130] This categorises it as a quasi-literal mapping, per table 1.

3.7.2. Materials/Structure

For the first half of the piece's duration, the listener is guided through just intervals, played against a gradually-rising fundamental. The rising pitch is designed to ascend at such a rate that it is not noticeable to the listener. This is then disrupted, in the second half of the piece; the pitch rises more

[128] This is known as 'the illusion of explanatory depth'; Leonid Rozenblit and Frank Keil, 'The Misunderstood Limits of Folk Science: An Illusion of Explanatory Depth', Cognitive Science, 26 (2002), 521–62 <https://doi.org/10.1207/s15516709cog2605_1> [accessed 28th August 2023].
[129] Sam MS N., 'JUST NOTICEABLE DIFFERENCE (JND; Differential or Difference Threshold)', Psychology Dictionary, 2018 <https://psychologydictionary.org/just-noticeable-difference-jnd-differential-or-difference-threshold> [accessed 25th August 2023].
[130] Whilst researching this phenomenon, I came across the concept of 'change blindness' (the idea that, if presented with other, disruptive stimuli, a witness might not notice certain details changing between viewings of an original stimulus). The exploration of this phenomenon was not the intention of this composition – it is probable that it will have an effect. Scrutiny of this effect, though, is not included in this analysis; as the phenomena examined are only tools for the overall compositional effort, other, coincidentally-aligned phenomena cannot be considered retrospectively or speculatively.

quickly, and beating is deliberately more prominent (both through prolonged playing of close pitches, and through the increased use of sine tones doubling these close pitches). Overall, then, the piece seeks to explore two things: whether its listeners notice the rising pitch, and if so, at what point it becomes detectable.

The strings are given the role of the chief 'vehicle' of the movable fundamental, for the first half of the piece. Their tuning moves from -50¢ to +50¢ at a constant rate (which is described henceforth as a 'pitch-sweep'). They are supported by sine waves, but these are designed to be essentially inaudible, until 10'00" (halfway), at which point they take on equal footing with the strings, in order to highlight the moving fundamental, to bring it to the listener's attention. In order to keep the strings in tune with the sine wave, the players are all given in-ear recordings of the sine wave with which they should play. The strings are given small musical gestures (described in more detail in 3.7.3.) to cover up their moving pitch.

Two sine tones are played by two tracks in Logic Pro X (therefore requiring a laptop). They are pre-recorded. However, the application will also be used for its virtual instrument 'vintage mellotron', which will be played live with a MIDI keyboard. Both sine tones and the mellotron have their tuning pre-automated according to specific timestamps in the Logic file. As such, the performer responsible for the mellotron should direct the start of the piece (and they may choose to indicate other timestamps, if the ensemble wishes), as they control Logic. The mellotron is set up as follows (see fig.6), and is designed to blend well with the strings in particular. This is so that, especially at lower dynamics, it cannot necessarily be distinguished from the strings, whilst offering more precise and automated functionality, leading to a convincing (and therefore less detectable) execution of the pitch-sweep.[131]

[131] Eric Dahlin, 'Are Robots Stealing Our Jobs?', Socius : Sociological Research for a Dynamic World, 5 (2019), <https://doi.org/10.1177/2378023119846249> [accessed 19th April 2022].

Fig.6. Settings for Logic Pro X's virtual instrument, 'Vintage Mellotron', which emulates the tape-based instrument. A string setting ('3 Violins') is selected to blend with the real string instruments in the orchestra, whilst a choral sample is also selected to add an airy timbre to the sound. The violin sample (sound A) is favoured, as indicated by the 'blend' knob, showing a c.60% bias against the choral sample (sound B). The tone knob is adjusted to control the higher frequencies, so that the instrument is not so apparent when placed in context in the texture. A tremolo effect is occasionally applied to this virtual instrument; quite different from a string instrument's tremolo, this common guitar/synthesiser effect 'ducks' the volume of the instrument at user-defined intervals. For instance, around 3'00", the effect is sped up rapidly, to mimic beating; actually, it masks beating in other instruments, adding to the confusing sonic palette.

In essence, the piece is binary in nature. The first half explores just intervals, created by the moving string fundamental. The exploration of the just intervals is most intense around the middle of the first section, as they occur in a 33-cent range when compared with an equal tempered note (therefore leaving the extremes of the string pitch-sweep free from just intervals, between -17¢ to +16¢; see fig.7 below). This gives the middle of the first half of the piece a burgeoning turbulence.

Fig.7. A graph showing the difference between equal temperament and just intonation.[132] Just intervals are given as '0', whereas the bars indicate the difference in cents between them and the equivalent equal-tempered pitch.

A linear glissando, from -50¢ to +50¢ is carried out by the strings (those cent indications being relative to the notes indicated in the score). This is the 'pitch-sweep'. The various just intervals are created by the strings moving into the 'just' pitch, and other select instruments playing the desired just interval. For instance, the majority of the string material in the first half is centred on G4; when the strings play at 378Hz (i.e. -14¢ from the equal-tempered G4, usually c.392Hz), the just major third above it is sounded (being a B).

The second half of the piece, designed to make the rise in fundamental pitch more noticeable, does away with the linear raising of the fundamental, instead demonstrating movement mapped to expressions of cubic and cube-root functions[133] (see fig.8, below). This is for two reasons: firstly, to generate a sense of development in the piece. By design, the first half is very static, and the rate of change in macroscopic pitch material is very slow; the pitch-sweep takes a full ten minutes to traverse a semitone. Secondly, by expressing rapid changes in tuning (and therefore similarly rapidly-changing beating patterns between close pitches), this section brings to light the fact that the fundamental pitch is changing at all.

The second half is less concerned with the introduction of just intervals against an ever-changing fundamental. In fact, there is no regular system of tuning governing the introduction of

[132] Alex Yoder, (2014) "Equal Temperament Intonation Reference", https://www.alexyoder.net/blog/equal-temperament-intonation-reference [accessed 18th April 2022].
[133] That these are not used to express the functions so that they can be 'heard', as a 'pure' sonification might attempt; the functions, and their sonic results, are used solely for differentiation from the linear pitch-sweep in the first half of the piece. They also create rapidly-changing beating patterns, as described in the figure caption.

chords – as they move away from just intonation, the introduction of tones focusses more around the 'hourly' cymbal strikes. The pitch of different instruments is constantly (but irregularly) moving in relation to others, a part of which is shown in fig.9. As discussed below, the rate of change of these pitches is rapidly increased (and indeed increases constantly over the course of the second half of the piece). This means that, whilst just or equal-tempered intervals might be passed through coincidentally, this veneer of perfect intervals evaporates, giving in instead to the overall thrust of the rising pitch (designed, in turn, to bring this rise to the listener's attention).

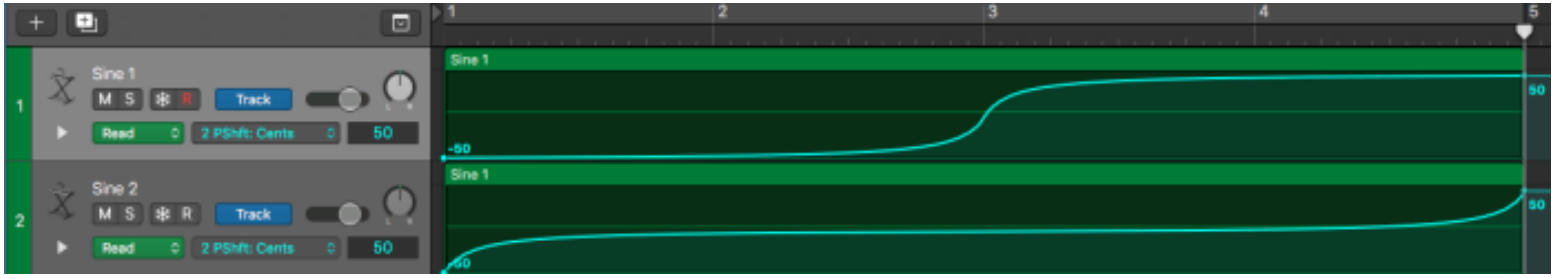

Fig.8. Indicating the functions by which the pitches of two sine waves are altered. Both are playing a G4; the blue line indicates the difference in cents from the equal-tempered note over a four-bar period. Sine 1 plays a pitch proportional to a graphic representation of a cube-root graph; sine 2 plays the same, for a cubic graph. This creates periods of intense but short-lived beating at the beginning, middle, and end of the four bars (i.e. when both lines, and therefore both pitches, are closest to one another in value). N.B. This is a simplified analogue of a much longer (and, because of the limitations of the software, less visible) musical gesture.

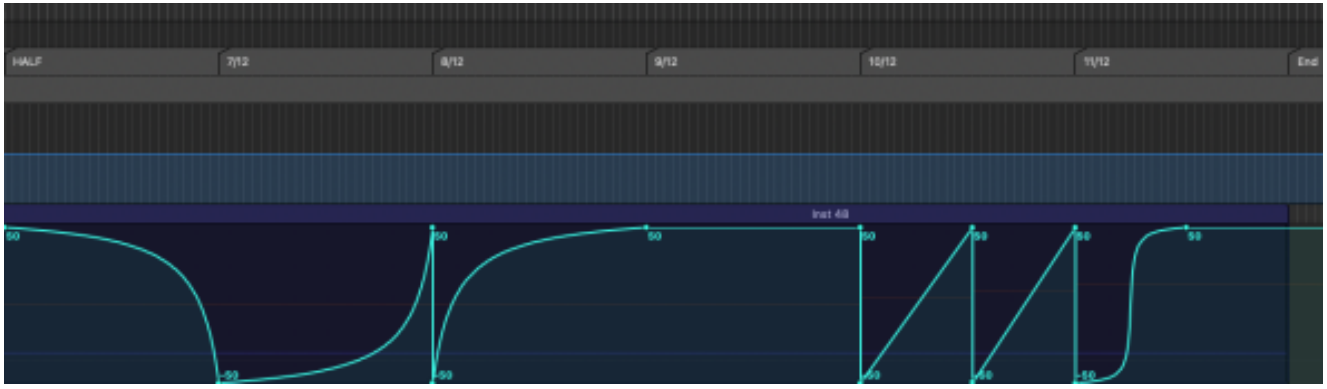

Fig.9. A contextual example of the more rapidly-changing microtonal movement of sine tones in the second half of the piece. Note the evenly-spaced 'hours', indicated by twelfths. This is only one sine tone – the movement represented in fig.8 forms the basis of the musical gesture at 11/12. Throughout the section at 10/12, the sine tone is also being raised by a semitone, at the time that the cents drop sharply from +50¢ to -50¢. This is to enable the sine tone to rise continuously (and smoothly); it actually ascends by 3 semitones between 10/12 and 11/12 (visible in the faint brown line, roughly halfway down the selected track). This is brought about by the limitations of the software – the automation responsible for adjusting the sine tone microtonally only has a range of ±50¢, so it is necessary to shift the whole fundamental up a semitone and bring the microtonal automation back down to -50¢ if the user wishes to continue the ascent.

The JND for frequency (when two pitches are not played simultaneously, causing beating) is about 3Hz for the microtones around the fundamental G4 on which the first half of the piece is based. This means that, where two tones are played in succession (but separately), differing by 3Hz, listeners would be expected to notice a difference more often than not, on average. Naturally, given that the pitch-sweep is continuous (and therefore two different pitches are not presented simultaneously), the intention is that the JND-threshold would not be reached for most listeners. Besides, only 9¢ are covered in the first minute of the piece; whilst there is no direct mathematical function to translate between cents and Hertz, this rate of change in the pitch-sweep is nonetheless well below the expected JND, and should therefore be undetectable to most listeners. What will be detected in the first half is beating, whether that is between sine tones, sine tones and instruments, or between instruments alone. This does not undo the premise of the piece – whilst a listener might hear that the piece is microtonal, the upwards trajectory of the pitch-sweep is still disguised.

Structural proportions (at each twelfth of the piece's duration – the piece's 'hours') are marked by cymbal 'clock-strikes', played with a superball, with the central cymbal strike (at 10'00") given special prominence, to usher in the second (more turbulent) half of the piece. As the just intervals do not fall on any of the twelve strikes, a kind of irrational pattern is formed between the cymbal and the non-stringed instruments.

Although calling these sections 'hours' and using the clock-related nomenclature of 'strikes' to refer to the cymbal sounds delineating them, there is also a perceptual point to be made here – specifically that, whilst they are all entirely equal, the audience may not perceive the durations of the 'hours' as such. As the amount of new material introduced changes (for instance, the relative frequency of new just intervals being sounded around the middle of the first half of the piece), it is likely that this increased activity will gather audience attention, leading to the perception that time is passing slower in these moments.[134]

[134] SW Brown, 'Time and Attention: Review of the Literature', in *Psychology of Time*, ed. S. Grondin (Bingley: Emerald Group Publishing Ltd., 2008), pp. 111–38 <https://link.springer.com/content/pdf/10.3758/APP.72.3.561.pdf> [accessed 19th April 2022].

3.7.3. Score/Reflection

The score was the single most difficult aspect of this piece to get right. This is because of the way the piece was written. Individual tracks were created in Logic Pro X for every single 'real' musician that the piece would require, and these were assigned 'virtual' instrumentalists,[135] to 'play' the music written for them. This is where the major deceit of the piece is focussed: the instruments are *not* playing 'normally-sounded' pitches, but instead a series of musical gestures at the meso scale, to distract from or cover up the macro-formal driver (the pitch glissando). These gestures are sampled in the VSTs used in the Logic file, and transcribing them to quasi-traditional notation was very difficult. This is largely because the spatial notation of the long durations for which the gestures must be performed did not combine well with the short durations of the groups of sound objects, comprising the musical gestures themselves. Essentially, two different time scales had to be notated at once – meso-scale gestures, which then had to be held on to establish macro-scale formal units.

The way around this was to employ notational systems akin to those used by Lutoslawski in works such as *Livre pour Orchestre*, in which musical gestures are only initiated by a conductor, who then leaves instrumentalists to execute the musical gestures *ad lib.,* until a defined stop-point given in the score (often given by seconds, but also from lengths of horizontal lines).

3.7.4. Inspirations from Gradients of Detail

The primary source of inspiration, especially in terms of aspects of the aesthetic, not to mention form and perception, was Szlavnics's work *Gradients of Detail*. Examining the side effects of long, drone-like notes in *Gradients* […] is a useful way of contextualising some of the techniques in *Fabric Seas.*

In *Fabric Seas,* small musical gestures on the meso scale are designed to lure the listener, and distract from microtonal pitch changes on the macro scale (that is, over the course of the entire piece).[136] This contrasts somewhat with *Gradients*, whose shifting microtones are perceived in the

[135] Using VST plugins – 'virtual studio technology' (in this case emulating real instruments).
[136] Roads (2001), p.14.

moment, and are highlighted through beating.[137] Although the phenomenon of beating is necessarily reliant on microevents,[138] lasting fractions of a second, the *sensation* of beating is more readily classified as a sound object. This is especially true of the beating experienced in *Gradients.* As the strings in *Gradients* glissando through pitches and produce beats, the duration of these sensations of beating (and their identity, even) is necessarily curtailed. This is a very important distinction to draw, and is a principle that sets apart the microtonal movements in *Gradients* from those in *Fabric Seas.* In Szlavnics's piece, the droning notes appear as meso objects, inhabiting a zone 'measured in minutes or seconds'[139] by Glover.[140] The sensation of beating is necessarily shorter than the glissandi that create that sensation. This is because the fundamental pitches (and therefore the beating patterns generated) are almost always moving. Combined with the fact that the beating patterns are sometimes partly or fully obscured by other players' tones, perceiving consistent beating in *Gradients* is limited to shorter moments, before those beats become obscured, or change because of the glissandi. Therefore, a classification of the beating in *Gradients* as a series of sound objects is appropriate according to their time scale.[141]

Besides this, the beating is prone to the sort of mutation that Roads describes (for instance, although the rate of beating may change along the length of a beating event, it is still capable of being perceived as the same event).[142] Moreover, Roads stipulates specifically that, in the field of sound synthesis, microtime events can combine to generate sound objects.[143] In both *Gradients* and *Fabric Seas*, an 'analogue' version of Roads's description is realised – rather than using synthesis, beating occupies an important place as the source of sound objects.

The effect of smaller meso material in drawing the listener's attention away from any larger-scale motion is also similar to Szlavnics's piece.[144] In *Fabric Seas*, this is the intent of the

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[137] Jennie Gottschalk, 'Separation and Continuity in Chiyoko Szlavnics' Gradients of Detail', in *Being Time* ed. Richard Glover (New York, N.Y.: Bloomsbury Academic, 2018), pp.67–86 (pp.79-80).
[138] Namely, the result of combining troughs and peaks in sound waves, therefore occurring at least dozens, if not hundreds or thousands of times per second. Roads (2001), p.157.
[139] Roads (2001), p.3.
[140] Glover (2018), p.74.
[141] Roads (2001), p.4.
[142] Ibid., pp.19-20.
[143] Ibid., p.19.
[144] Glover (2018), p.68.

smaller gestures (some of them microtonal themselves). The meso scale gestural material in the strings parts is designed to mask the pitch-shift further still.

3.8. Blood-Bloom

3.8.1. Background

This piece is about social networks. *Blood-Bloom* explores a 'Swiss cheese model'[145] where a particular condition can only be realised when a number of criteria align. This model gained some traction in the media recently, offering a metaphor to explain harm reduction during the Covid-19 pandemic.[146,147] The inspiration for the piece, though, was more general. The progression through increasingly energetic materials is a metaphor for the passing-on of progressively more extreme ideas, leading from a neutral basis to a radical-sounding result. It is useful to think of the piece as a plastic environment to explore agency; the performers are not obliged to be 'radicalised' by more and more active musical gestures. They can also moderate others as well as themselves.

The piece takes after musical games.[148] Instead of relying on a combination of dice-rolls or some other chance-mechanism to realise a unique performance, the piece uses the motivations and desires of the players to explore the medium of contingency, parallel to 3.5. Here, though, the players have more agency, and their roles are more dynamic, because of the different form, explored in 3.8.3.

3.8.2. Score

The score here is only moderately divergent from Western Classical norms. Elements of traditional staff notation occur, such as pitches, clefs, and repeat marks. The most 'extended' extended technique is the 'quasi-jeté', the bouncing-to-drawing bowstroke at figure A, followed (at some distance) by the variable-speed and quasi-trills in A and B.

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[145] J Reason 'Human Error: Models and Management', BMJ (Clinical Research Ed.), 320 (2000), 768–70 <https://doi.org/10.1136/bmj.320.7237.768> [accessed 29th November 2023].
[146] Carmine Gallo, 'The Virologist Who Created A "Swiss Cheese" Metaphor To Explain The Pandemic Has A Message For Educators', Forbes, 10th December 2020 <https://www.forbes.com/sites/carminegallo/2020/12/10/the-virologist-who-created-a-swiss-cheese-metaphor-to-explain-the-pandemic-has-a-message-for-educators/> [accessed 29th November 2023].
[147] Siobhan Roberts, 'The Swiss Cheese Model of Pandemic Defense', The New York Times, 10th December 2020 <https://www.nytimes.com/2020/12/05/health/coronavirus-swiss-cheese-infection-mackay.html> [accessed 29th November 2023].
[148] Gerhard Nierhaus, *Algorithmic Composition: Paradigms of Automated Music Generation* (Vienna, Austria: Springer, 2010), p.36.

The musical gestures are not fully spatially notated, but are nonetheless spaced fairly equally. This is so that the performers' transitions through the stages of the gesture (from a slow to a fast trill and back again, for instance) are not distorted by any visual cues like clusters of notes, or uneven spacing. Other than the direction that 'gestures on this page will last c.5 secs', though, there is no specific durational information on the A/B/C gestures page. This is not the case for the first 'baseline material' page, whose timestamps are given in minutes. This is to allow the players some degree of flexibility on two of Roads's timescales: the meso scale (occupied by the gestures) and the macro scale (in this case best experienced as the form, defined by the players' interaction through their playing of the gestures).[149] This is explored more in 3.8.3.

3.8.3. Materials/Structure

The mapping here is metaphorical (according to table 1), and therefore the piece embodies a system or model. In this case, that is the social network, and more specifically the passing of material, along bonds between nodes, elaborating the 'Swiss cheese' model. Generally, though, the work elucidates a progression through layers of increasingly energetic gestural materials, the higher levels of which players can only access when another member of the ensemble is playing a lower level. For instance, see fig.10 for a demonstration of the energy increase across three layers A, B, and C.

[149] Roads (2001), p.3.

