

Title:	Defamiliarisation of a string instrument through Lorentz-force actuation
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Introduction

This paper examines how the defamiliarisation of a string instrument through Lorentz-force actuation enables the redistribution of musical agency across performer, composer, and instrument. Focusing on a viola d'amore (with added magnets and brass strings), we analyse how altered physical and acoustic responses generate new affordances that both extend and destabilise established techniques. Unlike our previous collaborations in which performance agency remained asymmetrical, the introduction of the electromagnetic feedback system creates an expanded and shared field of shared agency. Through this entangled and collaborative system, instrumental practice becomes a site of negotiated agency, where materials, embodied technique and expertise, and external manipulation all interact dynamically. This article outlines and demonstrates our initial steps in an ongoing project.



Research Questions

1. How does the defamiliarisation of a known instrument through Lorentz-force¹ actuation transform the relationship between embodied technique and instrumental affordances?

¹ The Lorentz force is the force exerted on an electric current when it passes through a magnetic field. In the present system, electrical current is passed through the conductive brass strings of the viola d'amore; their interaction with nearby magnets generates a mechanical force that sets

2. In what ways does the introduction of feedback-based control redistribute agency in performance between instrument-performer, electronics-performer, and the instrument itself?

The instrument-system

Two contextual points should be made about our choices that informed the initial phase of the project discussed below, both of which stem from a desire to make the system as open as possible to other string players.

- We avoided the development of specific new techniques, focusing instead on engaging Fusi's expertise as a performer on this instrument, and as a specialist in contemporary music, and extending his string-playing techniques in dialogue with the new affordances of this instrument, rather than developing completely new techniques.
- To make it accessible to other string players, it was important to us that we find a way to use the electromagnetic system without invasive alterations to the viola d'amore, and without needing specialist hybrid/3D-printed parts.

Fusi plays a six-string viola d'amore which is strung with brass strings. In the video documentation of this paper, the detailed string sets are configured as following: main strings I. 0.44mm, II. 0.52mm, III. 0.60mm, IV. 0.70mm, V. 0.80mm, VI. 0.90mm. All six sympathetic strings were of identical gauge of 0.21mm.

The tuning of the instrument varied greatly in the course of our experimentation, and it was generally determined according to a perceived optimal balance among tension, effective electrical activation, and instrumental playability.

Fusi's viola d'amore has magnets on the fingerboard and under the bridge (held in place with additional magnets), and is connected to a custom electromagnetics system developed by Adam Schmidt for Lorentz Time Division Multiplexing (hereafter referred to as the "LTDM box") that supplies electrical current through the strings. For a more detailed account of the LTDM box see Schmidt 2026. This current interacts with the magnets, creating a Lorentz-force that causes the strings to vibrate. In essence this is a form of feedback system but achieved through electromagnetic force (like an EBow) rather than through purely sonic means. The advantage of using this system rather than using EBows or sonic feedback is that we can connect multiple viola strings into a single feedback system with an LTDM box, and we can be very flexible about which strings are included and how many are activated (singly or as a group). Also, we can use other magnets to manually 'bow' and/or "finger" the strings, or move them along strings to favour different sets of harmonic nodes. All of this offers significant possibilities for entangled forms of exploration and, ultimately, creative agency since any changes to the system—the violist's interaction with the strings (through the fingers or bow) or the electronics-performer's alteration of the feedback parameters—may tip the feedback into a different regime of vibration and alter the musical matter and sonic behaviours, offering rich possibilities for performance.

Documentation: at the end of this article there are links to the six documentation videos made during two days of experimentation.

the strings into vibration. The LTDM system controls this electrical excitation, allowing the strings' vibratory behaviour to be manipulated without conventional bowing or plucking.

Defamiliarisation and Performance

Our research engages with the question of human and material agencies with a project that defamiliarises an acoustic bowed string instrument—a viola d'amore—by modifying it with electromagnetically actuated strings, thus dynamically altering its expected physical and acoustic responses for the performer. We argue that this transformation of a known instrument into a partially unknowable system enables the discovery, articulation, and enrichment of instrumental performance through a collaborative redistribution of performative roles and agencies. We explore how the embodied performance techniques of the musician adapt to a well-known instrument now acting in an unfamiliar way, how this instrument's new affordances arise and extend these techniques. More specifically, we examine how such alteration of instrumental behaviour not only generates new sonic possibilities, but also enables these new sonic and technical possibilities to be explained, transmitted, and integrated into performance practice.

Our paper also engages with the field of electronic lutherie from the perspective of performance and composition on acoustic instruments. We valorise the "intimacy" of the performer–instrument relationship, which is sometimes underemphasised in DMI/HCI discourse (McMillan and Morreale 2023). Here, that relationship is augmented and 'made strange' through electronic intervention over conventional instrument affordances. The three actors (instrument-performer, composer/electronic-performer, engineer) are building and artistically exploring an instrument that sits at the crossroads of their individual areas of expertise, competences, trainings, and interests, forming a shared creative "performance ecosystem" (see Waters 2021, and Rodger et al 2020) in which each agent engages the instrument from a distinct but equally performative perspective.

