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A Spectral Approach to Melodic Development within a Sound-Sculpting Environment for Classical Guitar

Annotation

This article centres on guitar sounds. Melodic aspects viewed in relation to the repertoire as well as morphological structuring principles developed in my recent research. Musical contours derive from manipulating consecutive, merged, and combined morphologies allied to shaping phrases formed by using archetypal or variant morphologies. The archetypal morphology of guitar sound – attack/resonance – forms the basis for classifying some of the techniques, while the others can be regarded as variants or extensions of the archetypal morphology.

Keywords: guitar morphology, sound-based and note-based music, melodic contour.

1. Introduction and about Guitar Morphology

This article will centre on guitar sounds. Leigh Landy tells us that "*sound-based* music typically designates the art form in which the sound, that is, not the musical note, is its basic unit" (Landy 2007: 17). When melodic development involves streaming *sound-based* rather than *note-based* material, a conventional means of analysis are not adequate for describing the music.

I will discuss some of my ideas. However, in order to support the theories a bit of a background is needed, especially as the musical contours used in my music derive from manipulating consecutive, merged, and combined morphologies allied to shaping phrases formed by using archetypal or variant morphologies.

Melodic aspects will be viewed in relation to the repertoire as well as morphological structuring principles developed in my recent research. Here I am using Landy's definitions as a guide and moving Denis Smalley's work on spectromorphology into the extended guitar techniques arena (Smalley 1896: 61–93). Therefore, sound sculpting on an acoustic instrument is to adopt a *sound-based* aesthetic to music, by composing, performing, improvising, or a mix of the three.

1.1. Morphology

From my research content, I will concentrate on Guitar Morphology. The archetypal morphology of guitar sound – attack/resonance – forms the basis for classifying some of the techniques, while the others can be regarded as variants or extensions of the archetypal morphology. My definition of a guitar morphology is: "An unconventionally played procedure that produces morphologies containing a spectral content alternative to the conventional pitch-biased attack-sustain/decay model (Vishnick 2014: 5)".

Let us have a closer look at the diagrams I am using to illuminate guitar morphology. They have two functions; however, this will be an overview:

1. Draw attention to the temporal evolution of spectra and pitch-to-noise content produced by playing particular techniques.
2. Show how the combining of morphologies results in the integration of spectral components, creating more complex sound qualities.

Musical potential of the techniques are examined in my compositions, which comprise studies that explore the juxtaposing and merging of morphologies. A table that indicates morphological and notational information has been devised as an aid to understanding guitar morphology. A typical morphology is based on two interlinked phases – an attack force followed immediately by a resonance that decreases in spectral richness as the sound decays. Although a single morphology can be regarded as a sound object in its own right, by combining successions and combinations of morphologies musical pieces are formed.

1.2. Table of morphologies, archetype and variants

Twenty-one morphologies are set out in Figure 1 "Table of morphologies, archetype and variants". Spectral content is used as a basis to order morphologies (from a pitch dominant spectrum to the noise-oriented, morphologies with a balanced mix of pitch and noise, like "snare drum", occur mid-way). The morphological diagrams represent the progress of spectral content through time.

Alongside the morphological diagrams the notational symbols are used in the scores. Some are based on standard notation, while others represent timbral aspects, or a mixture of both. For example, from playing standard repertoire, a guitarist will be familiar with diamond heads for natural harmonics and cross-shaped

ones for percussive sounds. However, for more timbrally oriented resonances, graphic shapes are used to convey physical action and the notion of phases. In the morphological attributes column, a brief description of the relevant temporal phases is given for each technique, as well as an approximate duration.

Each morphology possesses a varying degree of pitch and noise. Shading is used to reflect the changing noise-to-pitch aspect: the blacker the shading the noisier the spectral content. For instance, when playing a multiphonic harmonic loudly (black to grey), the noise from the force of attack is followed immediately by a mostly stable, distinct and easily identifiable pitch content (grey to white).