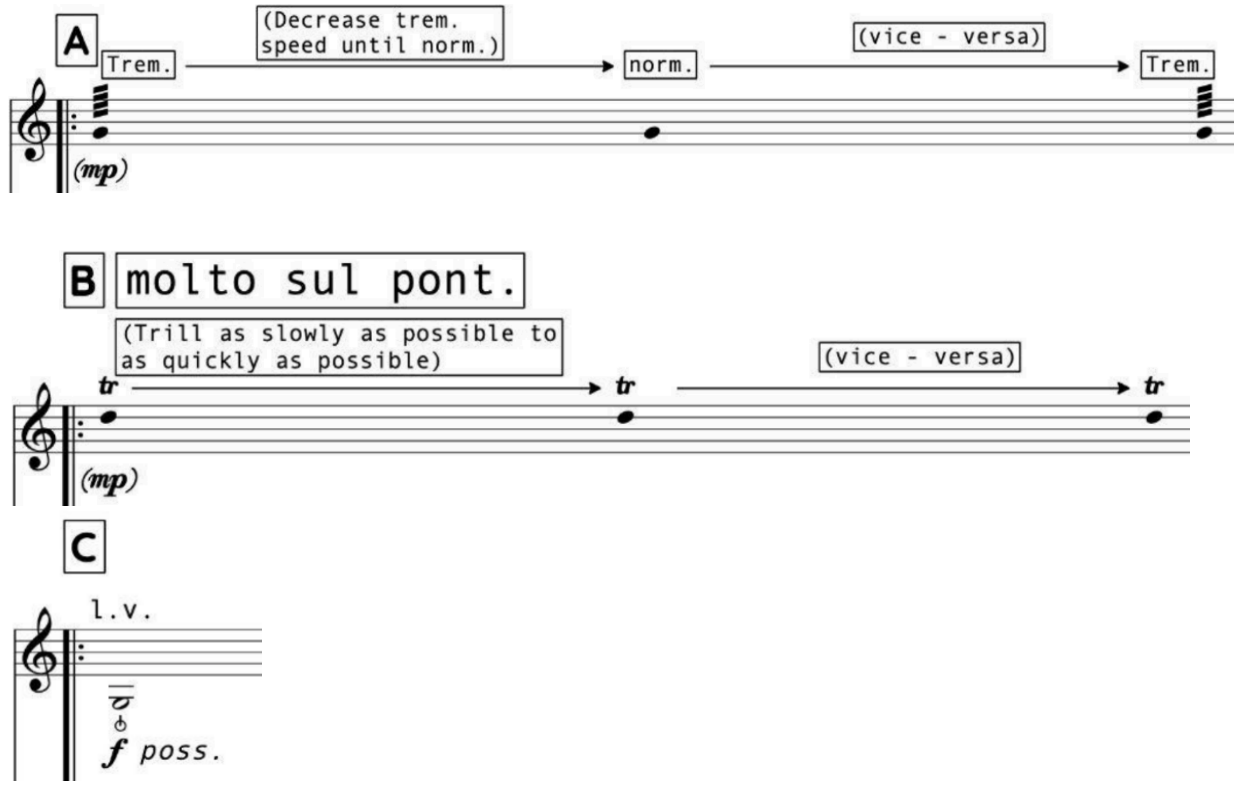

Fig.10. Extracts from violin's musical gestures, demonstrating an increase in energy from A through C. Note in particular the changing timbre; contextually, the 'baseline' layer, which acts as a default for all players, is performed *molto sul tasto*, with a very slow glissando, in the middle-low range of the respective instruments, at a *piano* dynamic. This is so that it is the least aurally imposing material.

The form is contingent on player decisions; it is here that the metaphor is encoded. Like *contingency* (3.5.) there are musical gestures from one performer that are dependent on the gestures of another, but unlike that piece, the onus is on each individual to progress to the next stage of the form. In this way, *Blood-Bloom* falls more easily into the 'performance-driven' category of pieces, whereas *contingency* is largely score-driven.[150] The gradient of change, from one moment to the next, can be quite steep (hypothetically, as passing to the next lettered gesture is only dependent on the players perceiving another's similar gesture, this could be near-instantaneous). This is an expression of the object of the 'game', in fact – exploring the variations in sonic result brought about by players' choices as individuals, in reaction to others', and as an interactive network.

[150] Rowe (1993).

3.8.4. Reflection

When applied to a network, as it is here, the 'Swiss cheese' model can be explored mathematically, using 'percolation theory'. Although not the chief focus of this piece (and not directly applicable, in any case, as it assumes an infinitely large system), this does offer some directions to explore, and some points to address.

In this model, the players' likelihood of playing material, allowing others to progress to further material, is given by p. The players can allow a 'full' performance, where all the material has been performed (and all 'holes in the cheese' have been passed through). Alternatively, they can refuse to explore lettered material, meaning that there is no 'path through the cheese'. Establishing and exploring the likelihood that players will realise a 'full' performance is a facet of the identity of the piece. This number is called 'critical' p, or p_c.[151]

Aspects of basic percolation theory that do not apply here include that nodes are presumed independent, and are not decision-making;[152] this cannot be applied to human musicians. Nonetheless, further directions can be explored through changing the number of players, or their materials, to observe different p_c values. This can be accomplished by formalising the 'game' as a sound-producing computer program (as in *Migrance*), with the careful assigning of p values to computer-controlled nodes. Exploring criticality under different conditions, especially the use of large numbers of nodes, is only really feasible using computing methods, but this opens an exciting avenue of further exploration. Regardless of

[151] SR Broadbent and JM Hammersley, 'Percolation Processes: I. Crystals and Mazes', Mathematical Proceedings of the Cambridge Philosophical Society, 53 (1957), 629–41 (p.630) <https://doi.org/10.1017/s0305004100032680> [accessed 29th November 2023].
[152] Ibid., 629.

3.9. Midnight Immolation

3.9.1. Background

This is a piece in which a flautist gives and receives material to and from an electroacoustic source. It is conceived as a closed, interactive system, in which the nodes command and obey each other. The application of this setup to a concept (a *social* network) is what makes this mapping quasi-literal, per table 2.

The piece is a classic 'instrument paradigm', according to Rowe's 1993 taxonomy, as 'performance [i.e. musical] gestures from a human player are analyzed [*sic*] by the computer and guide an elaborated output exceeding normal instrumental response.'[153] Although highly score-driven from one point of view, as there are predetermined elements, unalterable by the interactive system involved,[154] the precise rhythms of the flautist are not determined. Therefore, neither are their repeats by the electroacoustics. Whilst the rhythm and metre of these repeats *are* predetermined, their timbre and pitch are not, as these are dependent on the quasi-improvisando inputs by the flautist. This marks the piece as at least somewhat generative, according to Rowe.[155] Similarly, some elements are pre-recorded (i.e. not interactive).[156] These considerations account for the slight ambiguity in classifying the piece according to the established taxonomy. See the continua below:

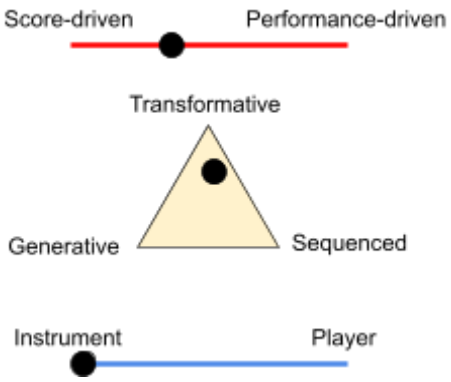

Fig.11. *Midnight Immolation* classified on Rowe's 1993 continua.

[153] Rowe (1993).
[154] Ibid.
[155] Ibid.
[156] Ibid.

The passing back and forth of control along a finely-balanced continuum is embodied in the title. Midnight – here, an imagined singularity between one day and another – is the fulcrum of the balance of power. The immolation threatens to engulf either end of this continuum (player and electroacoustics respectively).

3.9.2. Score

The written score is reasonably traditional. It contains pitches, durations, and directions on the manner in which these should be executed. Departures from the traditional involve things like references to cues in the Logic file (see the markers such as 'Key clicks' and 'Play G', fig.12 below).

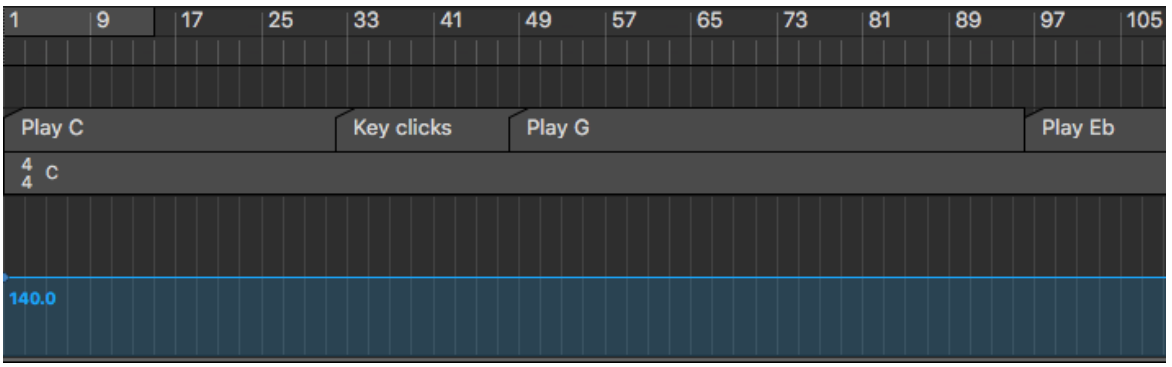

Fig.12. The 'global tracks' from the associated Logic file, showing bars, cues, time signature, and tempo.

There is a difficulty in translating between Logic and Sibelius (or other typesetting software) in that Logic will not accept a tempoless, time-signature-less composition. Here, tempo and time signature are not necessary for the performer to play the piece (they are given cues to move from pitch to pitch, and gesture to gesture, and they are instructed by the text in the score to play in a certain manner – arrhythmically, for instance). All the same, the tempo is indicated in the player's score – after all, the rhythmic stutter does play at this tempo, and although the arrhythmic and ad-lib. elements performed by the flautist cannot be rigorously written-out, it is still useful for the performer to get a sense for the quick flurries of stuttering echoes in the electronics.

3.9.3. Materials/Structure

The flautist's prolonged, arch-like musical gestures are sustained by the electroacoustics, at an increasing rate, throughout the beginning of the piece. The blown gestures are then complemented by percussive key clicks, in time with a glitching response to the blown gestures from the electroacoustics. This defines the sound world for the first part of the piece. The purpose of the blown gestures and the key clicks is to establish two different strata of musical gestures; one long and sustained, the other pointillistic and jittering (the latter supported on a 'bed' of the former).

The opening gestures are subsumed by powerful synthesised tones. The feedback generated from the combination of these with the live monitoring of the flautist generates a pulsing, all-eradicating aura, cleansing the blown and clicked gestures from the mind. This is the immolation. It also invokes a different (Bb major - Eb major) harmony, moving away from the C minor inflections of the opening section. The flautist, in adding their tones to the synthesised jitters and feedback succumbs willingly to the immolation.

As this dies, clicking and whistling gestures remind the listener of the opening section. The clicking is now more frantic, as there is more electroacoustically-regenerated material due to the comparatively higher level of previously-heard gestures being reverberated. The flautist's whistling is intended as a transformation of the arch-shaped blown gestures of the beginning. These are still arch-shaped, and are obviously blown, but have transcended the flute and embody a higher octave. Thus the effective A-B-A' structure is realised.

3.9.4. Reflection

Like the next piece, *Migrance* (3.10.), this piece is reliant on a networked interactive system. The pieces' identities are very different, however. This is because of the nature of the network, the interaction, and the method by which the network is mapped to the music (according to table 1). However, given the presence of prerecorded material in both, and the intended goal of changing the gradient of power between nodes, it is useful to reflect on the efficacy of using the interactive system as a mapping method in *this* application.

It is a reasonable criticism that, as there is no real-world social network mapped here, the metaphor is limited in its validity. As stated earlier, this is due to the fact that the aim here is to explore one aspect of social network theory. Although, logically, there are no social networks with only two nodes (i.e. two people who know only each other, and nobody else), this rather misses the point – the join between nodes can *only* exist between two of them.

This piece is tangentially related to other pieces in the portfolio in the 'social network' category – *Blood-Bloom* and *contingency* for instance. In *Blood-Bloom*, the network extends a node further (i.e. the form is dependent on not only the reaction of one player to another, but a third player's reaction to that reaction. In *Midnight Immolation*, the reaction is limited to the flautist and electronics). Further directions could involve an ensemble of musicians 'interacting' through mutually-contingent material. This hypothetical piece would sit well alongside the next piece examined – *Migrance* – as it also examines the interaction between multiple nodes of a social network.

3.10. Migrance

3.10.1. Background

This piece stands apart from the others in its execution, but shares an synthesised aesthetic with others (*Midnight Immolation* in particular). It is the sole (purely) electroacoustic work in the portfolio. It uses a laptop camera, trained on a group of people, to generate MIDI data. It does this by using a blob-detection algorithm to detect similarly-lit and coloured pixels, which are grouped together as blobs.[157] The position and size of these blobs are logged as data points. The data are sent to Logic Pro X, and sonified there by virtual, MIDI-driven 'instruments'.[158] This is what categorises this piece – the only one of its type in this portfolio – as a literal mapping.

The piece's inception is in the desire to use everyday surveillance technology and techniques to generate musical material. However, depending on how the technology is deployed, there are essentially four possible iterations of the piece:

a) Audience (or subject) aware of surveillance, able to hear sonified result.

b) Audience aware of surveillance, unable to hear sonified result.

c) Audience unaware of surveillance, able to hear audio.

d) Audience unaware of surveillance, unable to hear audio.

The first of these was explored, with the piece in a prototypical form, at its premiere. This form is the one discussed in 3.10.3. It is also the main conceptual identity of the work; b), c), and d) are all conceived as possible iterations after a). Generally, the work was designed to be interactive, its sonic results heard by those interacting with the technology, with other iterations explored only as interesting case-studies.

[157] This used code initially derived from Mario Klingemann's 'Super Fast Blur v1.1' blob-detection code. This was later refined through use of ChatGPT to alter parametric detection (such as relative size).
[158] There is a range of acoustic-instrument-aping synthesisers used, as well as synthesisers using more abstract sounds.

These variants comment on covert and overt surveillance (a/b vs. c/d),[159] and the tendency of subjects to modify their behaviour if they know they are being observed (a/c vs. b/d).[160,161] Although *Migrance* is not a scientific study of these conditions, it is interesting to question public attitudes to surveillance through the piece. Would a member of the public or audience be more or less willing to engage with *Migrance* than with a security camera, regardless of their near-identical modes of operation? Is there a similar debate to be had over the use of overt and covert observation for the piece, as there is about overt and covert surveillance more generally?[162]

To probe around these issues, two small, non-performance trials were staged in the images of c) and d).[163] In the case of c), images were captured from a window on a residential/commercial street, and the resultant sonification was broadcast from the same window back to the pedestrians, simultaneously. The blob-detection algorithm is not sufficiently discerning as to be able to identify human-sized blobs (and therefore humans)[164] from others such as passing cars, but there was a noticeable sonic result from the regularity of the lateral movement of pedestrians and cars.

In the case of d), the camera of the laptop running the program was trained on livestreamed images of the queue to see Queen Elizabeth II lying in state. The subjects were unable to see the surveillance apparatus, or hear the sonification. Occasionally, the broadcast switched between different camera angles; this was not under the control of the person operating the programs associated with *Migrance*, but rather the broadcaster (in this case, the BBC).

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[159] 'Surveillance', LII/Legal Information Institute <https://www.law.cornell.edu/wex/surveillance> [accessed 9th August 2023].
[160] Steven D Levitt and John A List, 'Was There Really a Hawthorne Effect at the Hawthorne Plant? An Analysis of the Original Illumination Experiments', American Economic Journal. Applied Economics, 3 (2011), 224–38 <https://doi.org/10.1257/app.3.1.224> [accessed 9th August 2023].
[161] Rob McCarney, James Warner, Steve Iliffe, Robbert van Haselen, Mark Griffin and Peter Fisher, 'The Hawthorne Effect: A Randomised, Controlled Trial', BMC Medical Research Methodology, 7 (2007) <https://doi.org/10.1186/1471-2288-7-30> [accessed 9th August 2023].
[162] O'Mathúna, Ron Iphofen And, 'Introduction', in Ethical Issues in Covert, Security and Surveillance Research (Bingley: Emerald Publishing Limited, 2022), pp. 1-8 (p.2) <https://doi.org/10.1108/S2398-601820210000008001> [accessed 9th August 2023].
[163] 'Non-performance' here meaning that they did not receive any kind of concert/installation-style performance; one was streamed live on YouTube, to allow the composer and other invited observers to 'tune in' periodically.
[164] Guyue Zhang, Jun Liu, Ye Liu, Jingwen Zhao, Luchao Tian and Yan Qiu Chen, 'Physical Blob Detector and Multi-Channel Color Shape Descriptor for Human Detection', Journal of Visual Communication and Image Representation, 52 (2018), 13–23 <https://doi.org/10.1016/j.jvcir.2018.01.013> [accessed 9th August 2023].

3.10.2. Score

The 'score' here, per se, is really a combination of the code of the program the laptop runs, and the Logic file into which it 'feeds' data. The program is reproduced in appendix 6.B. but the basic tenets of blob detection are described above (in 3.10.1.). What cannot be interpreted from appendix 6.B. is the role of the Logic file. This process is distinct from the techniques used in *Midnight Immolation*, as in that piece the overwhelming majority of sounds heard are derived from audio effects (such as delay). Here, the data generated from the program are sent to different channels in Logic, where they are used to drive software synthesisers. The piece requires no external sound source, and 100% of the sonic generation and manipulation is done 'in the box'; *Midnight Immolation*'s sonic output is wholly derived from a (manipulated) input from a live sound source.

As in *Fabric Seas* there are automation tracks, which fade instruments in and out, and control the introduction and rate of effects. These are not controlled by the data from the camera feed, but they could be in future iterations of the piece. The reason that they are not data-controlled is that it was feared this would confuse or cloud any perceivable relationship between the surveilled subjects and the pitch material generated. The intention is not necessarily to demonstrate such a relationship, or to make subjects aware of the sonifying systems at play, but it is considered preferable to keep the sonification to *x*/*y* location, and to add 'artistic' detail with composer-curated effects later on in the process.

3.10.3. Materials/Structure

It is useful to delineate between materials which are solely derived from the camera and algorithm – the primary materials – and secondary materials. Secondary materials comprise those which arise either from a manipulation of the primary materials (through addition of effects such as delay and reverb, done 'in the box' in Logic), or supplement them in some way (such as by adding note-repeating functions in Logic, or supplementing rounded pitch data with other, composer-derived MIDI data).

Primary materials themselves are not without manipulation; numerical values generated from the *x* location of detected blobs are rounded to values corresponding to notes of the chromatic scale (in fact, this is further rounded to notes of specific triads). MIDI velocities are derived from the size of the detected blobs (by calculating their area), and durations are derived from their *y* location. Considering the primary materials as 'raw' materials would be wrong – the rounding of the *x*-axis numerical values to MIDI notes means that a degree of transformation has been undertaken, and besides, *x/y* location and musical data are not homomorphic. However, there is a degree to which they are 'closer' to the data than the composer-derived rhythmic and supplementary harmonic material, in that this is a composerly response to the material generated from the algorithm, and is therefore one 'step removed'.

3.10.4. Reflection

As the piece manipulates so much of its received MIDI data, in both algorithms and Logic, there is a question over whether any semblance of the data originally recorded on the camera can be heard in the resulting sonification.[165] Its answer, in this context, is that one *can* hear movements visible to the camera, but that these are only part of the materials which form the piece (which is not, after all, a 'pure' sonification). More generally, the art that is derived from sonification is not 'obliged' to maintain any semblance of the original identity of the materials that contributed to its formation.

Another valid question is whether the surveilled subjects can contribute in a meaningful way, which informs or alters material, musical gesture, or form. Here, it is useful to try to categorise the piece on Rowe's (1993) taxonomy of interactive music systems, in order to demonstrate the degree to which the course of the music changes according to different inputs.[166]

[165] King (2019), p.103.
[166] Rowe (1993).

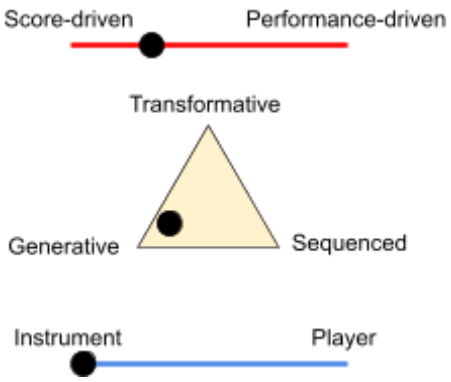

Fig.13. Classifying *Migrance* according to Rowe's (1993) taxonomy. The pre-recorded material, accompanied by a set of stored scales, mean that the first and second continua favour a score-driven and generative model.

Rowe's first continuum is useful to invoke. The piece is no less artistic because of its tendency towards a score-driven outcome – one in which its subjects have less of an opportunity to change the course of the form of the piece. Furthermore, the piece is not less 'about' the surveilled subjects because it also involves an artistic reflection. This is the intention here – to provide a space to reflect on the push and pull between autonomy of subjects in a particular system. This sort of reflective space is discussed in the introduction.

3.11. klaT

3.11.1. Background

klaT was the result of a discovery. A speech-jamming 'gun' (or, rather, a directional mic and amplifier combination) effectively mutes or disrupts utterances when pointed at a speaker.[167,168] This much-mythologised device echoes science fiction,[169] but relies on an established phenomenon – delayed auditory feedback, or DAF.[170] This phenomenon states, very basically, that a person's own utterances will disrupt their speech when replayed to that person at very short delay (c.0.15s).

DAF is a difficult phenomenon to quantify in terms of its application to the human body. It can cause "drawling (usually on the medial vowels), [lead] to a Lombard effect (increased voice level), while pitch [becomes] monotone, speech errors [arise] and messages [take] longer to complete than messages produced in normal listening conditions." On the other hand, it actually *improves* speech in those who stammer.[171]

The application of such an effect in the field of bodily integrity, applied specifically to a vocal piece, was particularly appealing. The phenomenon was ripe for exploitation, because it was minimally invasive but maximally disruptive (in robbing a person of a fundamental expression of their identity – their voice). The fact that DAF has an inherent sonic result meant that the phenomenon presented very fertile territory for exploration.