One of the central concepts of this paper, "defamiliarisation" is used here to mean the substantial modification of an instrument's traditional responses (physical, acoustic, cultural) so that it becomes a tool that is partially (but, crucially, not completely) unpredictable to the performer themselves. The term is often used in literary theory derived from Viktor Shklovsky's *ostranenie*, "making strange", in which everyday objects are described in ways that make them unrecognisable, so that, when the mundane object is later revealed, it is seen "more clearly than we ordinarily would" (Gunn 1984, 25–26). Shklovsky's point is that art is the antithesis of habit, that art "restores experience to us by making the world strange once again" (Gunn 1984, 28). When applied to a musical instrument and an expert player, defamiliarisation produces fascinating interactions with "technique" (in the expanded sense developed in Spatz 2017) in which the balance between the habitual and the epistemic is temporarily inverted. The player recalibrates technique to the new order and shifts technique to align with newly emergent affordances, and while sonic outcomes may remain contingent and, to some extent, indeterminate, the recalibrated expert technique retains a level of agency and influence on sound.² This allows for a less-prescribed exploration of the instrument, and possibly the discovery of other technical and sonic resources that the instrument may offer when not constrained by pre-defined approaches. At the same time, it is beneficial if the performer is not a novice; that they have developed skills that can be applied to the instrument, but that these skills remain flexible and can be recalibrated within the unfamiliar environment, becoming epistemic in that moment and reflecting back on familiar skills. In this sense, defamiliarisation operates as a condition that destabilises established technique while remaining grounded in embodied expertise.

In the course of our previous collaborations (see below) defamiliarisation of string instruments (viola and viola d'amore via preparations and non-standard string types) has resulted in multiple instantiations of a particular work by McLaughlin—*there is no gap between bird and song* [see

² Or as Jonathan De Souza describes it: "a prepared instrument, like a silent or random keyboard, may suspend auditory expectations while preserving motor schemas." (De Souza 2017, 98)

here for performance [video](#)³—built deliberately as an open piece for Fusi’s exploration of the defamiliarised instruments, and allowing him to extend and develop new sounds and techniques. However, this proved to be an increasingly asymmetrical relationship with the instrument, with Fusi developing and consolidating his performance approaches across successive instantiations, while McLaughlin being distanced by the development of the sonic palette, and ultimately leading both to question the authoriality of the latest instantiations of the work: see the documentation videos at the bottom of this article, especially [video #6](#).⁴ In this configuration, performative agency remained largely concentrated in the performer, while the composer’s role was observational rather than operative.

The process described in this paper reflects our intention to address the asymmetric situation of the previous experience by conceiving and putting to the test an electronic reconfiguration of the viola d’amore wherein it becomes a double-instrument played by two people: Fusi bows the strings while McLaughlin manipulates the feedback parameters governing those same strings. Through this configuration, performativity is shared across agents, allowing both composer and performer to act directly on the instrument in real time, each through their own embodied expertise. This also intersects with another of McLaughlin’s research projects as a feedback performer (McLaughlin 2022) on guitar, microphones, and, especially relevant here, the [Halldorophone](#).⁵ The Halldorophone is a useful precursor to this project because it is a feedback-actuated string instrument on which McLaughlin also used preparations, but crucially, (a) it uses audio feedback not Lorentz-force actuation and (b) McLaughlin is not a trained cellist so the situation does not involve the same defamiliarisation of highly developed cello technique: see example [video](#).⁶ By contrast, in our system both agents are highly skilled practitioners operating within the same instrumental ecology, but through differentiated modes of performance.

In the present project, this asymmetry is addressed through the application of Lorentz-force actuation to the metal strings, which generates a feedback-driven system of vibration and control integrated into the instrument itself. This configuration not only alters the instrument’s behaviour but also opens a second domain of performance—feedback manipulation—alongside traditional string playing. Because this domain draws on McLaughlin’s established expertise as a feedback performer, it invites his participation not only as composer but also as a second performer, acting directly on the instrument. Defamiliarisation therefore does not merely destabilise existing technique; it produces a redistribution of performative knowledge and action, grounded in the complementary expertise of the agents involved, and rebalances the previously asymmetrical relationship between composer and performer.

The choice of the viola d’amore is grounded in its intrinsic acoustic and physical properties. Resonant activation already belongs to the instrument’s physics and construction through its additional bank of sympathetic strings. The electromagnetic system intensifies and partially separates this resonant behaviour from the instrument’s ordinary acoustic operation, allowing it to be externally actuated. We stress here that we are not inventing an instrument, we are instead strengthening the historical and traditional affordances of the viola d’amore and amplifying one aspect that already exists so that the instrument can assume the double nature of a dual viola d’amore/feedback-instrument configuration. This approach positions the instrument not as a new object, but as a reconfigured site of interaction in which latent affordances are intensified and redistributed.

All of this results in a hard version of the topic of agency through the radical possibilities offered when a physical instrument can be externally influenced to the extent that the musician’s own

³ <https://youtu.be/0x9vqN5ws1w>

⁴ <https://youtu.be/ZuWBgDPksp4>

⁵ <https://halldorophone.info/home/>

⁶ https://youtu.be/gYyrQUO7U_c

agency is no longer (always) dominant. Our new system both applies continuous Lorentz-force actuation, which is agential in itself as the strings vibrate on their own according to resonance characteristics (now largely inharmonic due to the preparations), and also allows McLaughlin to alter the Lorentz-force actuation externally, changing the resonances further and acting with an intentional musical agency. In this sense, agency is distributed across material processes (self-oscillating strings), performer gesture (bowing and contact), and external control (feedback manipulation), producing a shared field of performativity.

The instrument is doubly defamiliarised here. The preparations—developed by McLaughlin and Fusi over several years of collaboration—alter the bowing response and resistance, and completely change the instrument's resonances and pitch affordances. The Lorentz-force actuation was developed through a new collaboration with Schmidt, which advances our previous work by giving material processes a more active role within the performance system, and allowing McLaughlin to alter the actuation during performance. Together, these interventions establish the conditions through which agency is redistributed and shared. This dual defamiliarisation creates conditions in which no single agent fully stabilises the instrument, requiring continuous negotiation between participants.

Bowed-string technique interacting with the system

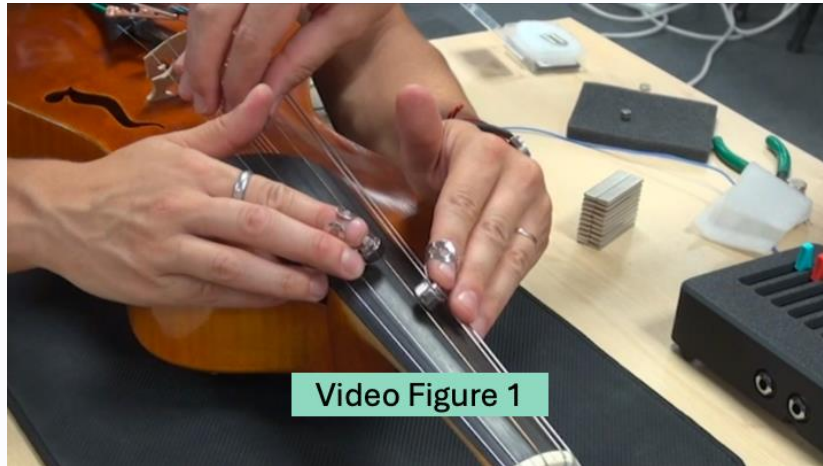
Regarding the instrument-performer—in this case a trained and highly experienced string player—two distinct phenomena arise in the performer's embodied technique, concerning left-hand and right-hand respectively. We should also note here that of course it is trivial to use normal string-playing techniques on strings that are not being activated by the feedback system. In our experience so far, the feedback is almost always less powerful than bow pressure, so normal bowing will completely suppress the Lorentz-force activation for the duration of that action: this can also be used deliberately to overpower strings currently being activated by the feedback system. The discussion below is for situations where the performer's technique interacts with strings while they are activated by the feedback system.

LEFT-HAND TECHNIQUE

For the left hand we can discuss two techniques: (1) using magnets attached to the fingers of the left hand to excite the strings like a bow, and (2) using these finger-magnets to mute strings.

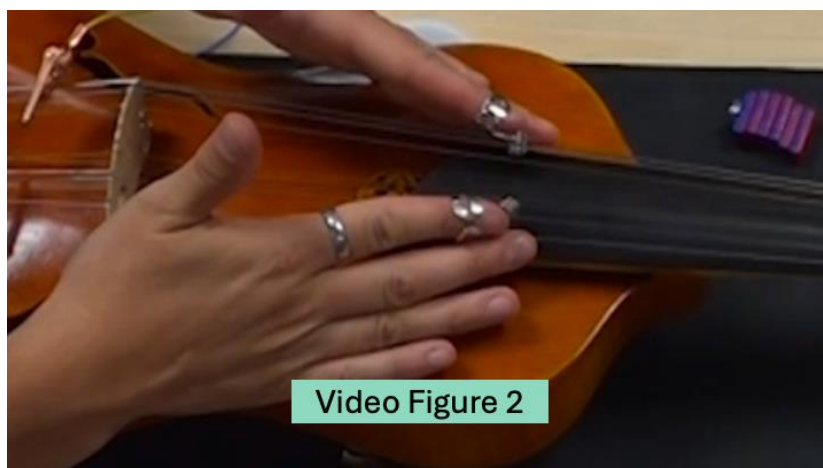
By attaching magnets to the fingertips of the left-hand we make a very specific alteration to the normative left-hand technique of a string player: we still use the embodied techniques of the trained player, but adapted to a new set of affordances. Traditionally this left-hand technique focuses on the finesse of tuning through fine control of where the string is stopped by the finger, which requires physically approaching a string in a specific way. Here, this control and sensitivity translates to holding magnets near enough to the string to initiate or sustain activation without colliding with the string, and moving the magnet across and along the strings to find harmonic nodes and other interactions. This is something very specific to string playing but at the same time is defamiliarised in the sense that Fusi is not actually touching the string, rather he is physically interacting with the string through judgement of distance, the magnetic pull on the finger, and a holistic embodied relationship between hearing, tactile sensation, and the resulting sounds. The gesturality of his left hand is essentially mimicking conventional playing gestures, without actually being grounded in the confirmation of the contact with the string itself. The act of performing this way is a hypothetical act, an exploration of anticipated harmonic possibilities and visual distances whose sonic confirmation remains fragile and not

singularly predetermined. While enacting one of the most traditional, refined, and deeply rooted aspects of a violinist's technique (the control of intonation), the performer develops a new mode of observation, listening, and instrumental relearning.