Note, though, that the sonic *result* is the thing that is audible, apart from in the first seconds of the piece. As such, the piece's effects are truly only felt by the performer, who is subjected to the

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[167] Kazutaka Kurihara and Koji Tsukada, 'SpeechJammer: A System Utilizing Artificial Speech Disturbance with Delayed Auditory Feedback', arXiv [Cs.HC], 2012 <http://arxiv.org/abs/1202.6106> [accessed 6th December 2023].
[168] Mariko Chiba, Wataru Yamada and Keiichi Ochiai, 'Shadowed Speech: An Audio Feedback System Which Slows down Speech Rate', in Adjunct Proceedings of the 35th Annual ACM Symposium on User Interface Software and Technology (New York, NY, USA: ACM, 2022) <https://doi.org/10.1145/3526114.3558640> [accessed 6th December 2023].
[169] Geeta Dayal, 'New Video Shows Japanese Speech-Jamming Gun in Action', Wired, 2nd March 2012 <https://www.wired.com/2012/03/japanese-speech-jamming-gun/> [accessed 3rd January 2024].
[170] Peter Howell, 'Effects of Delayed Auditory Feedback and Frequency-Shifted Feedback on Speech Control and Some Potentials for Future Development of Prosthetic Aids for Stammering', Stammering Research: An on-Line Journal Published by the British Stammering Association, 1 (2004), 31–46 (pp.33-34) <https://www.ncbi.nlm.nih.gov/pubmed/18259594> [accessed 3rd January 2024].
[171] Ibid. (34).

DAF. The audience are placed in the reflective space by the twinned discomfort of the performer, and the warpings of their performances by the delay, granular delay, reverb, EQ, and so on. The intention here is to warp the speech and the performer through DAF, and revel in the sonic result – *not* to generate a poetry recital.

3.11.2. Score/Materials

The words that form the basis of the sonic materials were designed to fit a few key criteria. They must be English, be used in a deliberately-fantastical manner (without regard to rhythm or metre) so as to confound the reader somewhat, and should have some kind of pattern or mechanism that means that grammatical rules cannot or do not apply constantly. To generate such words, an AI language model was used. ChatGPT 4.0 responded to prompts, effectively guiding the AI towards results aligned with the above, and eliminating unusual or silly neologisms, character names, or specificities. The results – i.e. the words – are reproduced in appendix 6.A.iii. It is mandated that the words are spoken with no special instruction other than to speak naturally, *semplicemente*, according to no rhythmic or pitch model. The only specific direction to the vocalist is for them to whisper inwards from line 12 (the start of the reversal of the palindrome). This is to partially disrupt any training or adaptation, by adding a layer of difficulty.

In the same model as *Midnight Immolation*, the environment created by the Logic file is one of gentle synthesised interaction in the first half, with an effective *crescendo* to the centre of the piece. Effects themselves are automated like they are in *Midnight Immolation* and *Migrance*. They are designed to artificially prolong and excite any pitches that may be generated in reading the script, and to introduce gently-rippling rhythms into the otherwise arrhythmic piece. The second half of the piece's duration is generated entirely from delayed/'reverbed' material from the first half, making, in effect, a 'double-mirror' structure. By about 4'10" all semblance of the text is lost, succumbing to granular glitches and choppy, irregular delays.

The piece is score-driven, primarily, although the unpredictability of the effects of the DAF give it a small degree of performance-derived contingency. For the same reasons as *Midnight Immolation*, although the effects and synthesised elements respond to variable live inputs from the

vocalist, these *are* aligned to a global tempo and form defined within the Logic file. Live inputs are analysed by the computer, and the audio result is above what could be achieved by vocalist alone – indeed, the second half of the piece is derived wholly from computer manipulation of previous live input. The interplay between vocalist and program is akin to an instrument, therefore. Classification according to Rowe's 1993 continua leads to the following interpretation (see fig. 13).

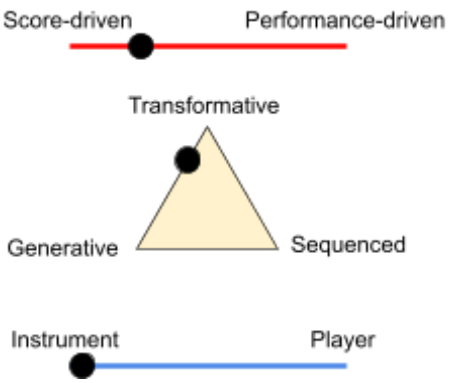

Fig.14. Classifying *klaT* according to Rowe's 1993 taxonomy.

3.11.3. Reflection

In writing *klaT*, there were a number of performer-dependent hurdles that had to be overcome, in order to realise an effective performance. First among these was the variation in effectiveness of precise delay timings, when trying to achieve maximally-disrupted speech. Thankfully, there are a number of free apps which allow users to define the delay at which they feel their speech is most disrupted by DAF.[172,173] This value can then be given to the delay in the Logic file, meaning that vocalists can proactively engage in the planning process, prior to a performance.

Early versions expected too much of the phenomenon. It is easy to 'overwhelm' the DAF with musical or speech-derived sounds *not* involved in the process. These have the effect of 'diluting' the DAF effect. Therefore, later iterations were pared-back, almost blurring the line between poetry and music. This was difficult to accept at first, as the original intention was to give the piece more pitched

[172] Nilu Technologies, Speech Jammer°, 2019 <https://apps.apple.com/us/app/speech-jammer/id1527551724> [accessed 3rd January 2024].
[173] Dwight Dickinson, Speech Jammer, 2013 <https://apps.apple.com/us/app/speech-jammer/id597426372> [accessed 3rd January 2024].

material, akin to *Midnight Immolation*. However, it was pleasing to showcase the effect of DAF on speech, and (whilst not a scientific examination of DAF itself) it provided an engaging way of learning about the limitations of the application of a particular phenomenon, as one might study the limitations and capabilities of an instrument.

4. Conclusion

Central to the project is the theme of bodily integrity. A number of pieces (for instance, *to project inwards*, *i dissociate*, and *5 TENSe minutes*) demonstrate methods by which composers can engage with the body directly, or encourage performers to explore their relative autonomy together (*Say you love me* [...], and *contingency*) . All disrupt the ways in which performers are able to produce sound using their bodies. On the other hand, *Fabric Seas* disrupts the autonomy of listeners' senses, interfering with a more perceptual flavour of bodily autonomy. This artistic exploration is important in a world in which bodily autonomy is regularly denied.[174]

Other relational reflections (*Three Head God*, *Blood-Bloom*, *contingency*) are just as relevant to the theme of bodily integrity, given the individual's existence in relation to others. The 'onlinification' of relationships, extensive surveillance, and the interference of technology in our daily lives (experienced in *Migrance*, *Midnight Immolation*, and *klaT*) are also musical embodiments of significant developments in bodily autonomy in the 21st Century.[175,176]

Composers should maintain an awareness of these factors, to avoid isolation and irrelevance.[177] Imminent compositions in this area might 'go online' themselves. Future directions may involve live, online, cloud-based performances by numerous networked users, allowing a closer mapping of large-scale, online social networks.[178,179]

The mapping techniques analysed in the project also demonstrate how composers can bridge between real-life phenomena and their music. Besides, the analysis conducted above has not been

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[174] Boris Groys, 'Art Power', in *Anthologie Kulturpolitik*, ed. by Martin Tröndle and Claudia Steigerwald (Bielefeld, Germany: transcript Verlag, 2019), pp. 653–62.
[175] Chaffey (2022).
[176] O'Harrow (2006), 1934.
[177] King (2019), p.103.
[178] Online music production software has exploded in popularity over the past 10 years, with cloud-based features parallel to social networks (such as sharing, commenting, and editing content across multiple connected users). David H Knapp, Bryan Powell, Gareth D Smith, John C Coggiola, and Matthew Kelsey, 'Soundtrap Usage during COVID-19: A Machine-Learning Approach to Assess the Effects of the Pandemic on Online Music Learning', Research Studies in Music Education 45 (2023), 571–84 <https://doi.org/10.1177/1321103x221149374> [accessed 31st October 2023].
[179] 'Compose', Mabinogi World Wiki <https://wiki.mabinogiworld.com/view/Compose> [accessed 15th November 2023].

done in isolation. Analyses of Laurenzo's, Knotts's, and Prins's works demonstrate the ways in which these composers deal with aspects of bodily autonomy, mapped to musical expression. Analysing these using coherent, theoretically-robust taxonomies, such as those of Roads and Rowe,[180] allow composers a theoretical framework against which to cross-reference their own works. In doing so, an inter-piece and inter-composer narrative can be established, which can act as a useful analytical tool for composers to locate their works in the canon, to reverse-engineer derivative work, or to react more coherently to established techniques.

These analyses have also illuminated pathways for various future directions, by exploring similar works, and hybridising techniques explored in them. For instance, a hybrid between *5 TENSe minutes* and *Migrance* could use sonification of computer vision data from a camera trained on an involuntarily-twitching body. On the other hand, the musician's body could become the site of experimentation with and interaction between musical gestures, in a mixture of techniques from *Blood-Bloom*, *Say you love me / "you love me"*, and Steen-Andersen's *Buenos Aires.*[181] Donnarumma's work,[182] using the body's own sounds as materials, could be informed by the approach of *5 TENSe minutes* and *Migrance,* by using the body's movement as a formal driver.

Other extensions of ideas presented in this portfolio could include further exploration of Foucauldian principles – specifically, by building on themes discussed in this project. How, for instance, would an instrumentalist react to the highly specific sorts of instructions in *to project inwards* in a situation under stress? Are there ways that musicians could be given the opportunity to go against such instructions, using their bodies as the 'seed' of resistance?[183]

In terms of its wider contribution to research, the project has sought to redress the top-down compositional process, common to Western Classical music. Instead, it has showcased a number of means by which musical material can be generated by taking into account the qualities inherent in extramusical systems. The project has also demonstrated a deconstruction of the

[180] Specifically, Roads (2001) and Rowe (1993).
[181] Maier, Michi, 'BUENOS AIRES, Music Theatre Documentaion', 2015 <https://vimeo.com/127979531>
[182] Donnarumma, Marco, 'Marco Donnarumma', Marco Donnarumma, 2011 <https://marcodonnarumma.com/works/xth-sense/> [accessed 17 December 2024].
[183] Oksala, J, 'Freedom and Bodies', in Michel Foucault: Key Concepts, ed. by D. Taylor (Stocksfield, UK: Acumen Publishing LTD., 2011), pp.85–97 (p.87).

composer/performer/audience tripartite. The integration of performer and audience alongside the composer, as co-curators of material, is important in describing the autonomy-affective relationships about which the pieces are written.

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6. Appendices

6.A. *i loved you when you loved me*

(Score & performance notes reproduced overleaf)

i loved you when you loved me

for two cellos - c.8’30”

This piece explores musical form and material through perceptual awareness and interactive control, with each cellist alternating in a leading role. Positioned to face each other (with stands out of the way of the cellos’ bodies), the cellists copy each other. Cello 1 begins, and cello 2 mimics the gestures, although the mirrored setup means directional interpretation is likewise mirrored (e.g. a down-bow from cello 1 is an up-bow for cello 2). This setup is akin to an imagined scenario where the cellists share a single bow from opposite ends, requiring them to adjust bow angles and arm positioning to reflect each other’s actions.

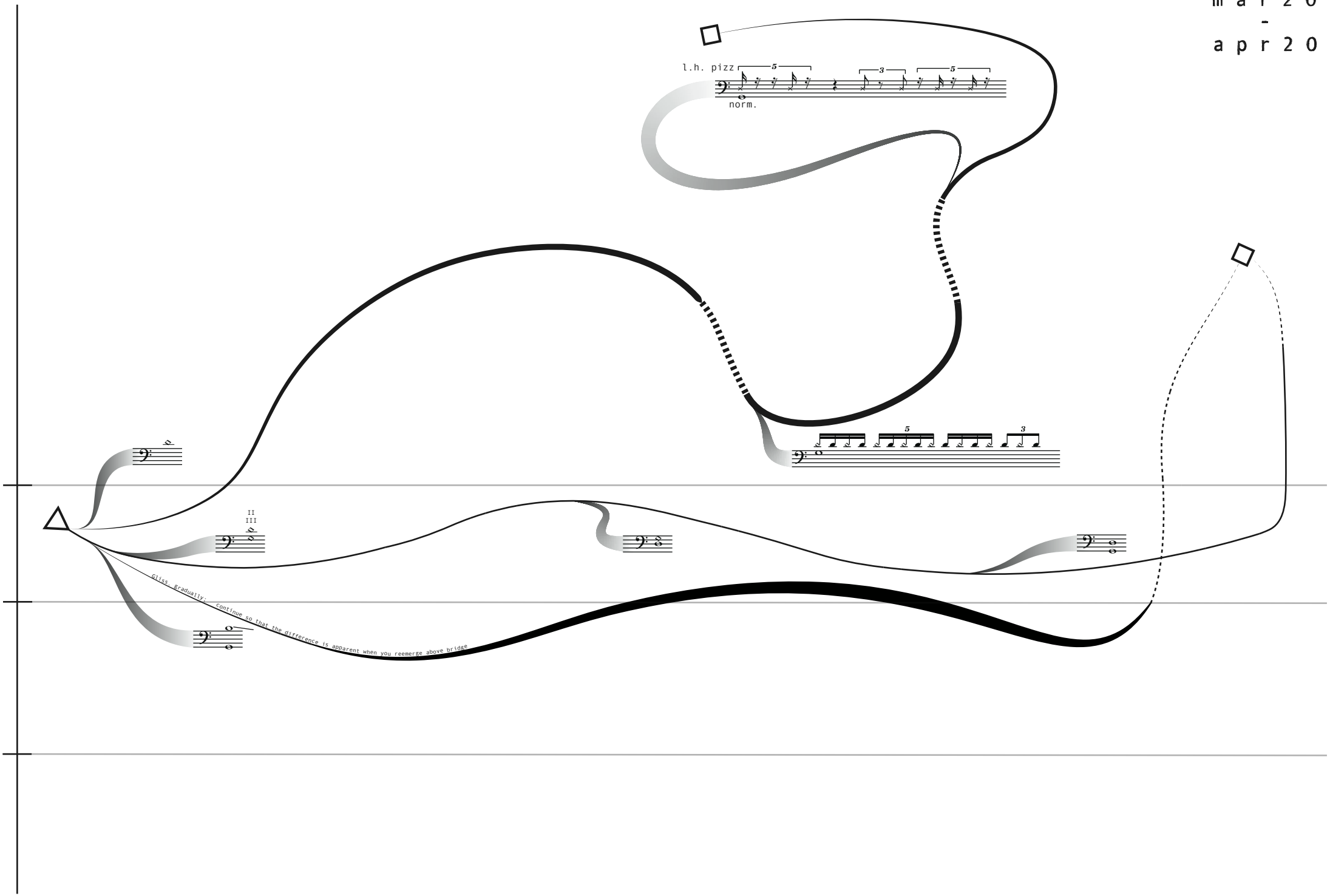
The cellists follow directional cues embedded in each other’s gestures rather than written music, with only start and stop symbols (triangles and squares) in each score providing guidance. A stop in one part signals a start for the other, allowing each cellist to anticipate their next movement based on the bow’s position. Traditional notation is absent after both players’ first pages; this is to mandate the players to improvise, based on preexisting material. This encourages a shift in focus from notated materials to the physicality of copying the opposing cellist.

The notation combines standard and non-traditional elements. Conventional notation is used, with some symbols rotated to align with the bow's motion. A distinct element, the "quasi-trill," involves alternating between harmonics and standard notes by adjusting finger pressure on the strings.

Graphic lines in the score are proportional to bow weight and speed, where thick lines indicate heavy, slow bowing. Dotted lines function similarly but represent silent movement of the bow above the strings. Overlapping lines may fade to improve readability without altering the sound. Additionally, graded lines connect pitch to bow-weight lines, guiding entry points and transitions. Some graded lines prompt players to improvise transitions between musical cells, while others clearly denote start and end points for techniques like glissandi.