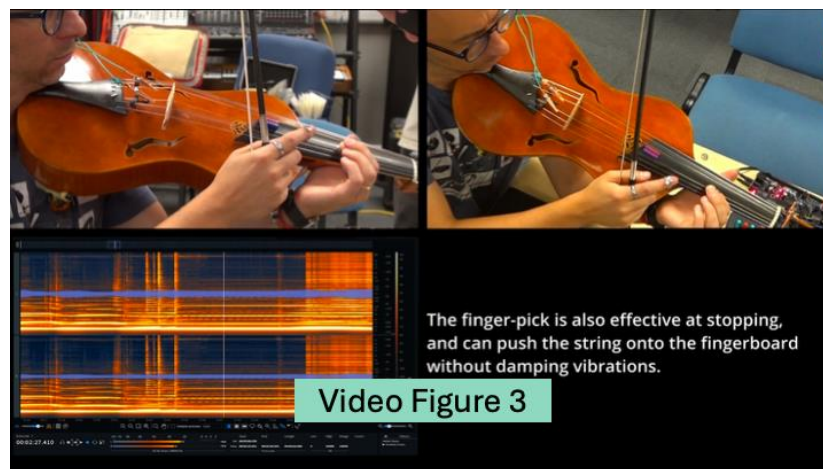
Video Fig.1: see <https://youtu.be/l38YdzsatXA> from 1:22 to 3:11

This is something very specific to string playing but at the same time is defamiliarised in the sense that Fusi is not actually touching the string, rather he is physically interacting with the string through judgement of distance, the magnetic pull on the finger, and a holistic embodied relationship between hearing, tactile sensation, and the resulting sounds. The gesturality of his left hand is "mimicking" conventional playing gestures, without actually being grounded in the confirmation of the contact with the string itself. The act of performing this way is a hypothetical act, an exploration of anticipated harmonic possibilities and visual distances whose sonic confirmation remains fragile and not singularly predetermined. While enacting one of the most traditional, refined, and deeply rooted aspects of a violinist's technique (the control of intonation), the performer develops a new mode of observation, listening, and instrumental relearning.



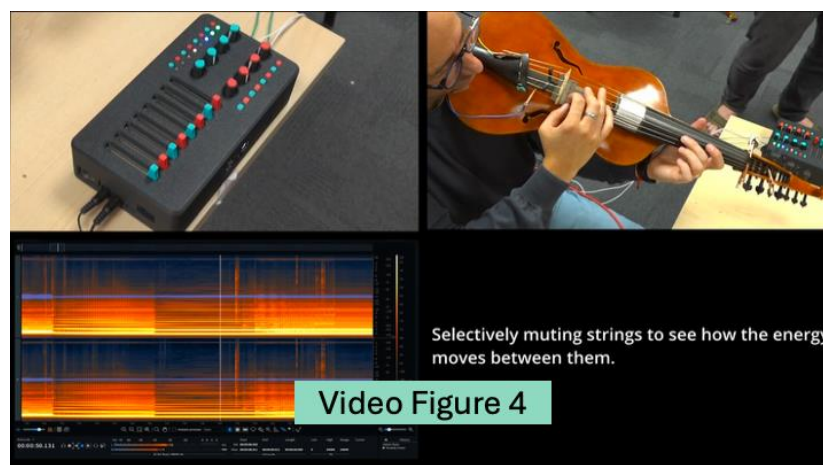
Video Fig.2: see <https://youtu.be/DBriPIO0Vc> from 0:00 to 3:09

Similarly, with the finger-magnets there is a specific ability to mute strings, which requires understanding which string is vibrating, where to mute it (the consequences of muting at different points on the string), how to mute it (the consequences of different pressures), each of these variables has different consequences for the flow of electricity and vibration in the string: for example, in a system where three strings are a single system all fed from the same LTDM box, muting a dominant vibrating string will likely redistribute the system's energy into one of the other two strings (learning to perform within such dynamic interrelations is a key part of this research). All of this means that here the left hand (with finger-magnets) is central to manipulating the overall interaction of the system. Rather than functioning primarily to stop the string at a precise location in order to produce a specific pitch, it is now actively influencing the overall system, sometimes even inverting the traditional technique in cases where muting a string actually creates sound in another string.



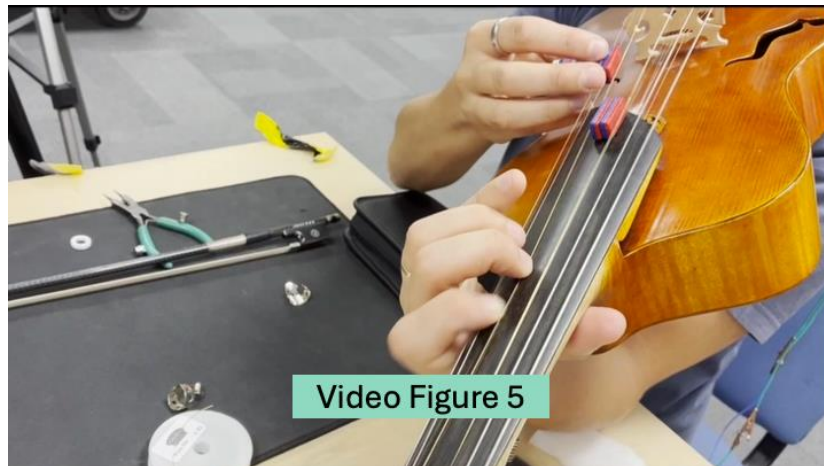
Video Fig.3: see https://youtu.be/_tOy_n_bBI from 2:17 to 2:49

In situations where the left hand has no finger-magnets, muting and string-stopping are still possible but in reduced ways. Muting with the fingertip itself is less effective because soft flesh damps the string to the extent that only very strong signals can continue exciting the string: unlike a bow that pushes/pulls the string, the feedback system needs to build up so requires very low damping or it cannot sustain itself. However, the action of muting one string creates different vibratory paths and sometimes invites other strings in the system to vibrate, producing an unusual and confusing result where touching one string is the gateway for that very string to become silent and the adjacent ones to vibrate. Here the performer is acting against their learned instincts that touching a string means producing sound on that string (not others).



Video Fig.4: see https://youtu.be/2g_-OGOMDLU from 0:36 to 1:09

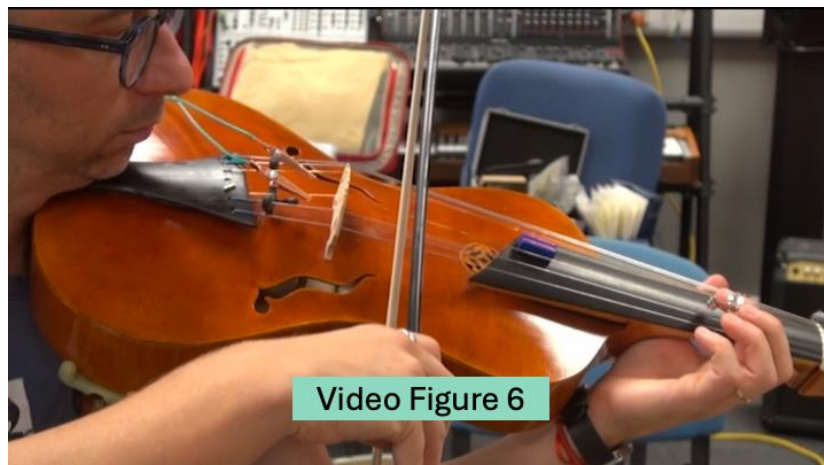
Fully stopping the string has the usual effect of changing fundamental pitch but here it is often undermined by the same damping effect as above (so the string stops vibrating), and also it can cause significant buzzing or even completely stop vibration if the string vibrations are now blocked by any of the fixed-in-place magnets (on the fingerboard or elsewhere near the strings): string-stopping lowers shortens the distance from the fret, and the magnets are already very sensitive to distance so there is not much room for change in this parameter.



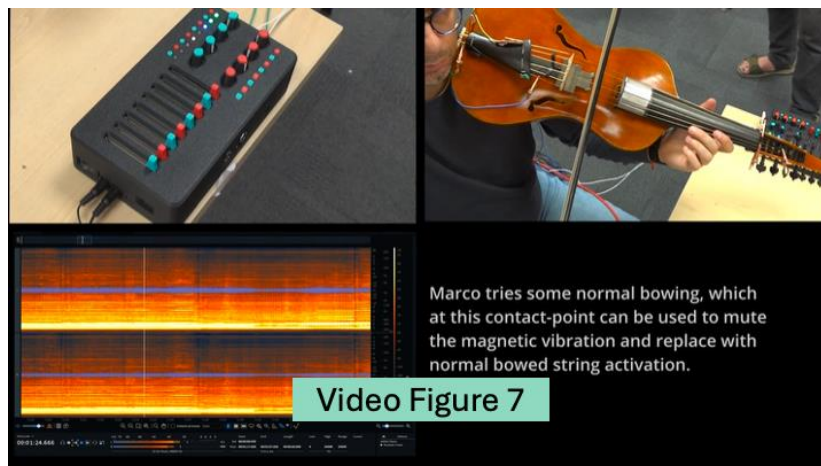
Video Fig.5: see https://youtu.be/-tOy_n_bBI from 7:35 to 8:22

RIGHT-HAND TECHNIQUE

The use of the bow in this setup is also a transformation of normative string technique, i.e. the control of bow pressure, contact point, and the parts of the bow (hair, stick, or both) that interact with the string. Standard bowing with the hair is often ineffective in this system because contact with the hair usually mutes the vibrating string completely. However, by altering the contact point and/or bow pressure, it is possible to complement the magnetic excitation and influence the overall string vibration without undermining it.