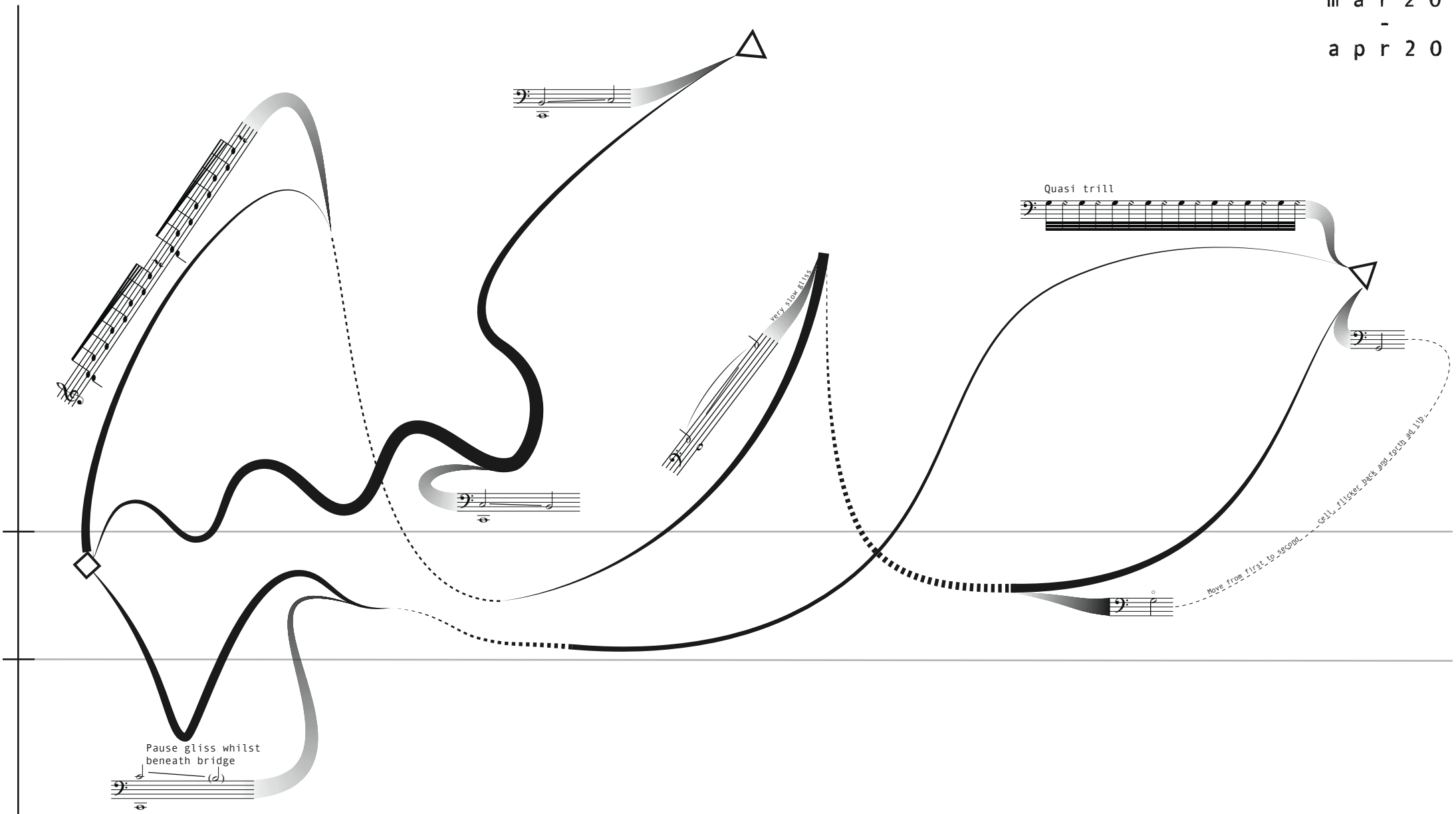
I loved you when you loved me

r k i n g
m a r 2 0
-
a p r 2 0



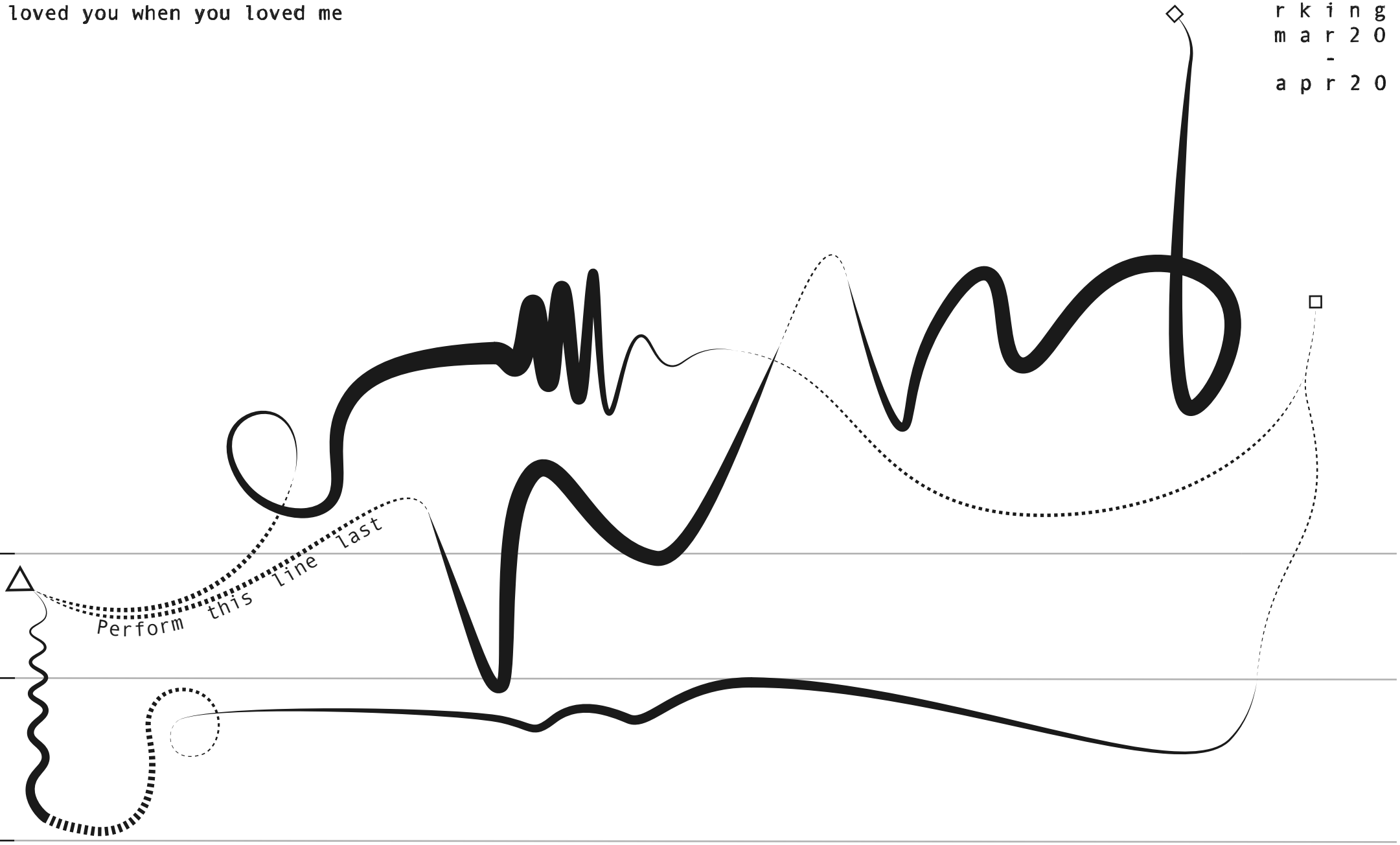
I loved you when you loved me

r k i n g
m a r 2 0
-
a p r 2 0

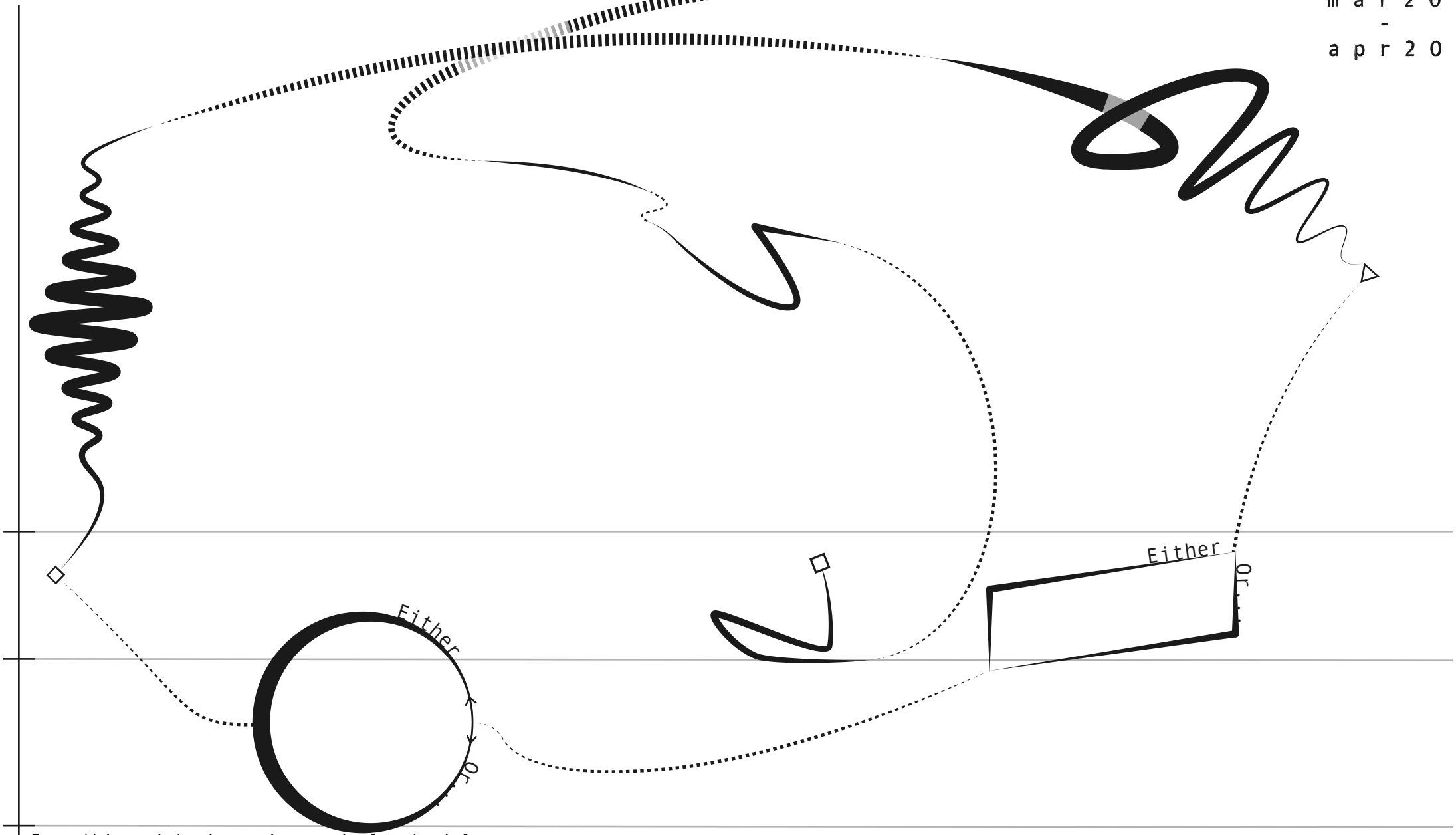


I loved you when you loved me

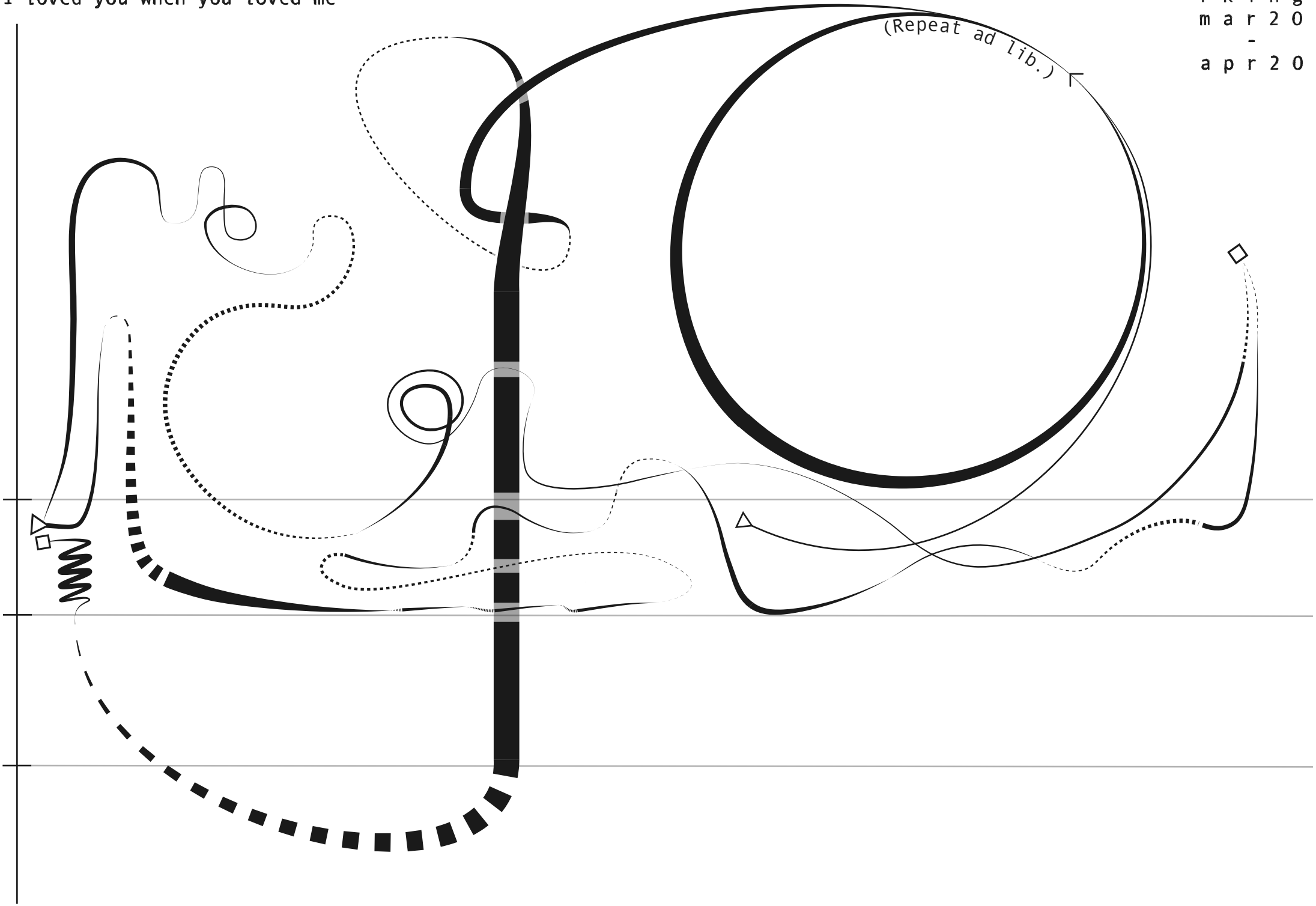
r k i n g
m a r 2 0
-
a p r 2 0

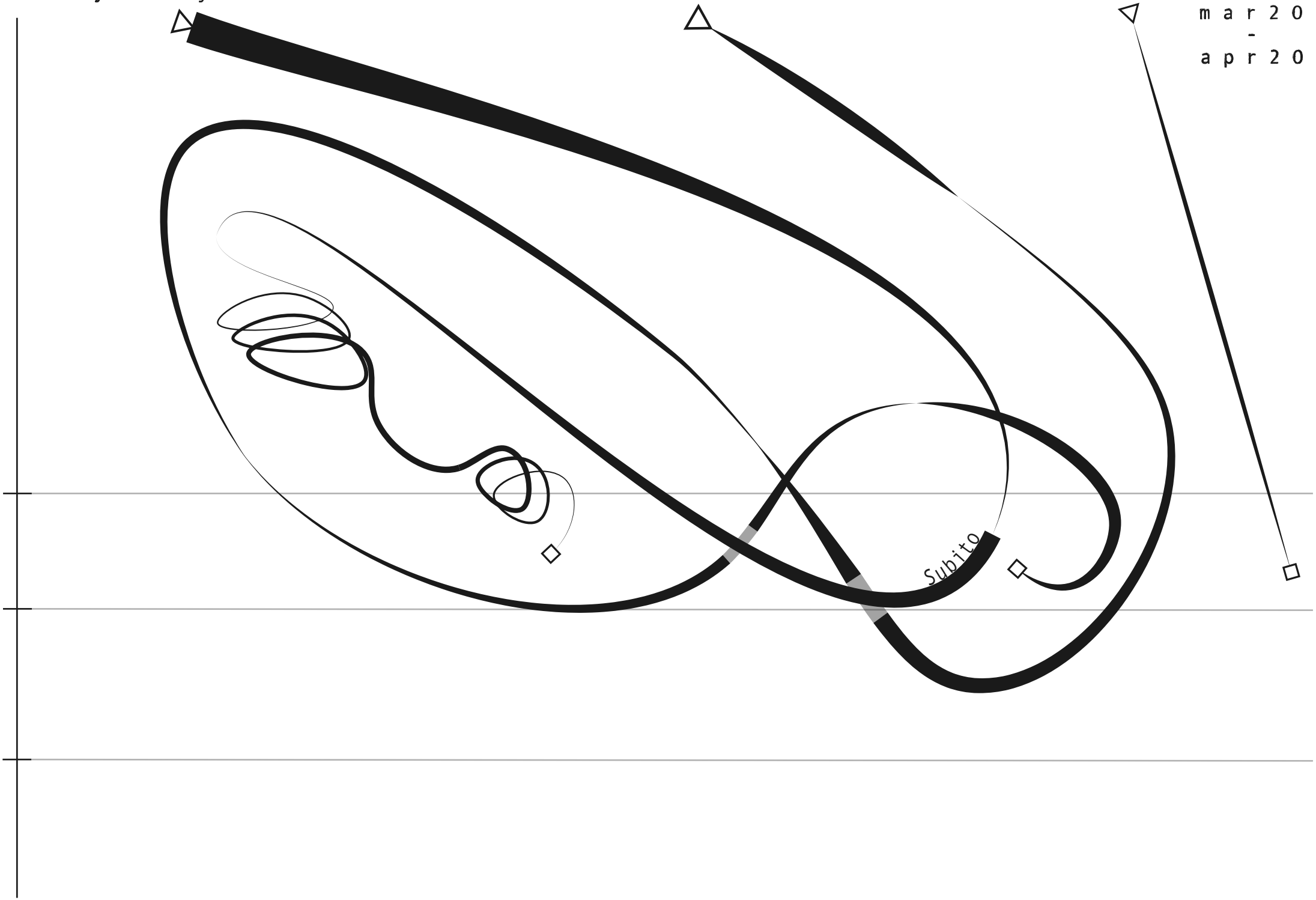


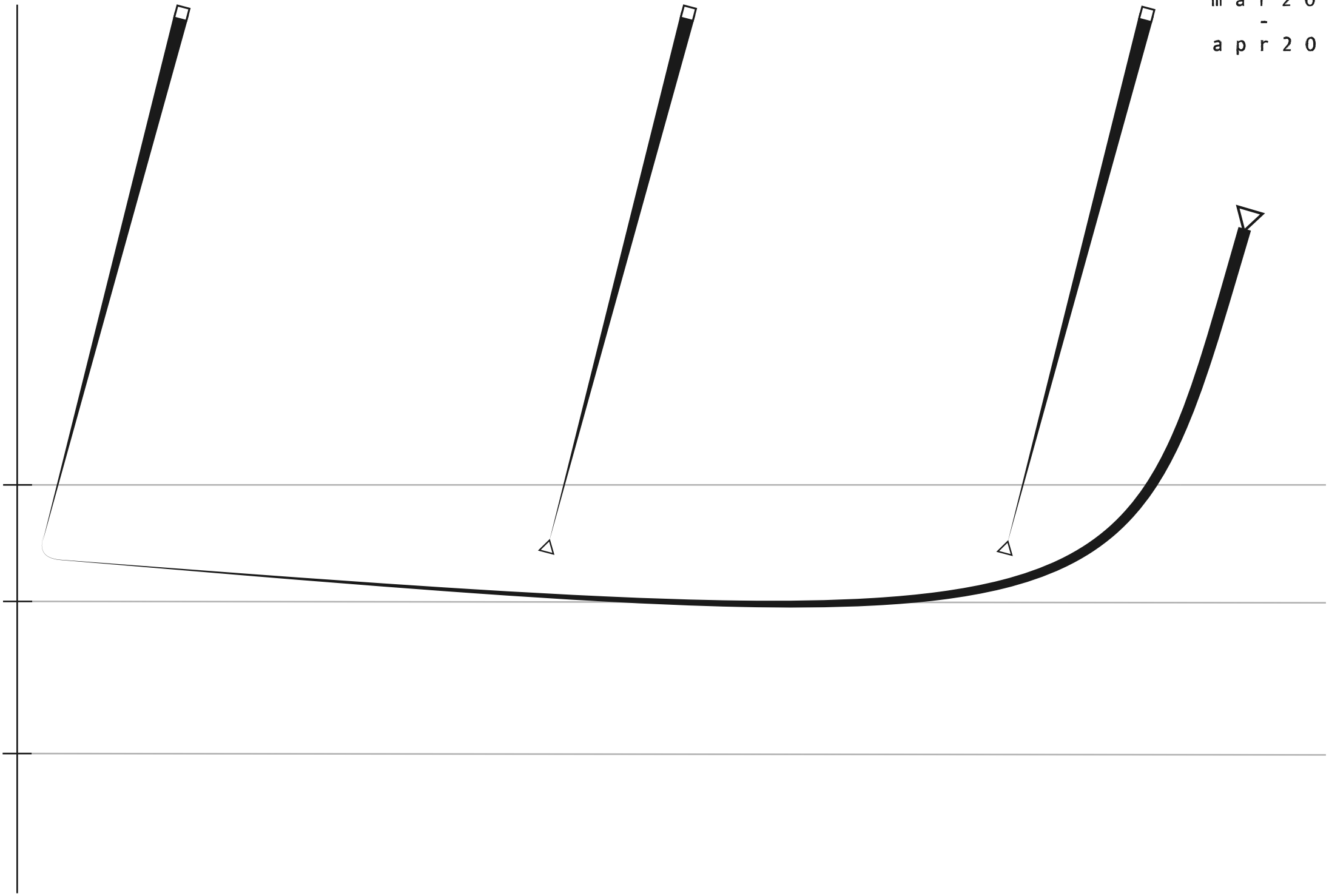
From this point, improvise musical material
at the start of each bowstroke using previous material



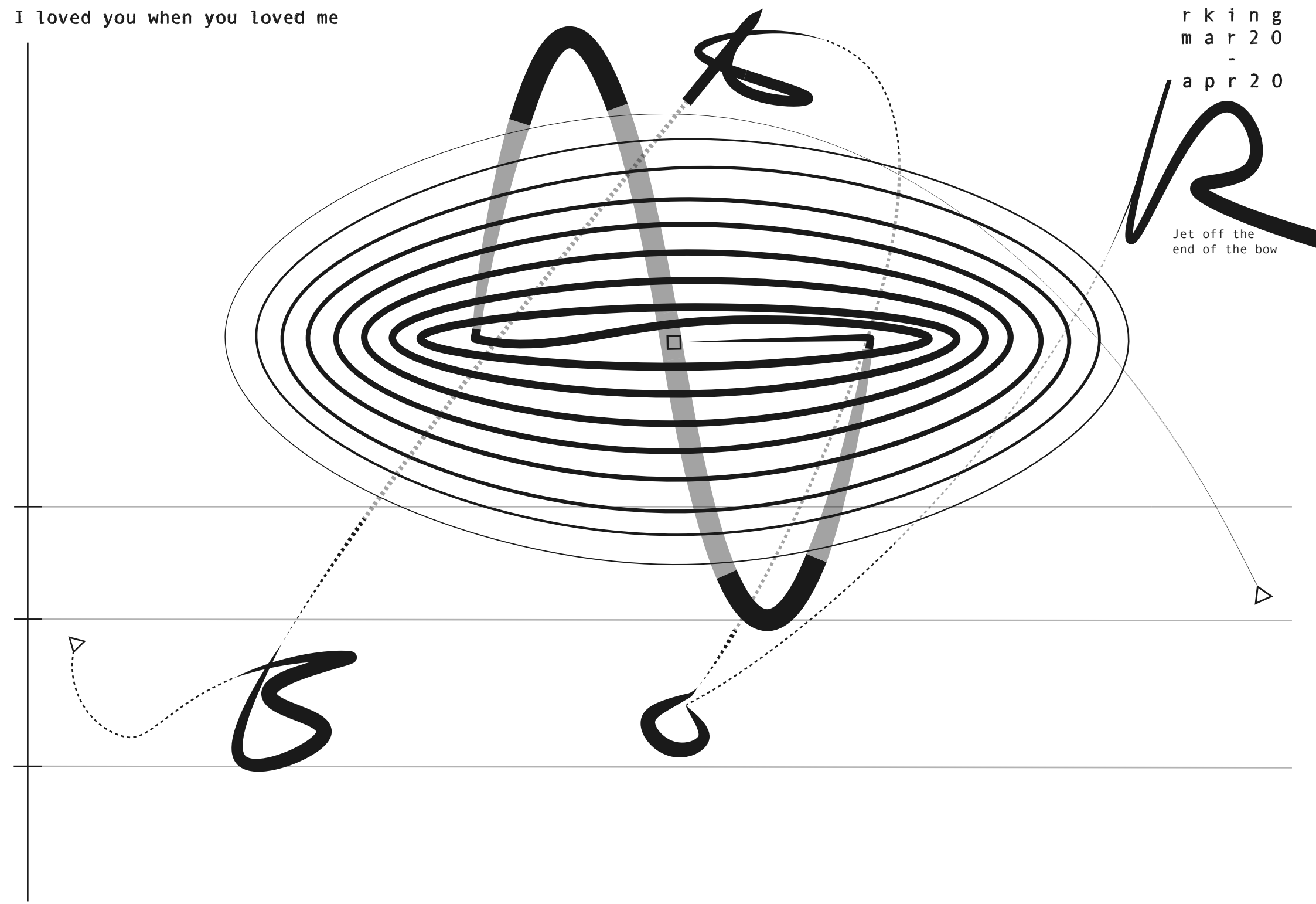
From this point, improvise musical material
at the start of each bowstroke using previous material

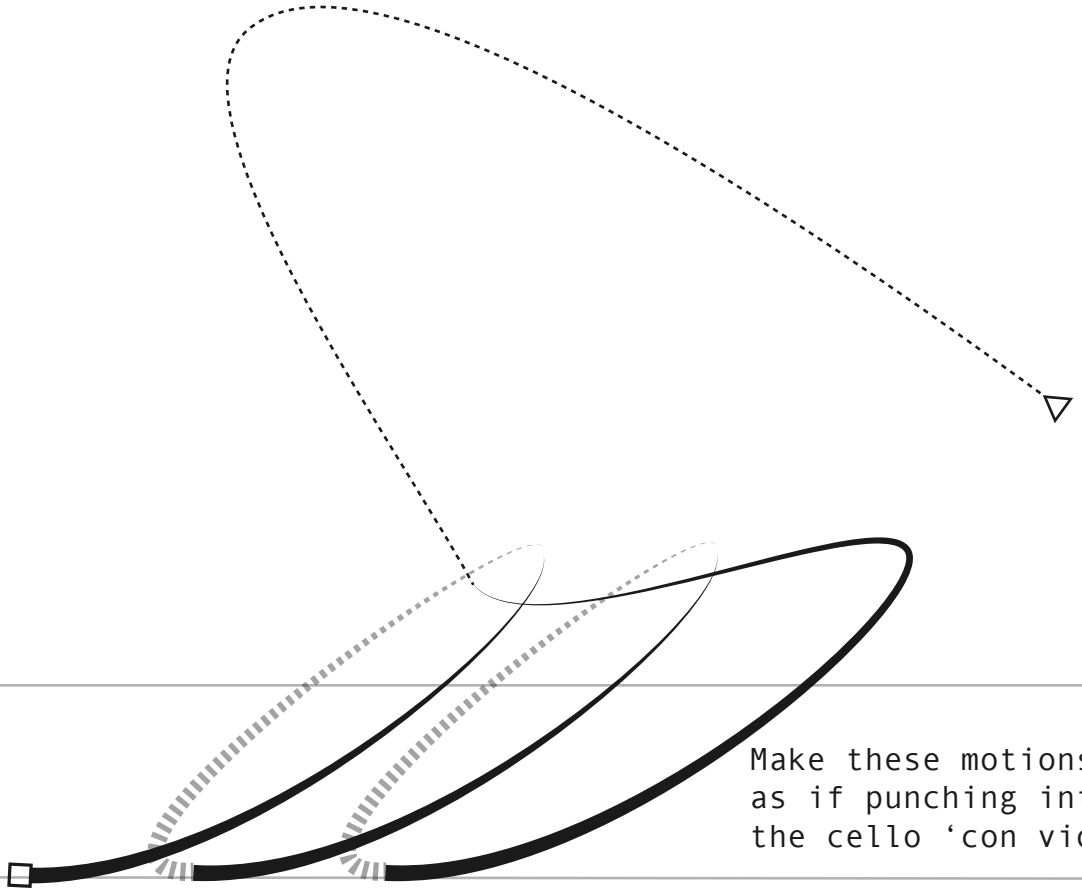

(Repeat ad lib.)