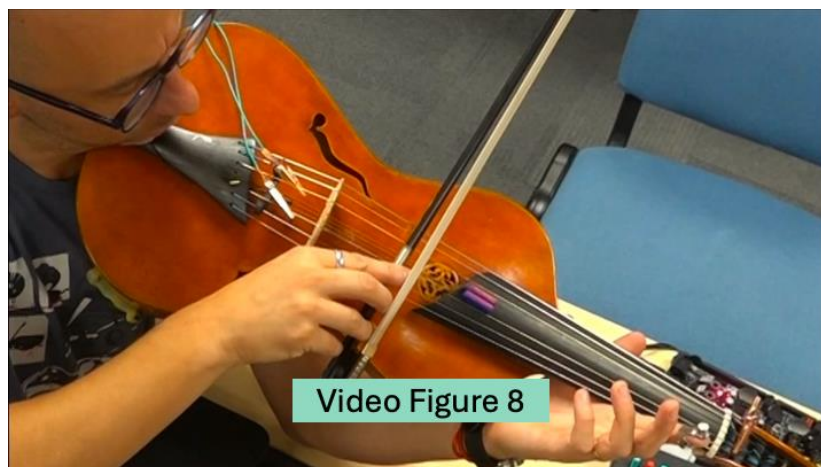


Video Fig.6: see https://youtu.be/-tOy_n_bBI from 0:00 to 1:09



Video Fig.7: see https://youtu.be/2g_-OGOMDLU from 1:12 to 2:17

Using the stick of the bow is more effective for interacting with the feedback-vibrating strings since the hard wood of the stick has less damping effect. By exaggerating pressure with the stick of the bow, the bow functions as a stopping force, essentially like a left-hand finger stopping the string. This technique is superficially similar to Lachenmann's *Toccata* (1986) in producing melodic movement via contact-point control, and also similar to McLaughlin and Fusi's work with prepared viola mentioned above in *There is no gap between bird and song* (2025) where the contact-point variation activates different harmonics out of an inharmonic complex.⁷



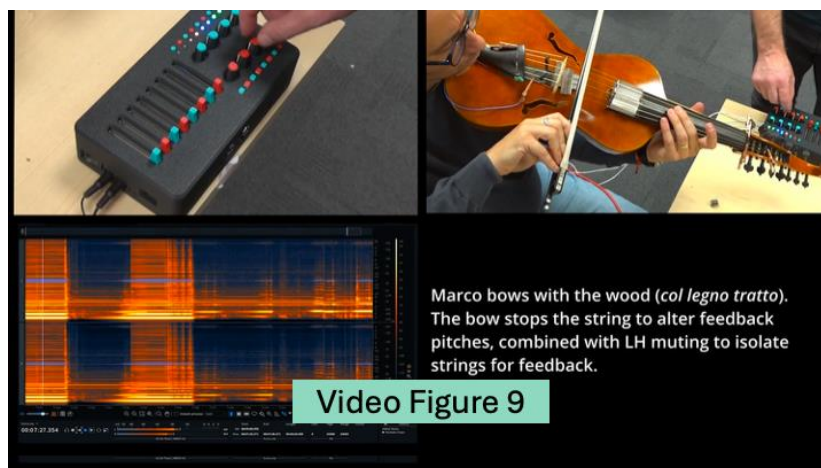
Video Fig.8: see https://youtu.be/-tOy_n_bBI from 1:25 to 2:05

This also comes with an advantage over the left-hand stopping discussed above because bow stopping is more effective since the bow is close to the bridge and has much effect on the distance from string-to-magnet, causing less buzzing and collision. This bow-stopping can be used to produce melodic movement (smooth/glissando or disjunct) and it can also have a similar effect to left-hand stopping and muting if the changing string length alters the electromagnetic flow of the strings: potentially jumping to other harmonics, or causing the stopped string to cease vibrating and reflowing energy into another string. It is also possible to use this bow-stopping to produce a kind of cross-fade across different strings, crossfading the magnetic vibration with the bow vibration; and by stopping one string at the same pitch as a

⁷ In this piece, the strings are prepared by physically coupling them together so that bow-energy flows through both strings to create inharmonic pitch-timbre complexes.

neighbouring open string it's possible to change the colour of the sound without actually changing the pitch.

Similarly to what we described with the left hand, muting a string with the bow allows other strings to emerge, to be triggered into play. Therefore, also the result of this bow technique, as described for the left hand above, is an inversion of traditional technique. The contact point of the bow can be used to 'suppress' a string and let another one vibrate and play, or even on a single string it can be possible to suppress a specific harmonic node, thus allowing another to bloom into life.



Video Fig.9: see <https://youtu.be/2g-OGOMDLU> from 7:19 to end

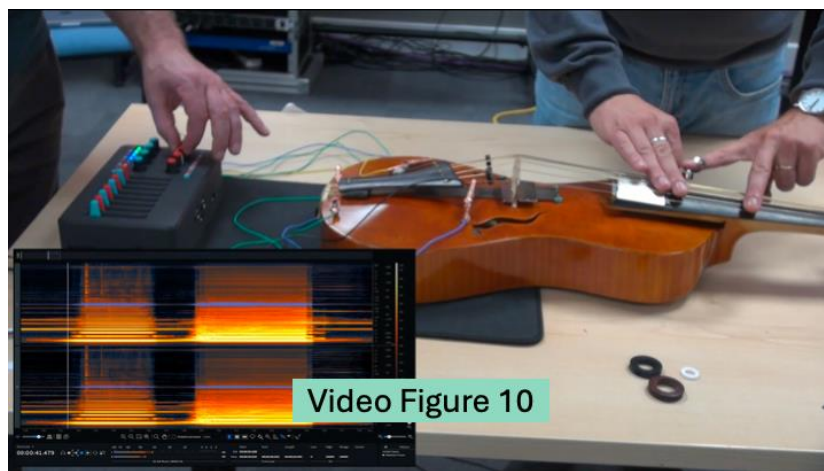
All of this emphasises how Fusi is not simply an active performing agent interacting with a passive instrument, or even a performer exerting control on an instrument: this is an interaction with a performance system that can make its own sound without the performer's input, and that invites a performer to work with its affordances and potentials. This research is aligned with much other work on feedback systems in general, but we wish to focus on how this system doesn't ask the performer to start from-scratch, it invites a grafting of existing trained techniques of the string player into new affordances, thereby enabling heightened interaction and nuanced musical performance. We propose that this is qualitatively different from live-electronics systems where the sound from a string instrument is processed and manipulated, or from sensor-driven contexts, since those systems, in most cases, require only minimal adaptation of existing instrumental techniques and training. Here the player brings their embodied knowledge and response into a context that is strange but not alien: in Gibsonian "affordance" terms, this door handle still affords turning but turning it now produces an unfamiliar consequence.

External Control

The second aspect of this project is to extend the agential network to include the composer/electronics-performer for real-time manipulation of the parameters of the feedback system. As above, there are plenty of examples in live electronics of such external control, but we argue that this specific case study is qualitatively different from conventional live-electronics configurations described above, since the external operator is altering the instrument itself, not simply manipulating the sound produced by the instrument. Any changes to the system

parameters will alter the instrument's response to the violist's actions, which may change the sound immediately or may change the potentials for sound by altering the system's sensitivity and responsiveness. It is useful here to compare this with similar projects such as the Halldorophone (mentioned above) and related instruments where a bowed-string instrument is fitted with an internal feedback/actuation system including microphones, loudspeaker, and control panel (see Úlfarsson 2018, Úlfarsson et al 2023, Kiefer et al 2020). In these cases the player themselves control the feedback parameters from their instrument, often developing sophisticated performance techniques to manage strings, bow, and faders as one. Our system is more closely related to the "entangled" (McLaughlin et al 2020) contexts where multiple players interact with a single physical instrument. An early example of this is Hugh Davies' feedback pieces such as his *Quintet* (1967–1968) where four players making feedback are routed to a central mixer controlled by player-V who controls levels and routing so the other four are constantly adjusting to new parameters by listening to the response of their own feedback system: see discussion in Mooney et al (2022), and van Eck (2017). In another project, Anders Førsidal puts this in a frame of performers being in a "precarious" position via "sharing and interdependency" in the context of pieces where multiple performers interact together with a single instrument or "networked performing apparatus" (Crane et al 2024). He discusses pieces by Simon Steen-Andersen and Simon Løffler where traditional understandings of the performer's "control" of the instrument are undermined by the entangled nature of the instrument, but concludes that "the lack of mastery of the totality of the [instrument] network should not be seen as a threat; it must be recognized as a condition of musical performance or music as such. Without precarity, no music." Similarly, discussions of the epistemic possibilities for performance with entangled agencies can be found in Peters et al (2017), McLaughlin et al (2020), and Benjamin et al (2026).

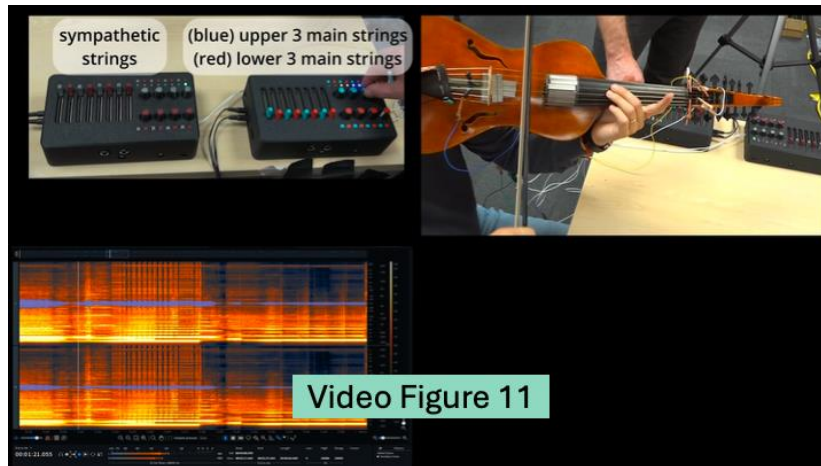
In our current setup, the LTDM box is limited to gain control, but since this is a feedback system this can significantly alter how the system responds to left-hand or right-hand string techniques.