Subito



r k i n g
m a r 2 0
-
a p r 2 0





Make these motions
as if punching into
the cello ‘con violenza’

6.B. Migrance Code

Declaration:

Significant amounts of the code below includes work copied in whole or in part, or derived from Mario Klingemann's 'Super Fast Blur v1.1', from Nick Collins during supervision sessions or email correspondences, or from ChatGPT. At all times, I acted as 'curator', responsible for creative decisions and direction.

The code below is a reproduction of the 'working document' in Processing 4.0.1, as it stood on 26th June 2024.

```
import processing.video.*;
import themidibus.*;  // Import MIDI library
import blobDetection.*;

Capture cam;
BlobDetection blobDetect, blobDetectInverted;
MidiBus midiBus;
PImage prevFrame, invertedFrame;
ArrayList<Blob> persistentBlobs = new ArrayList<Blob>();
long lastNoteOffTime = 12; // Time since the last note off was sent

// Note arrays adjusted for direct indexing based on x-position
int[] cMajor = {48, 55, 60, 67, 72, 79, 84, 91};
int[] aMinor = {45, 52, 57, 64, 69, 76, 81, 88};
int[] fMajor = {41, 48, 53, 60, 65, 72, 77, 84};
int[] gMajor = {43, 50, 55, 62, 67, 74, 79, 86};


long[] activenotes = new long[128];

void setup() {
  size(640, 480);
  cam = new Capture(this, width, height);
  cam.start();
  prevFrame = createImage(cam.width, cam.height, RGB);
  invertedFrame = createImage(cam.width, cam.height, RGB);
  blobDetect = new BlobDetection(width, height);
  blobDetect.setThreshold(0.2);
  blobDetectInverted = new BlobDetection(width, height);
  blobDetectInverted.setThreshold(0.35);
```

```
  MidiBus.list();
  midiBus = new MidiBus(this, -1, "RK proc. to Logic X");

  for (int i = 0; i< 128; ++i)
    activenotes[i] = -1;

}

void draw() {

    long timenow = millis();

  for (int i = 0; i< 128; ++i) {

     //check if already a note going
    if(activenotes[i]>(-1)) {

      if(activenotes[i]< timenow) {

      //midiBus.sendNoteOn(1, midiNote, 0);
      midiBus.sendNoteOff(1, i, 0);

      activenotes[i] = -1;
    };

    };
  };


  if (cam.available()) {
    cam.read();
    image(cam, 0, 0);
    updateBlobs();
    sonifyBlobs();
  }
}

void updateBlobs() {
  cam.loadPixels();
  prevFrame.loadPixels();
  invertedFrame.loadPixels();
```

```
  for (int i = 0; i < cam.pixels.length; i++) {
    if (cam.pixels[i] == prevFrame.pixels[i]) {
      cam.pixels[i] = color(0); // Ignore static pixels
    }
    invertedFrame.pixels[i] = color(255 - (cam.pixels[i] & 0xFF));
// Invert brightness for light blob detection
  }
  cam.updatePixels();
  invertedFrame.updatePixels();
  blobDetect.computeBlobs(cam.pixels);
  blobDetectInverted.computeBlobs(invertedFrame.pixels);
  updatePersistentBlobs();
  prevFrame.set(0, 0, cam);
}

void updatePersistentBlobs() {
  // Implement logic for persistent blob tracking
}

void sonifyBlobs() {
  //int numblobsnow = blobs.size;
  float proportion = (millis()/1000.0)/300.0;
  int blobstouse;

  if(proportion>1.0) proportion = 1.0;
  blobstouse = (int) (5*proportion);
  if(blobstouse<1) blobstouse = 1;
  ArrayList<Blob> largestBlobs = findLargestBlobs(blobstouse);
  processBlobs(largestBlobs, color(255, 0, 0)); // Red outline for
dark blobs

  ArrayList<Blob> largestLightBlobs =
findLargestBlobsInverted(blobstouse);
  processBlobs(largestLightBlobs, color(0, 0, 255)); // Blue outline
for light blobs
}

//void sonifyBlobs() {
//  ArrayList<Blob> largestBlobs = findLargestBlobs(4);
//  processBlobs(largestBlobs, color(255, 0, 0)); // Red outline for
dark blobs
```

```
//  ArrayList<Blob> largestLightBlobs = findLargestBlobsInverted(4);
//  processBlobs(largestLightBlobs, color(0, 0, 255)); // Blue
outline for light blobs
//}

void processBlobs(ArrayList<Blob> blobs, color outlineColor) {
  for (Blob blob : blobs) {
    float x = blob.x * width;
    float y = blob.y * height;

    int midiNote = getScaleNote(int(map(x, 0, width, 0, 7)), x, y);
    int velocity = int(map(blob.w * blob.h, 0, (width * height) / 2,
30, 127));
    int duration = getNoteDuration(y);

    //check if already a note going
    if(activenotes[midiNote]>(-1)) {

      //midiBus.sendNoteOn(1, midiNote, 0);
      midiBus.sendNoteOff(1, midiNote, 0);
    };

    activenotes[midiNote] = millis() + duration;

    //add new activenote


    midiBus.sendNoteOn(1, midiNote, velocity);
    // No delay here, allowing for simultaneous note playing

    // Handling note off separately
    //handleNoteOff(midiNote, duration);

    drawBlobOutline(blob, outlineColor);
  }
}


void handleNoteOff(int midiNote, int duration) {
  long currentTime = millis();
```

```
  if (currentTime - lastNoteOffTime > duration) {
    midiBus.sendNoteOff(1, midiNote, 0);
    lastNoteOffTime = currentTime;
  }
}

void drawBlobOutline(Blob blob, color outlineColor) {
  stroke(outlineColor);
  strokeWeight(2); // Line thickness
  noFill();
  beginShape();
  for (int i = 0; i < blob.getEdgeNb(); i++) {
    EdgeVertex eA = blob.getEdgeVertexA(i);
    if (eA != null) {
      EdgeVertex eB = blob.getEdgeVertexB(i);
      if (eB != null) {
        float xA = eA.x * width;
        float yA = eA.y * height;
        float xB = eB.x * width;
        float yB = eB.y * height;
        line(xA, yA, xB, yB);
      }
    }
  }
  endShape(CLOSE);
}

ArrayList<Blob> findLargestBlobs(int numBlobs) {
  ArrayList<Blob> blobs = new ArrayList<Blob>();
  for (int n = 0; n < blobDetect.getBlobNb(); n++) {
    blobs.add(blobDetect.getBlob(n));
  }
  blobs.sort((b1, b2) -> Float.compare(b2.w * b2.h, b1.w * b1.h));
  return new ArrayList<Blob>(blobs.subList(0, min(numBlobs,
blobs.size())));
}

ArrayList<Blob> findLargestBlobsInverted(int numBlobs) {
  ArrayList<Blob> blobs = new ArrayList<Blob>();
  for (int n = 0; n < blobDetectInverted.getBlobNb(); n++) {
    blobs.add(blobDetectInverted.getBlob(n));
```

```
  }
  blobs.sort((b1, b2) -> Float.compare(b2.w * b2.h, b1.w * b1.h));
  return new ArrayList<Blob>(blobs.subList(0, min(numBlobs,
blobs.size())));
}


int getNoteDuration(float yPos) {
  // Dividing the height into 6 zones for different note durations
  int zone = int(map(yPos, 0, height, 0, 6));
  switch (zone) {
    case 0: return 20000; // Semibreve (whole note)
    case 1: return 10000; // Minim (half note)
    case 2: return 5000;  // Crotchet (quarter note)
    case 3: return 2500;  // Quaver (eighth note)
    case 4: return 1250;  // Semiquaver (sixteenth note)
    case 5: return 620;   // Demisemiquaver (thirty-second note)
    default: return 500; // Default to Crotchet if something goes
wrong
  }
}

int getScaleNote(int index, float x, float y) {
  int[] scale;
  if (y < height / 2) {
    if (x < width / 2) {
      scale = cMajor; // Top left quarter - C Major
    } else {
      scale = aMinor; // Top right quarter - A Minor
    }
  } else {
    if (x < width / 2) {
      scale = fMajor; // Bottom left quarter - F Major
    } else {
      scale = gMajor; // Bottom right quarter - G Major
    }
  }
  return scale[index % scale.length]; // Ensure index is within the
scale length
}
```

```
class BlobTracker {
  Blob blob;
  long firstSeen;
  long matureTime = 2000; // Time in milliseconds for a blob to be
considered mature
  boolean present;

  BlobTracker(Blob b) {
    blob = b;
    firstSeen = millis();
    present = true;
  }

  void update(Blob b) {
    blob = b;
    present = true;
  }

  boolean isSameBlob(Blob b) {
    // Implement logic to determine if 'b' is the same as the
currently tracked 'blob'
    // This can be based on position, size, etc.
    return true; // Placeholder
  }

  boolean isMature() {
    return millis() - firstSeen > matureTime;
  }

  boolean isBlobStillPresent() {
    if (present) {
      present = false;
      return true;
    }
    return false;
  }

  Blob getBlob() {
    return blob;
  }
}
```

```
void stop() {
  cam.stop();
  super.stop();
}
```

7. Scores

Reproduced below – page numbering is non-contiguous from this point.

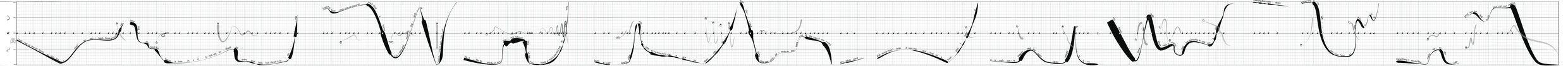
to project inwards

solo voice

4'00"

r k i n g
- p h d -
j u l 2 4

to project inwards



r k i n g
a p r 2 1

i dissociate

bass viol

8’30”

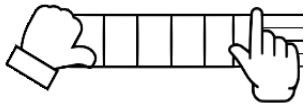
r k i n g
- p h d -
j u l 2 4

i dissociate

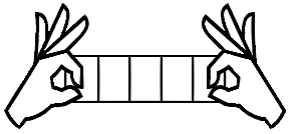
This piece reimagines the viol as a ‘sound-producing object’, focusing on minute sound details, and is inspired by musique concrète instrumentale, such as Lachenmann’s *Pression*. No bow is used throughout.

Throughout the piece, colour-coding is used to help the violist distinguish between paths; the colours have no performance implication in themselves. The **first two couplets** require the player to place the fingerboard of the viol on their lap, with the viol out to their right hand side. The following symbols indicate how the hands should be used to generate sounds:

The left hand fingers the lower notes silently, while the right hand taps and holds the upper notes, akin to electric guitar tapping.



The right hand fingers the written notes silently while the left thumb plucks the strings near the instrument's head. Note that the player will be plucking closest to the head of the instrument.



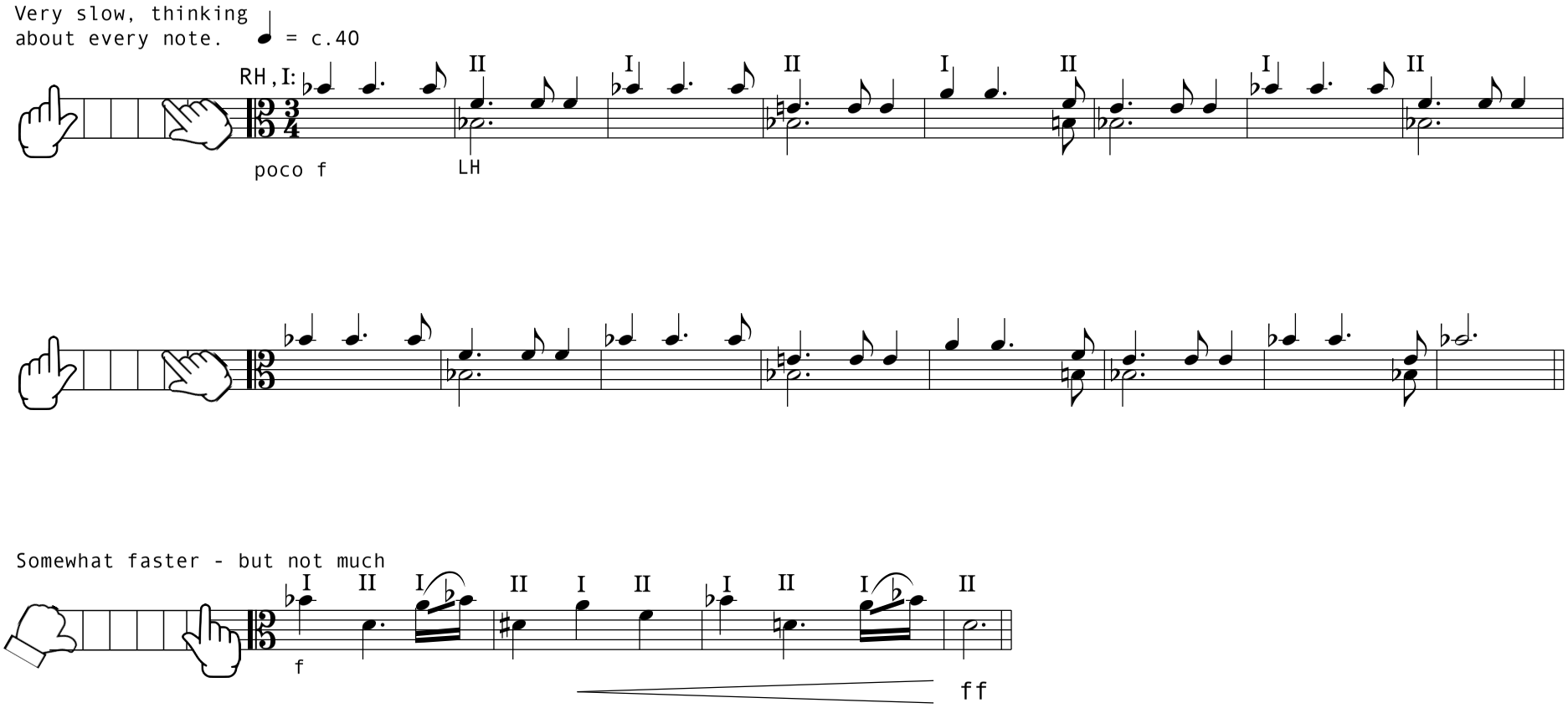
Pinch the indicated strings together and roll them over each other, so that they ‘ping’ in the rhythm shown in cells A & B. Move the centre-point between the hands along the strings as indicated by the grey line. Vertical movement and confusion in the line is intentional to enhance dissociation.

In the **third couplet**, tap notes again with the left hand, and smear a finger over the viol's body with the right hand to produce a squeaking sound. Line thickness is proportional to smear pressure and speed.

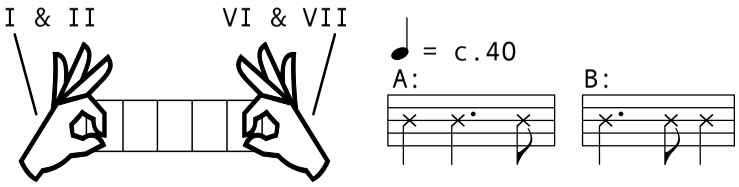
The **fourth couplet** requires the player to hold the viol against the body like a guitar with strings facing the chest. Tap notes with the left hand thumb and smear the back with the right hand. Follow numbered paths and perform slaps mid-smear based on rhythms for odd and even cells. Smear pressure and speed are proportional to line thickness.

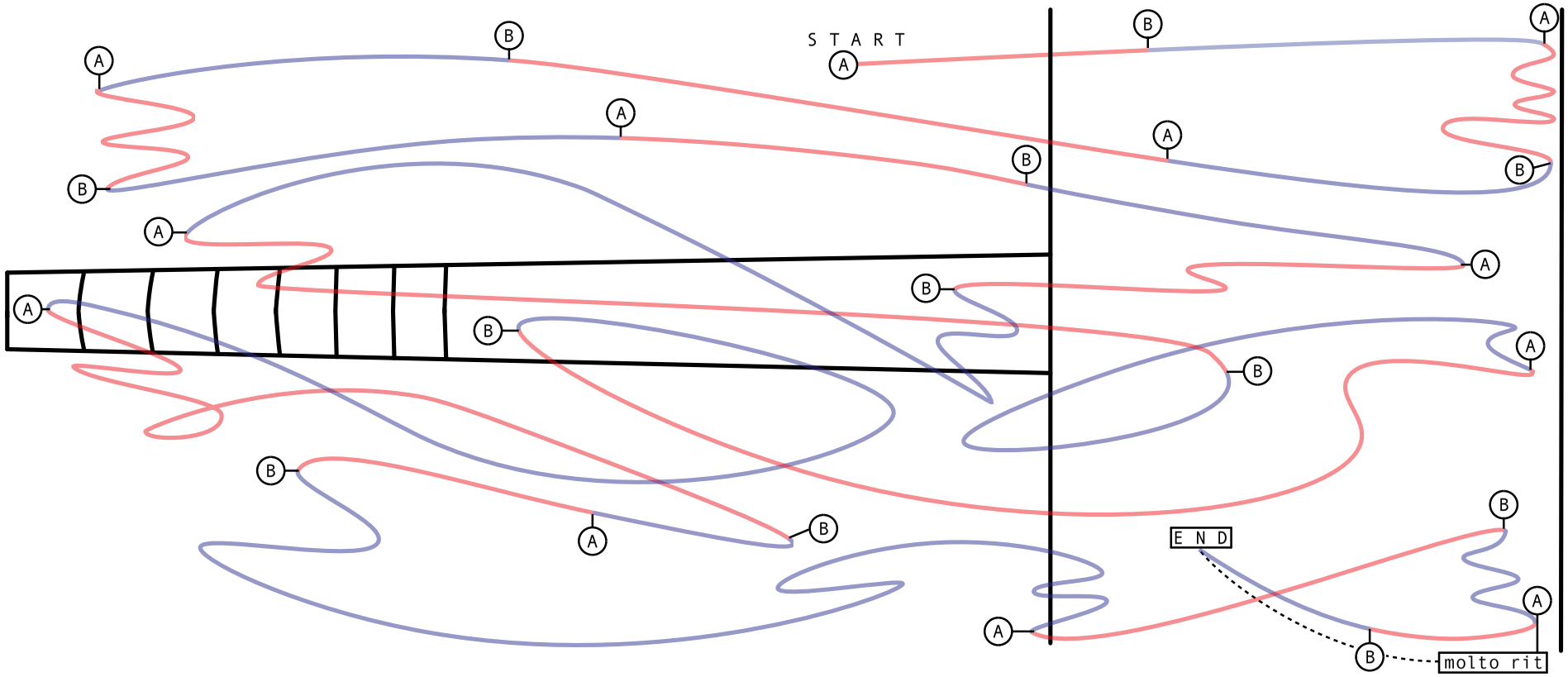
In the **fifth couplet**, the violist must drum on the instrument with four fingers, with speed and pressure again proportional to line thickness. Fingers should ‘walk’ over obstacles on the instrument. The viol is shown as a mirror image of the player’s view; the top bouts of the instrument, nearest the player’s face, are at the top.

1

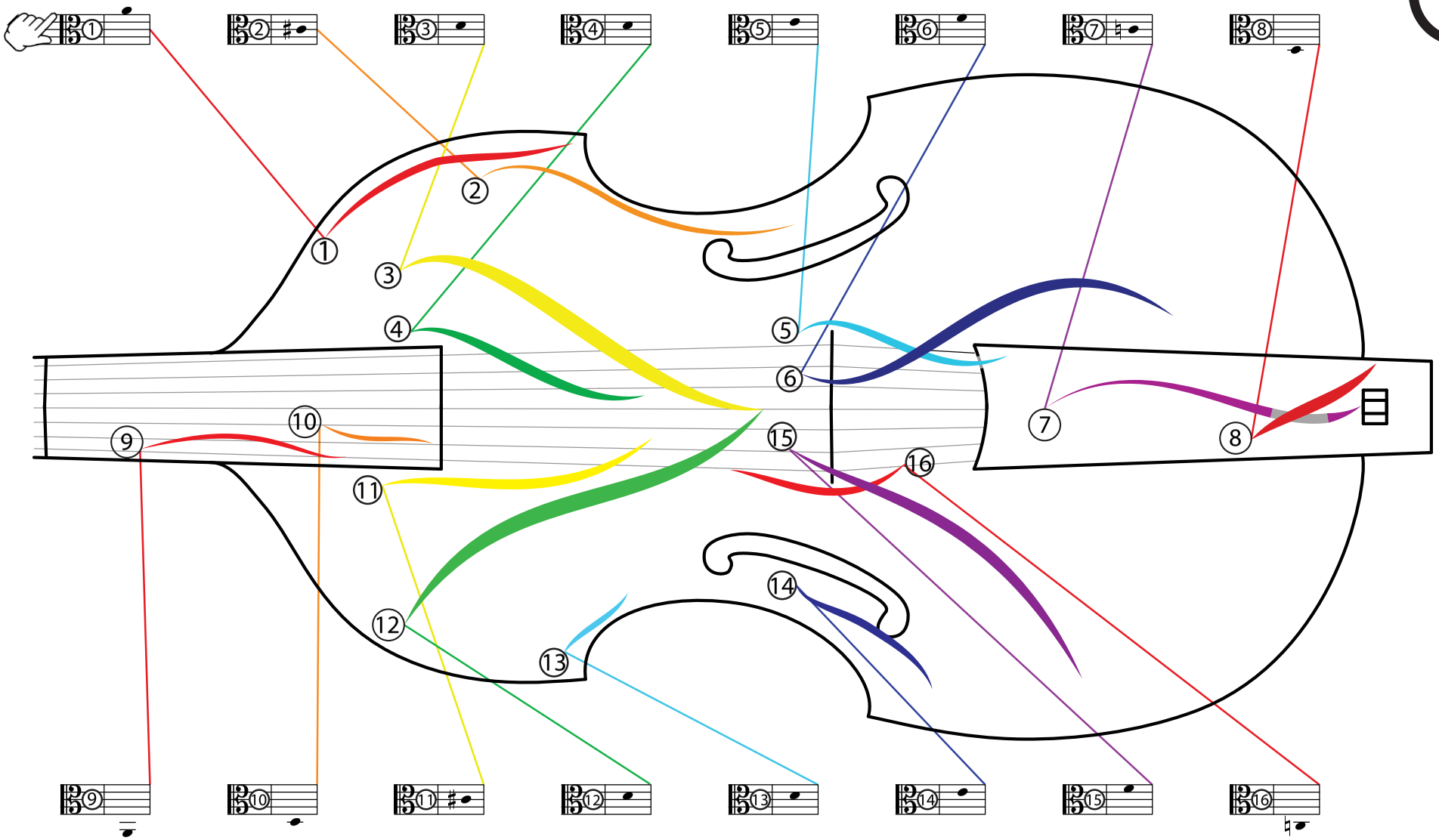

Very slow, thinking
about every note.
= c.40
RH, I:
poco f
LH
Somewhat faster - but not much
f
ff

2





3

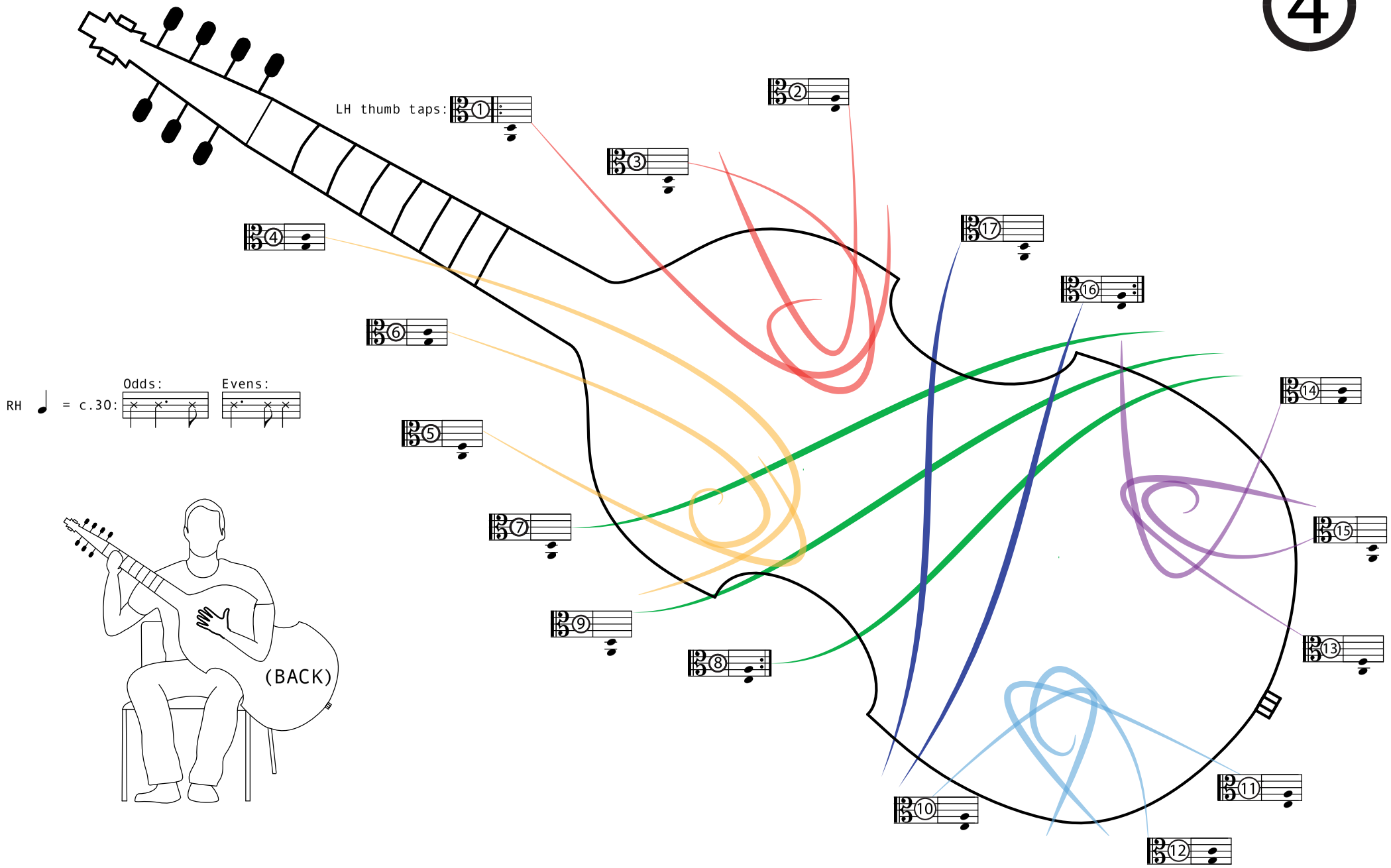


Ad lib.: try to connect all the starting points in reverse order,
(17) running over strings, bridge etc., as if they are undulations in a landscape.
Pitch material ad lib. around D.

i d i s s o c i a t e

r k i n g
m a y 2 0

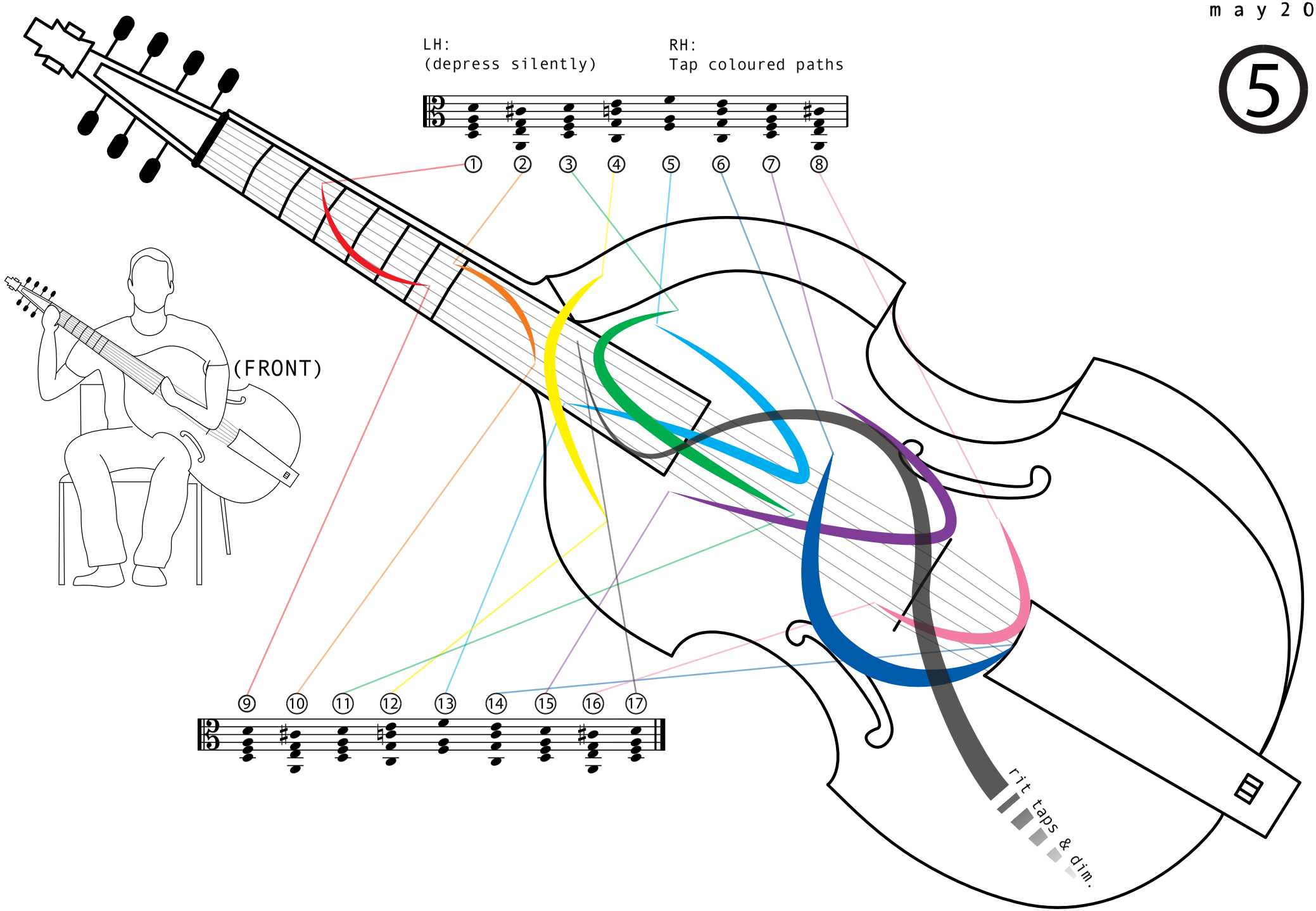
4



i dissociate

rking
may20

5



say you love me
('you love me')

violin with
two players

8'30"

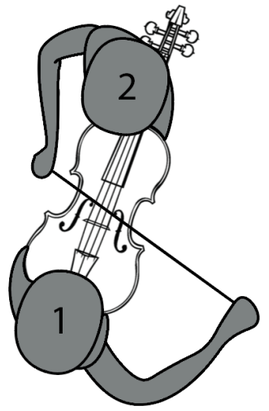
r k i n g
- p h d -
j u l 2 4

Say you love me / “you love me”

In this piece, two players face each other across a single violin. Player 1 uses their left hand on the fingerboard normally, while Player 2 fits around them. The strings are therefore reversed for player 2: the G string is the E string and vice versa. Player 2 plays notes as if holding the violin normally but closer to the bridge. Both players share one bow, with Player 2 holding the tip and Player 1 holding the frog.

The piece is structured in gestures, comprising the notated materials, and the path of the bow (emanating from the notated materials). In the first half (gestures 1-8), Player 1 leads, and Player 2 imitates each gesture immediately after it is completed, in reverse. In the second half (gestures 9-16), Player 2 leads, and Player 1 imitates. The gestures are finished when the bow stops moving; the imitating player should then push the bow back along the path the previous player drew.

Translucent lines on the score indicate bow position and dynamics of the gestures. Vertical height corresponds to bow placement relative to the bridge, fingerboard, and nut, while the width of the lines represents the dynamics. Diagrams on the left and right of the page provide a simplified schematic of the violin, to guide the path of the gestures, with the bowstroke beginning at the indicated material and lasting approximately 15 seconds, ad lib.



“You love me”

For John & Marie

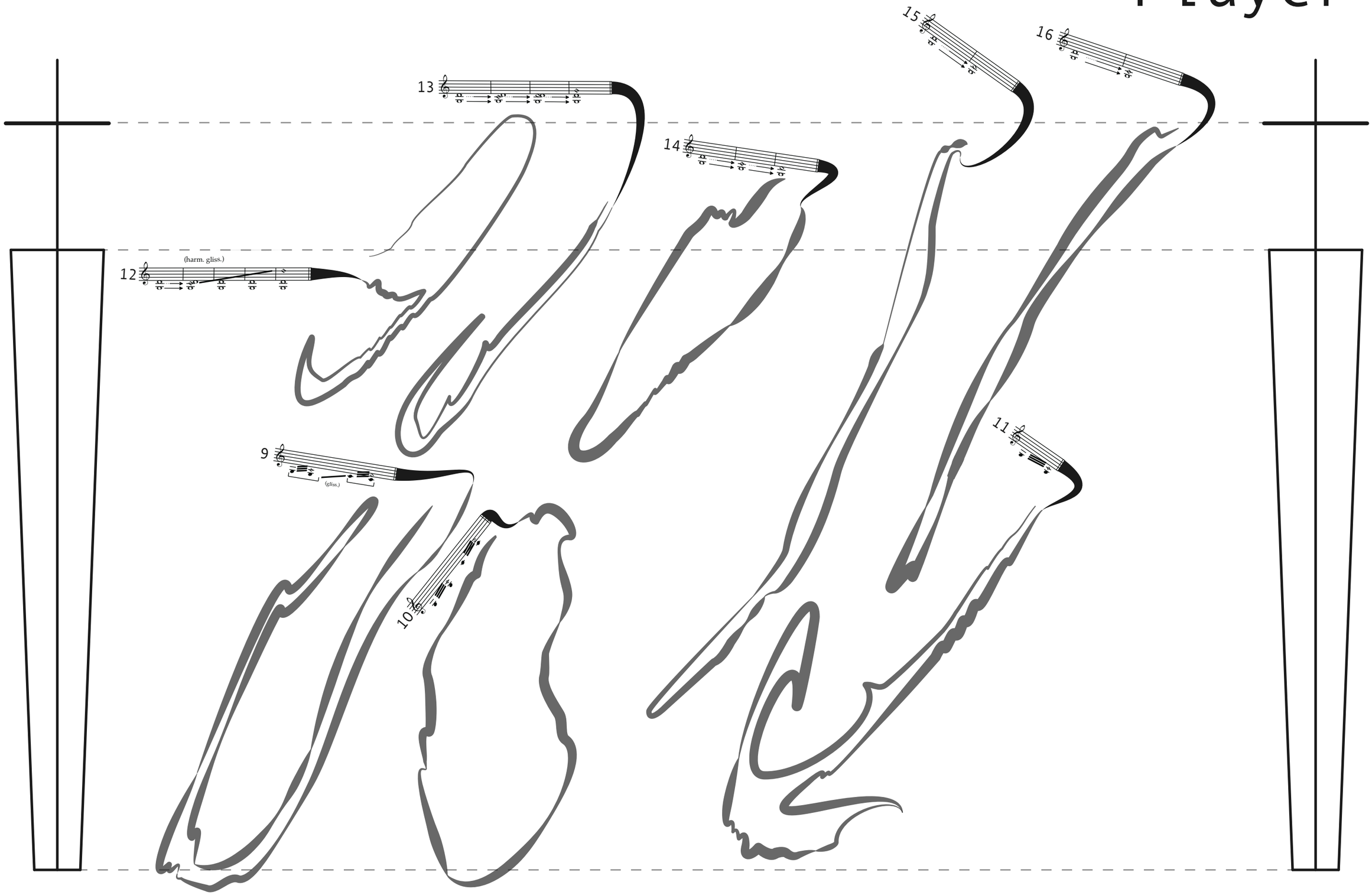
Say you love me

For 1 violin/2 performers

Player 1

“You love me”
For John & Marie

Player 2



Say you love me
For 1 violin/2 performers

5 TENSe Minutes

cello &
TENS machine

6'20"

r k i n g
- p h d -
j u l 2 4

5 TENSe Minutes

5 TENSe Minutes is a quasi-improvisatory piece for solo cellist, utilizing live video delay software and a transcutaneous electrical nerve stimulation (TENS) machine. Technical requirements include a laptop for video delay, a table or stand on which to place the laptop, and a TENS machine with three AAA batteries. The TENS machine's pads are secured to the right forearm with tape and a tight fabric/bandage 'sleeve' under regular clothing, with the device discreetly operated from the cellist's pocket. The video delay software chosen for the trials of this project was Zach Poff's 'live video delay' software.

The cellist starts by playing an improvised down-bow stroke (potentially introducing short up-bow moments, provided the main motion is from frog to tip). This stroke is then disrupted by painful, alternating short and long shocks from the TENS machine applied to the cellist's forearm. This introduces imperfections to the bowstroke, by involuntarily tensing their forearm muscles.

The cellist must mimic these altered movements in real-time, as displayed on the laptop screen. The video delay should be set to c.9.5 seconds at 20% opacity. This opacity allows the cellist to see themselves live, so that they can match their live image with the previous 9.5 seconds. The cellist should match the overlay with their live image as much as they can. This setup challenges the cellist to adapt their playing to both the involuntary muscle contractions and the visual feedback, layering imperfection over imperfection with each successive loop.

contingency

timpano *and*
trombone

6'00"

r k i n g
- p h d -
j u l 2 4

contingency

Timpano:

- normal noteheads: play with a medium mallet.

- crossed noteheads: play with a fingernail - (tapped on the skin of the drum, just as a mallet would be).

- diamond noteheads: do not 'hit' note with mallet or nail, but allow the trombone's note to make the timpano sound sympathetically. This applies to glissandi as well; sometimes, such as in b.7, a note is hit by the percussionist, and then a glissando is given with a diamond notehead. This later note is *not* to be sounded by the timpanist, who must only play glissando - the trombone will make the drum sound sympathetically. Only sound normal or crossed noteheads.

Trombone:

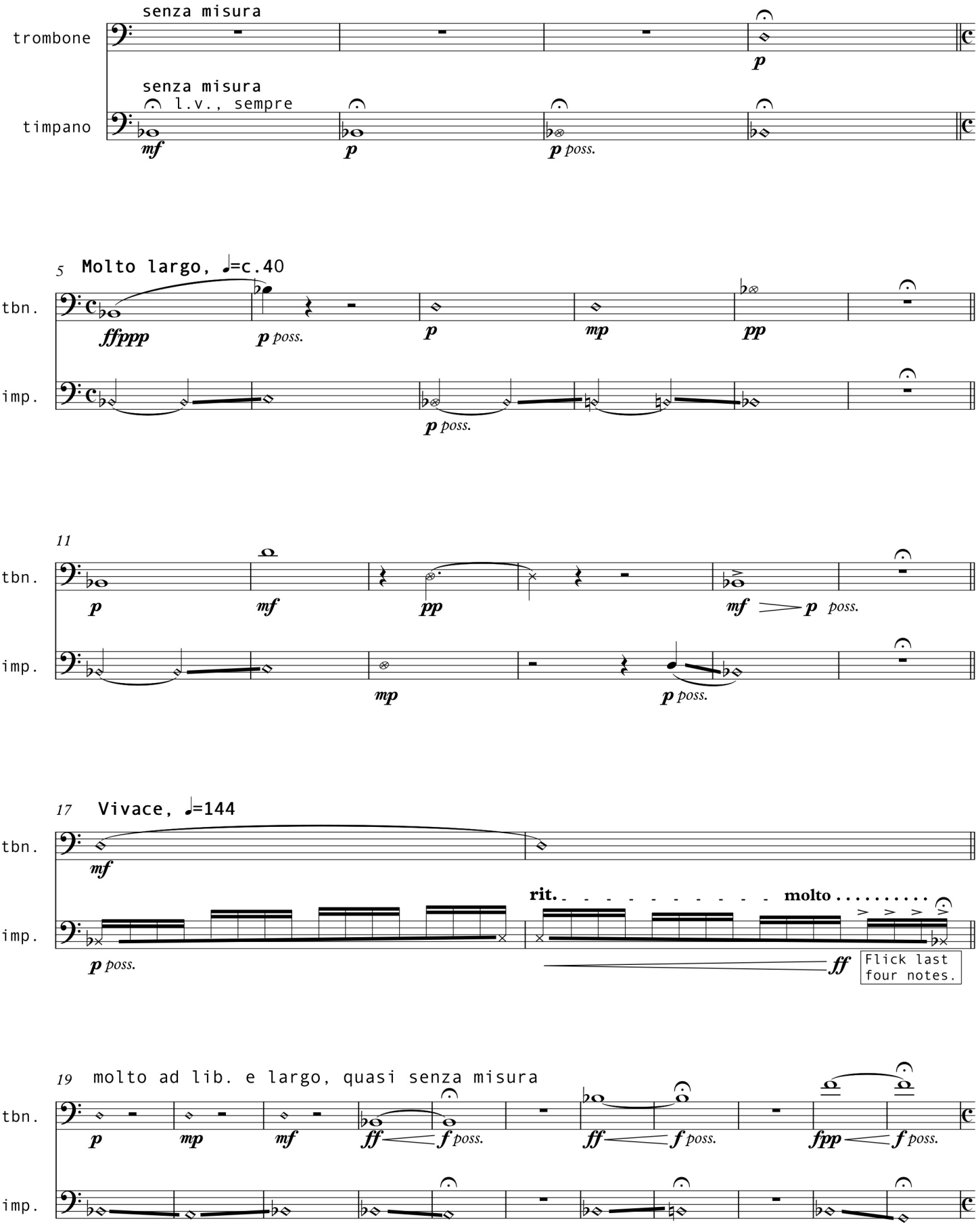
- crossed noteheads: put the bell of the instrument flat on the skin of the timpano, and play into its belly. Position the slide so that it misses the rim of the drum.