Video Fig. 10: see <https://youtu.be/5fPAYXxf2q0> from 0:00 to 2:21 [mostly left-hand technique]

The system setup and magnet placement also have large effects here. We tested several different system setups, but primarily we experimented with either (a) a two-part system where one box controlled the viola d'amore's main strings, and another the resonating strings, or (b) a three-part system where the main strings were split into upper and lower, each controlled by a separate box (three strings per box), with the resonating strings remained connected to their own box. With enough LTDM boxes, it is possible for each string to be its own feedback system, but we are finding that having a small number of independent feedback systems—each incorporating multiple interconnected strings—offers more interesting possibilities for

performance and exploration through the contingent responses from the entangled strings' agencies (manifesting as highly variable sensitivity of different harmonic nodes across strings within a single system). Since the magnet placement for these experiments was always quite close to the midpoint of the string, there was a tendency for the fundamental string frequency to dominate, limiting the scope for additional harmonics to emerge spontaneously but interactions with the bow and finger magnets produced greater harmonic variation.



Video Fig.11: see <https://youtu.be/ZuWBgDPksp4> from 0:00 to 2:00

The next step, in development, is to introduce controllable frequency filters that will provide significantly greater influence over the evolving feedback nodes within each string-network. Similarly, we are working on 3D-printed solutions to place magnets at different points on the strings to reduce the dominance of the strings' fundamental frequencies.

Conclusion

The system developed in this first stage of the project enables Lorentz-force actuation to defamiliarise a conventional bowed-string instrument while remaining deeply connected with the performer's established embodied expertise. Instead of replacing conventional technique with a completely new set of performance gestures, the proposed system offers room to modify the parameters within which those techniques can function. Bowing, stopping, muting, listening, and embodied judgments of contact and proximity are still operational concepts on the Lorentz-force-actuated viola d'amore, but the sonic results of those actions are no longer stable or entirely predictable.⁸ Defamiliarisation operates in this context not as a rejection of instrumental technique, but rather as an opportunity to put that technique into a critical frame of practice. Defamiliarisation places instrumental expertise into a new epistemic framework where given technical and performative knowledge about instruments can be re-examined, re-calibrated, and expanded upon through an extended encounter with its novel instrumental affordances.

⁸ To nuance this slightly. Because the instability is situated in the material configuration of that moment, if the material configuration doesn't change too much then within a given performance event the sonic results can become known and even repeatable across of a continuum of possibilities: from highly stable and repeatable ('dominant' even) elements like the fundamental tones of strings, to much more ephemeral and unlikely events such as multiphonics or isolated harmonics over the 12th partial.

The addition of externally operable Lorentz-force actuation further redistributes agency within the performer–instrument dynamic. Because the instrument-system is capable of sustaining and redirecting its own vibration independent of the performer’s continuous input, and because the electronic-performer is able to modify the conditions that the instrumentalist hears and responds to in real time, neither of the performers can unilaterally control the instrument’s sonic output. Rather, performance is negotiated through ongoing feedback between the instrumentalist embodied techniques, the electronics performer’s reactive expertise, and the physical instrument’s affordances as coupled strings and electromagnetic system.

Although much work remains before these prototypes can fully explore these potentials, this initial experiment sets the stage for a more general approach to electronically augmented acoustic instruments. By enabling electronics to shape the physical behaviour and affordances of the instrument itself—not merely its sound—the Lorentz-force-actuated string instrument allows questions of instrumental technique, material behaviour, and distributed agency to be rethought as mutually informative elements of performance practice.

Acknowledgements

We gratefully acknowledge Adam Schmidt and Andrew McPherson of the Augmented Instruments Lab at Imperial College London for their collaboration, technical expertise, and generosity in making the Lorentz-force actuation system available for this project.

Documentation Links

Here are the six documentation videos that the examples above have been drawn from, and which video figures come from each. These videos are also numbered in chronological order across our two days of experimentation.

1. <https://youtu.be/l38YdzsatXA> - video figure 1
2. <https://youtu.be/DBriPlO0Vc> - video figure 2
3. https://youtu.be/_tOy_n_bBI - video figures 3, 5, 6, 8
4. <https://youtu.be/5fPAYXxf2q0> - video figure 10
5. https://youtu.be/2g_OGOMDLU - video figures 4, 7, 9
6. <https://youtu.be/ZuWBgDPksp4> - video figure 11

Also available as a [playlist](#).⁹

⁹ https://www.youtube.com/playlist?list=PLXQd-O_nmfj8

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