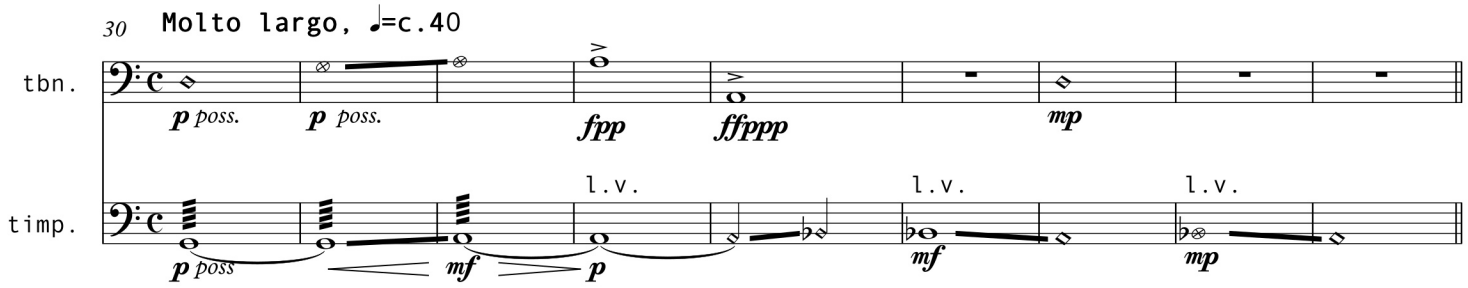
- diamond noteheads: put the bell of the instrument on the skin of the drum as above, but do not make a noise by blowing; the action of touching the instrument to the timpano's skin should create a sound, as if using the trombone as a kind of beater for the timpano. Once the duration of the note has passed, remove the trombone from the skin of the drum. These are all notated on the centre line of the staff - there is no pitch produced by the trombone itself, so the pitch notated is irrelevant (but will be controlled by the timpanist in accordance with the notation in their staff).

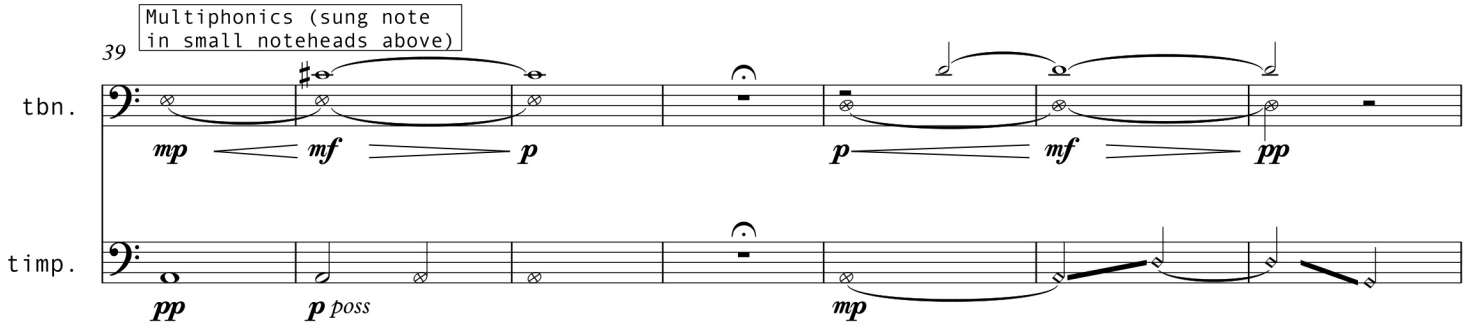
- Always play in the direction of the timpano, so as to maximise sympathetic vibrations.

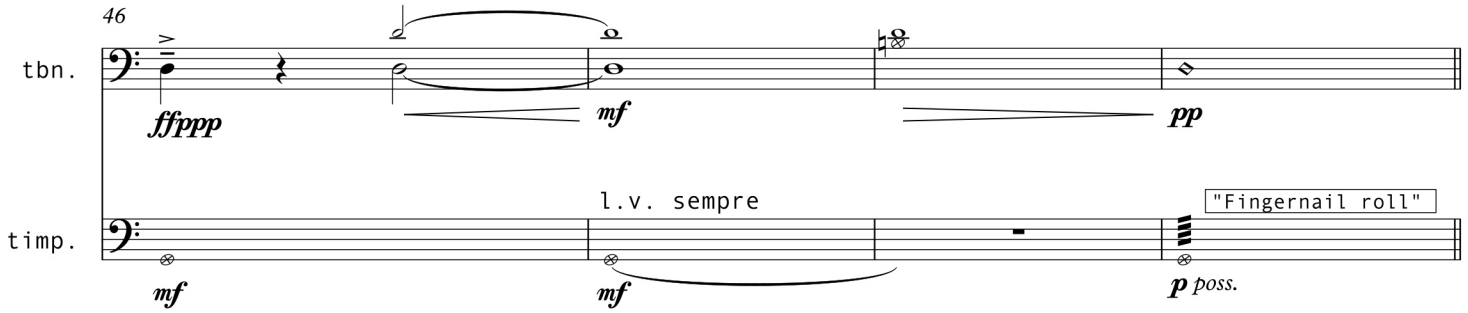
c o n t i n g e n c y

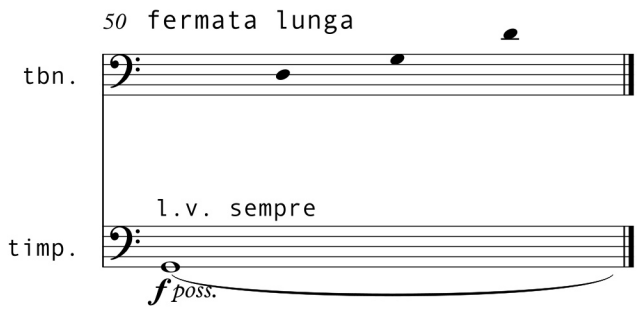
r k i n g
0 5 . 1 9











In the 'fermata lunga' bar, the trombone should play the notes given in order to 'top up' the sound from the timpano as it dies, in an attempt to keep the sympathetic vibrations resonating for as long as possible. This will require the trombonist to play louder and longer notes as the drum head resonates less and less, until the trombone is the sole source of vibration for the timpano (as opposed to the initial strike from the timpanist). When the trombonist decides that this point has been reached, settle on one of the indicated notes, as long and loudly as possible.

Three Head God

for open trio

6'00"

r k i n g
- p h d -
j u l 2 4

Three Head God

Individual players' notes are contained in their parts. It is important, however, for players to keep their parts a secret from the others; this will maintain the integrity of the piece.

The clarinettist focusses on their own playing, changing their material when their attention drifts away from what they are playing. The pianist focusses on the clarinettist's movements, changing when the clarinettist blinks. The violinist changes their notes when they notice the pianist's breaths changing from in to out, and so on.

The purpose of the piece is to provide a semi-irregular, organic 'clock' for the movement through materials. The three players all operate on different timescales, but they are linked somewhat by the interactivity of the 'watching' on which the piece is based.

All further, specific instructions are in individual players' parts.

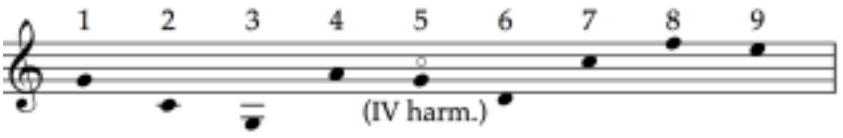
<u>Three Head God</u> - Player 1 *(for contrazontal performance: violin)*

Do not show your music or performance notes to the other performers - and do not look at their music/notes either.

All three players' parts are designed to work separately; you do not have to coordinate anything other than the start (and even this does not have to be precise - think of it as 'jumping into the middle' of a piece, rather than beginning together exactly as one ensemble). The start will be cued by player 2 *(for contrazontal performance: piano)*.

- This is a piece about **subconscious actions**; your focus is **breathing**.

- You watch player 2 *(piano)*; when they breathe in, you play (rest on out-breath). Try not to let player 2 know you are watching.
  - This may require you to be hyper-vigilant, if the pianist's breathing is shallow. Watch as casually as you can.
  - It may also require you to interpret, subjectively, whether the pianist has started/finished their breath, as it may not be obvious. This is acceptable.
  - Cycle through the following pitches, below (senza vib.). Repeat until the stop signal (nod) is given by player 2.
  - You may select one pitch per cycle to play tremolo.



- Dynamics should always be roughly proportional to your perception of rate of airflow; i.e. at the end of each inwards breath, you might expect a small diminuendo as the rate of airflow into the lungs slows. This might occur at the beginning of each breath too; you can interpret this artistically to give each gesture an appealing arch shape, if you wish. Maximum dynamic should be ***mf***.

<u>Three Head God</u> - Player 2

Do not show your music or performance notes to the other performers - and do not look at their music/notes either.

All three players' parts are designed to work separately; you do not have to coordinate anything other than the start (and even this does not have to be precise - think of it as 'jumping into the middle' of a piece, rather than beginning together exactly as one ensemble). The start will be cued by player 2 (for contrazontal performance: piano).

- This is a piece about attention; your focus is movement.

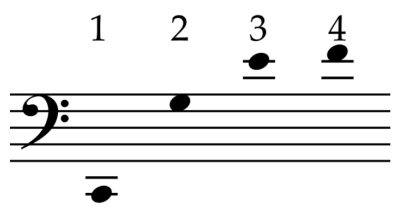
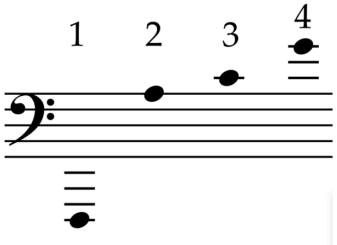
- You watch player 3 (for contrazontal performance: clarinet); when they blink, you play. Try not to let player 3 know you are watching (this might be difficult. Be as casual as you can).

- Start by playing pitches from set 1. When you notice player 2 take a long break, break with them, and start using pitches from set 2 when they begin again. Alternate between sets 1 & 2 any time you notice player 2 taking a long break.
    - The pitches are ordered by the rough frequency with which you should play them, 1 being the most, 4 being the least. The order in which you play them is entirely up to you (so you can repeat notes, and play them according to your taste; the piece is not prescriptive). Try not to miss a blink or mix sets - it is not 'against the rules' if you do, however.

- Dynamics should never exceed mp and sustain pedal should be constantly depressed.

- At approximately 4 minutes into the piece, ignore the timer and player 3; you should play 4 more notes from whichever pitch set you are on, to coincide with 4 of your outward breaths. After the 4th breath/note, stop and wait for the sound to die. Remove your hands from the instrument and cue player 1 to stop whilst sound dies (cue player 1 with a deep nod).

Pitch sets:

Set 1	Set 2
	

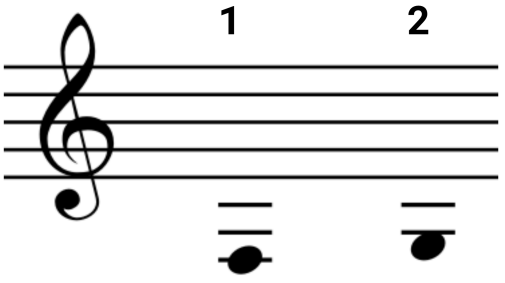
<u>Three Head God</u> - Player 3 *(for contrazontal performance: clarinet)*

Do not show your music or performance notes to the other performers - and do not look at their music/notes either.

All three players' parts are designed to work separately; you do not have to coordinate anything other than the start (and even this does not have to be precise - think of it as 'jumping into the middle' of a piece, rather than beginning together exactly as one ensemble). The start will be cued by player 2 (for contrazontal performance: piano).

- This is a piece about meditation; your focus is attention.
- Focus all of your attention on the note numbered '1', and play it. The moment you notice your attention has slipped from note 1, focus on note 2, and play it. Repeat this process - keep alternating between the first and second note. Sound should be fairly constant, but you may take a very brief moment between notes to breathe/retake a bow.
- Try to make each note well-shaped and beautiful (give the dynamics a subtle swell to max. mp in the middle).
- Try not to make it look as if you are focussing - just look at the music naturally, without staring or closing your eyes.
- You may take a break of c.10 seconds, roughly once every ten notes you play. Keep the same focus that you had, bearing the previous bullet point in mind.
- You may retake a note once you have reached its end, by re-bowing it or taking a breath (but bear in mind that this will almost certainly constitute your attention slipping from the note itself, meaning that you would have to move onto the next note anyway).
- You should finish when you notice that the other players have stopped.

N.B. these notes are scored in C



Fabric Seas

2.2.2.2 - 2.2.0.0
vib., cym., synth., strings

20'00"

r k i n g
- p h d -
j u l 2 4

Fabric Seas

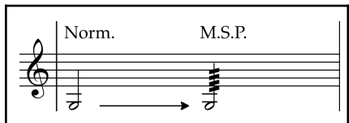
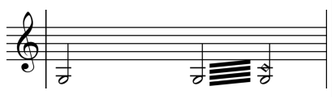
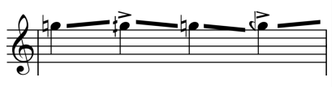
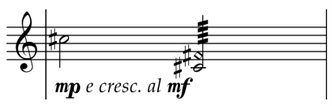
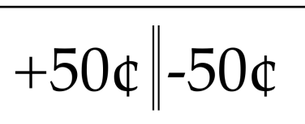
This piece requires each string player to have access to an audio source (likely a mobile phone) to play a moveable sine tone. They must play in tune with, or relative to, this tone. Tunings in cents are given to the strings to further orient them in their performance of microtones.

The piece is designed in two halves, further divided by 12 cymbal superball-scrapes. The two halves enshrine (and latterly reveal) the idea of the piece - 'just noticeable difference'. In the first half, the movement of the sine tone fundamental is incremental enough that it should not be noticed by the listener. In the second half, its slow progress changes - both in rate, but also in that it deviates from its original linear trajectory. As the piece progresses, instruments *other* than the strings play just-tuned intervals against the strings steadily-rising notes.

There are other harmonic materials, too, designed to obfuscate the microtonal rise of the strings, but complement the harmonies generated by the just-intoned notes. Furthermore, the strings play small gestures, whose rhythms and small-scale microtonal movements further obfuscate their macroscopic microtonal movement. The whole orchestra should play *non vibrato*.

Repeated cells are notated with only their first iteration fully written out; subsequent repetitions are indicated by thick lines, similar to Lutosławski's approach in the 3rd Symphony. The repeated cells are not rewritten for each repetition; instead, they are notated once, with the repetition duration marked by thick lines. The critical aspect is maintaining the overall duration of the gesture, measured in bars and beats. While the small-scale rhythmic shape of the gesture should remain intact if possible, the most important consideration is the total duration of the gesture.

Extended Techniques

	An arrow indicates a gradual, even transition from one note's articulations to the next, over the course of the bar or cell. Here, a normally-executed note should move to a tremolo note, *molto sul pont*. *Molto sul tasto* would be indicated by 'M.S.T'.
	This is a 'false harmonic tremolo'. Rapidly alternate between the note on the left and the false harmonic on the right, by quickly touching and releasing the string.
	Glissando to a half-sharp or half-flat (on the second and fourth notes respectively). Note that, as the player will usually be moving microtonally in accordance with the ¢ indications, the half-accidentals should be performed relative to the starting pitch, and *not* be 'absolute'. The gliss. line ending the gesture means that the player should gliss. back to the starting note. Half flat: Half sharp:  Three-quarter flat:  Three-quarter sharp: 
	Dynamics apply to the overall duration indicated by the thick line emanating from the gesture, *not* the length of the individual bar/cell. For instance, if the gesture is to be played over 12 bars, the indicated *dim*. (left) is to be executed for the length of the total 12 bars.
	This shows a fast jump between fundamentals from one bar to another. Here, any held notes from previous gestures carry on playing in tune with the in-ear fundamental.

The score and notes are best viewed at A3 size, as they were originally created.

f a b r i c s e a s

r k i n g
m a r 2 4

2 3 4 5 6 7 8 9 10 11 12 13 14 15

♩=60 - floating & free

Flute I
Flute II
Oboe I
Oboe II
Clarinet in B♭ I
Clarinet in B♭ II
Bassoon I
Bassoon II

Horn in F I
Horn in F II
Trumpet in B♭ I
Trumpet in B♭ II

Vibraphone
Cymbal (Superball)
Keyboard

Violin I.i
Violin I.ii
Violin I.iii
Violin I.iv
Violin II.i
Violin II.ii
Violin II.iii
Violin II.iv
Viola.i
Viola.ii
Violoncello.i
Violoncello.ii
Contrabass

Norm. → M.S.P.

III (harm.)

-50¢ -48¢ -46 -44¢ -42¢

2

16 17 18 19 20 21 22 23 24 25 26 A 28 29 30

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.Ball)
(L.V. sempre)
mf sempre
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Norm. M.S.P.
pp
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Norm. M.S.P. Norm.
Vc. II
Norm. M.S.P.
Cb.
(II harm.)

-40¢ -38¢ -36¢ -34¢ -32¢

31 32 33 34 35 36 37 **B** 39 40 41 42 43 44 45 3

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

Increase rotor to max.

Norm. → M.S.P.

-30¢ -28¢ -26¢ -24¢ -22¢

C

46 47 48 49 50 51 52 53 55 56 57 58 59 60

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

pp mp p pp

pp mp pp

pp mp pp

p poco f p

pp mp p

p poss. quasi flz. p poss. mf p poss.

pp mp

pp

D.L. pp

p Norm.

arco mp

Decrease rotor to max.

p mp

8va Norm. M.S.P mp dim.

p

-20¢ -18 -16¢ -14¢ -12¢

D

61 62 63 64 65 66 67 68 69 70 71 72 74 75

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

p pass.
D.L.
Avec baguettes
L.V. sempre
Av. bag.
Decrease solos to mm.
8va
Norm.
M.S.P.

-10¢ -8¢ -6¢ -4¢ -2¢

76 77 78 79 80 81 82 **E** 84 85 86 87 88 89 90

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

pp p mp mf f poco f

Norm. D.L. M.S.P.

arco

Ac. bag.

Increase rotor to max.

Decrease rotor to min.

8va

poco cresc.

0¢ +2¢ +4¢ +6¢ +8¢

91 92 F 94 95 96 97 98 99 100 101 102 103 104 105

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

arco
marc.
Rehor on min. al fine
Spa
Norm.
M.S.P.
Sul tasto
M.S.T.
dim. al pp

+10¢ +12¢ +14¢ +16¢ +18¢

8

106 107 108 **G** 110 111 112 113 114 115 116 117 118 119 120

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

p
pp
pp
p
pp
pp

+20¢ +22¢ +24¢ +26¢ +28¢

H

122 123 124 125 126 127 128 129 130 131 132 133 134 135

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib. — arco — *p* — arco — *pp* — arco — *ppp*
Cym. (S.ball)
Kbd. — *p*
Vln. I.i — *p dim. al* ***pp*** — ***pp***
Vln. I.ii — *p dim. al* ***pp*** — ***pp***
Vln. I.iii — *p dim. al* ***pp***
Vln. I.iv — *p dim. al* ***pp***
Vln. II.i — ***PPP***
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I — ***pp*** — ***PPP***
Vla. II — ***pp***
Vc. I
Vc. II
Cb.

+30¢ +32¢ +34¢ +36¢ +38¢

10

136 137 138 139 141 142 143 144 145 146 147 148 149 150

I

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

arco
ppp

ppp

ppp

+40¢ +42¢ +44¢ +46¢ +48¢

J

151 153 154 155 156 157 158 159 160 161 162 163 164 165

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

pp *Sva* *p*

+50¢ +50¢ +49¢ +48¢ +47¢ +46¢ +45

166 167 168 169 170 171 173 174 175 176 177 178 179 180

K

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

Av. bag.
mf
mp
8va
Norm.
M.S.P.
M.S.T.
p poss.
p e dim. al niente
S.T.
p

+43¢ +41¢ +38¢ +34¢ +28¢ +18¢ +1¢ -41¢

181 182 L 184 185 186 187 188 189 190 191 192 193 194 M

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

p poss.
pp
M.S.T
M.S.P
p
8va
pp e cresc. al mf

-50¢ -49¢ -48¢ -46¢ -45¢ -43¢ -40¢

196 197 198 199 200 201 202 203 204 205 206 207 208 209 210

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

p mp mf pp poco f pass. arco M.S.T. M.S.P. Rea e cresc. al dim. al

-36¢ -31¢ -23¢ -10¢ +18¢ +50¢ -50¢ -32¢ -11¢ -2¢ +17¢ +27¢ +33¢

N

211 212 214 215 216 217 218 219 220 221 222 223 224 225

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

aaco al fine

8va
M.S.T.
M.S.P.

+38¢ +50¢

O

226 227 228 229 230 231 232 233 235 236 237 238 239 240

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

M.S.P.
Norm.
8va
trem.
marc.

-50¢ -39¢ -31¢ -23¢ -15¢ -7¢ +1¢ +8¢

241 242 243 244 245 246 247 248 249 250 251 252 P 254 255

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

mp p pp 8va Norm. M.S.P. (I - harm.)

+16¢ +24¢ +50¢ +32¢ +40¢ +50¢ -50¢ -44¢

256 257 258 259 260 261 262 263 264 **Q** 266 267 268 269 270

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

mf dim. al niente

mf dim. al niente

mf

mp

mp

mp

(Norm., non gliss.) → trem.

mf e dim. al ***p***

8va

M.S.T.

Norm. → (III harm.)

-36¢ -28¢ -20¢ -12¢ -4¢ +4¢ +12¢ +20¢

271 272 273 274 275 276 277 **R** 279 280 281 282 283 284 285

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

(sim.)

(sim.)

8va

pp

8va

pp

8va
M.S.T.
M.S.P.

pp

pp

Norm. → M.S.P.

pp

col leg, tratto

pp

Norm. → M.S.P.

pp

8va

pp

Norm. M.S.P. (sim.)

pp

+28¢ +36¢ +44¢ +50¢ -50¢ -26¢ -12¢ -2¢

20

286 287 289 290 291 292 293 294 295 296 297 298 299 300 301

S

Fl. I
Fl. II
Ob. I
Ob. II
Cl. I
Cl. II
Bsn. I
Bsn. II
Hn. I
Hn. II
Tpt. I
Tpt. II
Vib.
Cym. (S.ball)
Kbd.
Vln. I.i
Vln. I.ii
Vln. I.iii
Vln. I.iv
Vln. II.i
Vln. II.ii
Vln. II.iii
Vln. II.iv
Vla. I
Vla. II
Vc. I
Vc. II
Cb.

8va
p
mp
dim. al niente
Norm.
M.S.T.
M.S.P.
(sim.)

+5¢ +16¢ +10¢ +50¢ -50¢ -35¢ -18¢ ±0¢ +15 +32 +50¢

Blood-Bloom

string trio

4’30”

r k i n g
- p h d -
j u l 2 4

B l o o d - B l o o m

The first page

This is the basis of the whole piece. The performers should start their stopwatches roughly simultaneously, and should use the minute markings as opportunities to ‘meet up’. These chords should be as purely tuned as the performers can make them. The chords at the minute marks should be sounded for approximately 10s.

The performers are required to glissando between pitches. These glissandi do not have to be performed precisely, provided the pitch indicated at the minute marks is reached. The glisses will be interfered with by material from the second page (described below).

The second page

This is where the idea of materials propagating from each other is explored. There are three groups of material: **A**, **B**, and **C**, which can be executed reasonably ad-lib., bearing in mind the following:

● Players decide, based on the following rules, when to switch to material from A, B, or C.

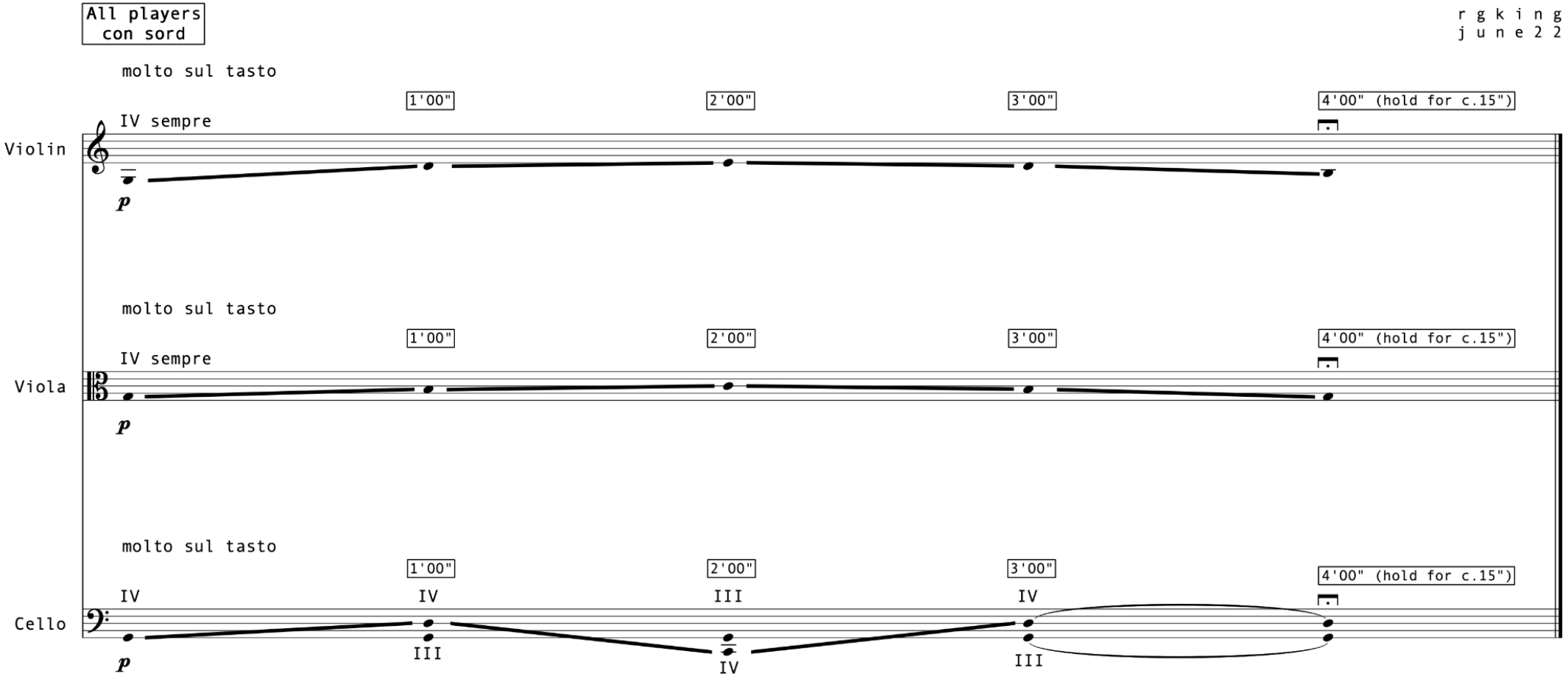
● You cannot play a letter unless someone is playing material from the previous letter (meaning that anyone can play A as they wish, but B only when A is also being played, and C only when A & B are both played).

● If whoever is playing A or B stops and returns to the first page, anyone playing successive letters (B & C, or C, respectively), must also stop, and return to the first page. They should aim to reintegrate themselves into the gliss. as seamlessly as possible (as in: they should start at roughly the same microtone at which they left the gliss. and should gently, quietly rejoin the texture, as smoothly as possible, with no accent etc.).

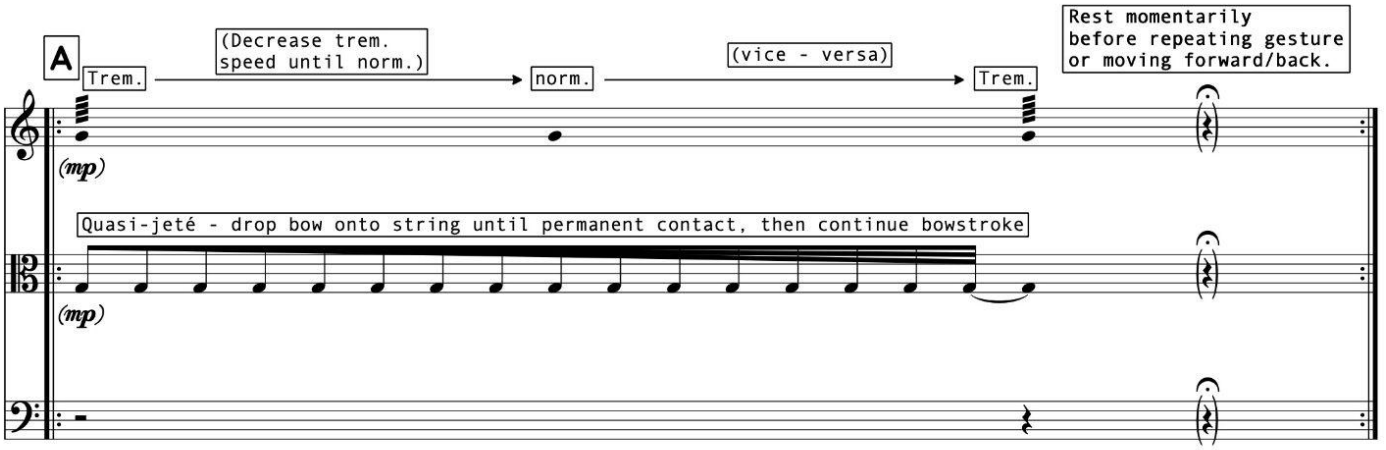
● Nobody can play the same letter’s material at the same time; that is, there cannot be three people playing A, or two playing B and one playing A. Material from the first page, though, can be played simultaneously.

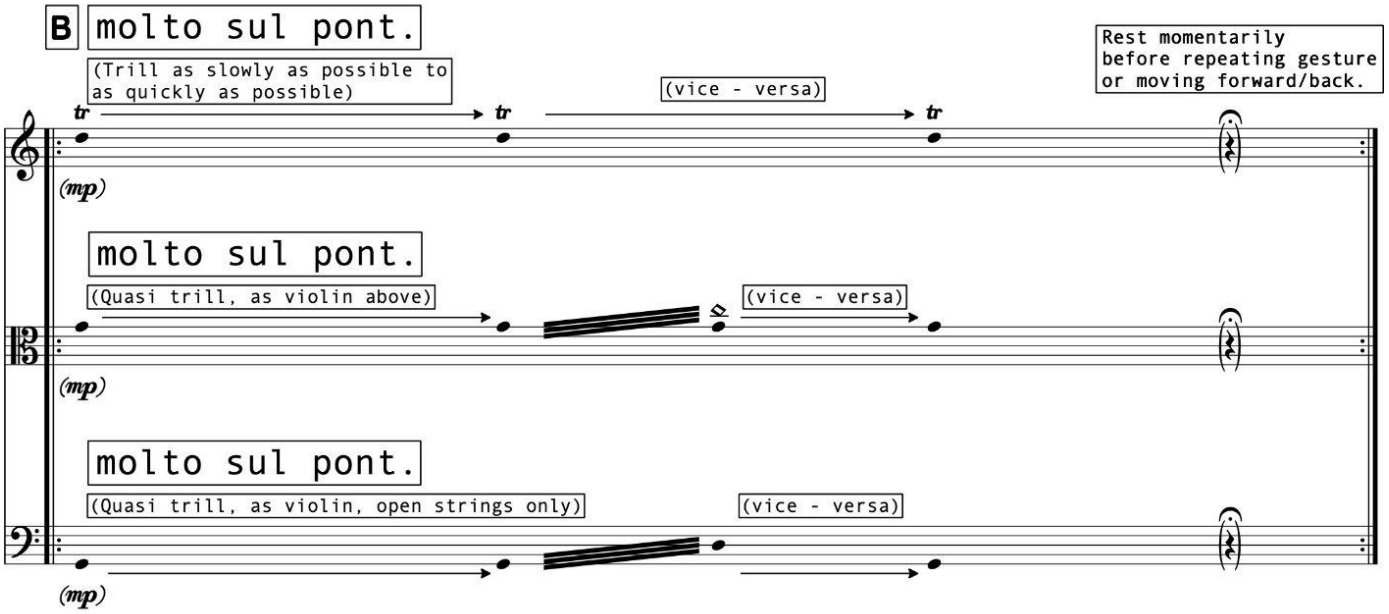
Think of this as a game, in which C (the most extreme material, furthest removed from the first page) is only heard with the cooperation of two other players. It is entirely possible (and fine) that some of the material will not be heard.

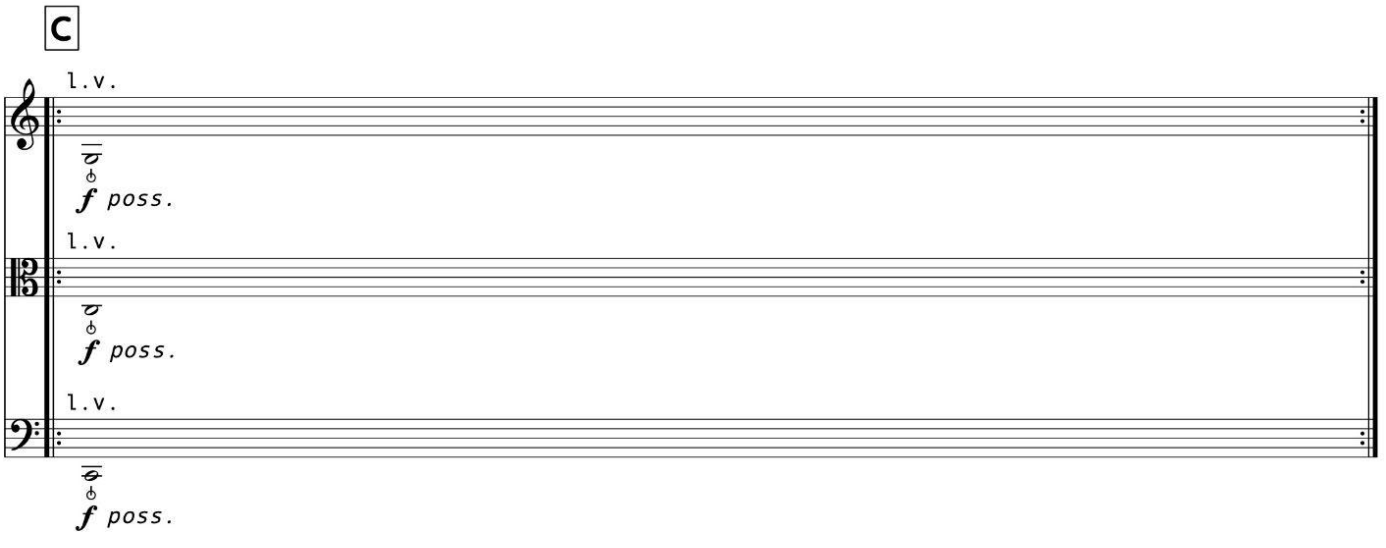
B l o o d - B l o o m


All players
con sord
r g k i n g
j u n e 2 2
molto sul tasto
IV sempre
1'00"
2'00"
3'00"
4'00" (hold for c.15")
Violin
p
molto sul tasto
IV sempre
1'00"
2'00"
3'00"
4'00" (hold for c.15")
Viola
p
molto sul tasto
IV
1'00"
IV
III
2'00"
III
IV
3'00"
IV
III
4'00" (hold for c.15")
Cello
p

Gestures on this page will last c.5 secs.







Midnight Immolation

bass flute
& electronics

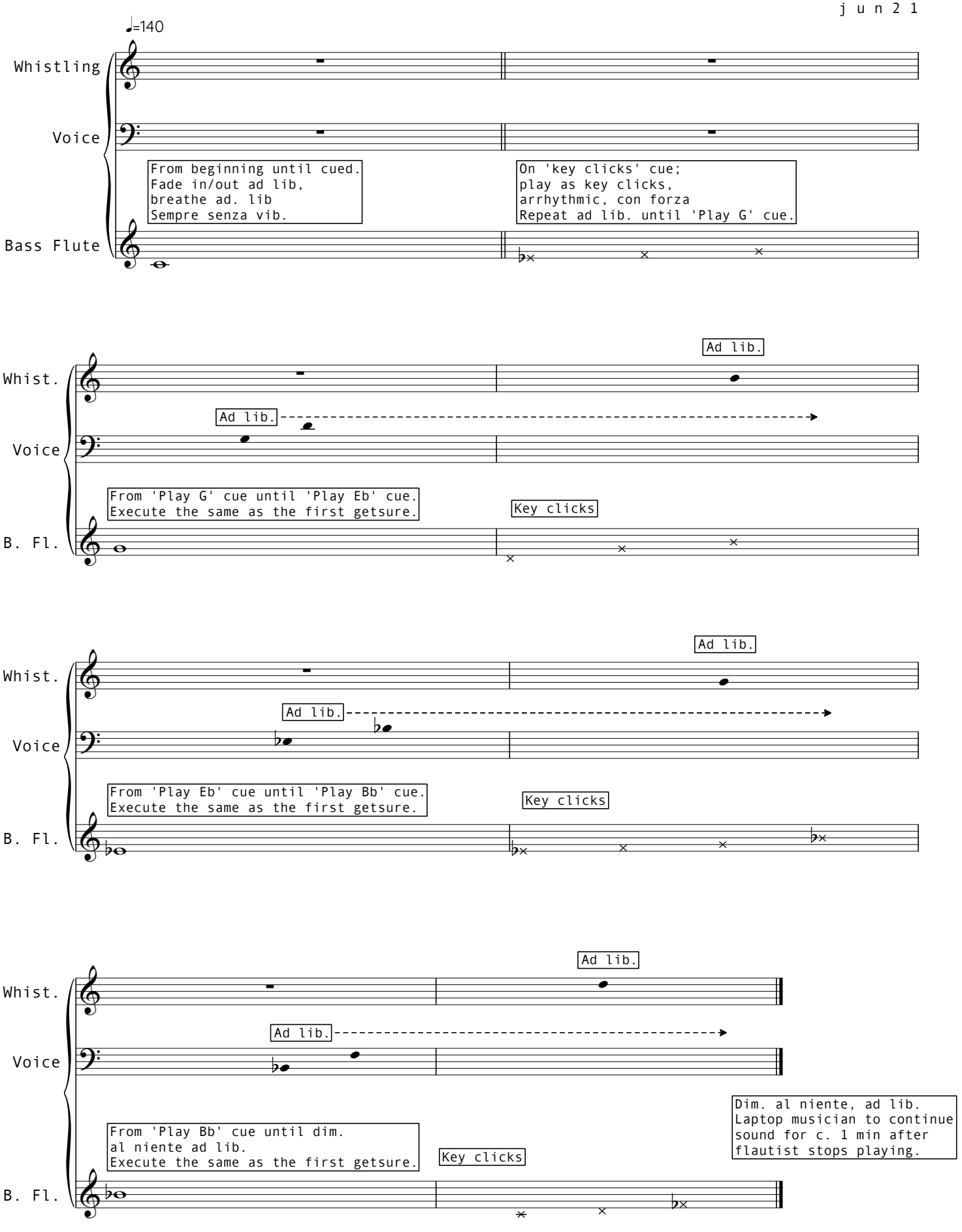
7’20”

r k i n g
- p h d -
j u l 2 4

M i d n i g h t I m m o l a t i o n

for bass flute & electronics

r k i n g
j u n 2 1



k l a T

voice & laptop

8’20”

r k i n g
- p h d -
j u l 2 4

klaT

music: r k i n g
words: any (provided here are words from ChatGPT)

The only things required for a performance of this piece are a copy of the lyrics, a pair of monitoring headphones, and a laptop running the Logic Pro X file on which the piece depends. This Logic file provides three things:

- A live sound delay, which the vocalist hears over their monitoring headphones. This will pick up their reading of the lyrics; it is best if these headphones are reasonably acoustically isolating, and do not allow the vocalist to hear anything other than their delayed speech.
- Software audio effects, inaudible to the vocalist, warping their speech.
- Prerecorded electroacoustic elements, designed to complement the vocalist's live and warped speech. This is essentially a 'backing track', not influenced by the live performance.

The performer reads the lyrics, but, because of a psychoacoustic phenomenon called 'delayed auditory feedback', their live performance will be affected by their own speech, played back to them after a short delay. The effectiveness of this delay will vary from performer to performer; it can be varied simply within Logic by adjusting the live monitoring channel's delay settings. Best results tend to be found with a c.0.15s delay, but experiment with this per performer, or even per performance depending on the acoustic environment and electroacoustic equipment available.

Pragmatically, it is best not to rehearse the piece too much. This is for two reasons: the performer may be able to develop some 'resistance' to the phenomenon through training, and the piece is easy enough to perform without much practice (as it only involves reading from a script).

Words:

In the beginning, stars whispered secrets of eternity. Time, a serpent, coils around the pillars of destiny. Vortexes of silence spin tales of forgotten lore. Eternal eyes gaze into the abyss, seeking truth. Pyramids of light cast shadows on ancient mysteries. Reflections of the cosmos dance in celestial pools. Moonlight weaves dreams across the fabric of night. Whispers of the wind echo in the halls of time. Shadows of forgotten gods linger in sacred temples. Mystic rivers flow in endless cycles of creation. In the heart of the labyrinth, lies the key to the universe.

(Whispered inwards):

The universe, the key to lies, labyrinth the heart in. Creation of cycles endless in flow, rivers mystic. Temples sacred in linger gods forgotten of shadows. Time of halls in echo wind the of whispers. Night of fabric the across dreams weaves moonlight. Pools celestial in dance cosmos the of reflections. Mysteries ancient on shadows cast light of pyramids. Truth seeking, abyss the into gaze eyes eternal. Lore forgotten of tales spin silence of vortexes. Destiny of pillars the around coils serpent, a time. Eternity of secrets whispered stars, beginning the in.”