Most of the morphologies consist of a single sound, executed on one of the six strings. However, three of the morphologies occur when more than one string is used simultaneously, the *snare drum* group, and *bottleneck (glissando)*, which both employ two strings, and *soundhole resonance (palm, fist, or thumb)* using up to six strings (See Vishnick 2014: 199–200).

Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
Natural harmonic	A	◇	Percussive attack, decaying spectral activity (higher harmonics have shorter resonance). Duration; 4" to 15".	Loud to very soft, (higher harmonics softer).
Multiphonic harmonic	A	◈	Percussive attack, decaying spectral activity (more complex than natural harmonics). Duration; 4 to 10".	Moderately loud, quicker to very soft than natural harmonics.
Bottleneck (plucked) *Refracted*	V		Percussive attack, decaying spectral activity, refracted motion. Duration; 3" to 6".	Moderately loud to very soft.
Bottleneck (unplucked) *Refracted*	V		Percussive attack, decaying spectral activity, refracted motion. Duration; 3" to 8".	

Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
Snap pizzicato (long)	A		Percussive noise attack, long decaying spectral activity. Duration; 10" to 15".	Very loud to moderately loud.
Snap pizzicato	V		Percussive noise attack, short spectral activity. Duration; 0.5" to 1". Rapidly terminated Snap pizz (long).	
Cross stroke *Extended*	V		Two phases - multiple attacks, then decaying spectral activity. Duration; 5" to 15".	Moderately loud to very soft.
Cross stroke (active scordatura) *Refracted and Extended*	V		Two phases - multiple attacks, then curvilinear or refracted decaying spectral activity. Duration; 5" to 15".	

Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
'Snare drum' (normal) *Extended*	V		Three phases - textural preparation - percussive noise attack (may be multiple), decaying spectral activity, noise release. 2nd phase duration 2" to 6".	Soft, always subtle loud to soft - soft to very soft.
'Snare drum' (lateral glissando) *Refracted and Extended*	V	gliss.	Three phases - textural preparation, percussive noise attack (may be multiple), refracted decaying spectral activity, noise release. 2nd phase duration 2" to 6".	
'Snare drum' (slide glissando) *Refracted and Extended*	V		Three phases - textural preparation - percussive noise attack (may be multiple), refracted decaying spectral activity, noise release. 2nd phase duration 1" to 4".	

Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
Soundhole resonance (palm, fist, or thumb)	A		Percussive noise attack, decaying spectral activity. Duration; 3" to 6".	Moderately soft to very soft.
Soundhole resonance (buzz)	A		Percussive noise attack, decaying spectral activity. Duration; 3" to 6".	
Tapping, bi-tone (long)	A	RH	Percussive attack, decaying spectral activity. Duration; 4" to 10".	Loud to soft.
Tapping, bi-tone	V	LH	Short spectral activity. Rapidly terminated bi-tone (long)	
Tapping, mute (long) *Damped*	A		Percussive attack, decaying spectral activity. Duration; 4" to 6".	Moderately soft to very soft.
Tapping, mute *Damped*	V		Short spectral activity. Rapidly terminated mute tap (long)	

Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
Nut-side	A		Percussive attack, decaying spectral activity. Duration; 2" to 5".	Moderately loud to very soft.
Rapid mute *Damped*	V		Short spectral activity.	Loud to very soft.
Rapid mute (sixth string) *Damped*	V		Short spectral activity, plus harmonics resonances.	
Pinch mute *Damped*	V		Short spectral activity, plus harmonics resonances.	Moderately loud to very soft.

Figure 1. Table of morphologies

1.3. Spectral variety

Figure 2 summarises *spectral variety;* that is, the possibilities for shaping spectral content of morphologies. The way that pitch content is manipulated, whether left to resonate, refract, extend, or interrupt, facilitates the creation of morphological variety.

Attack, resonance, and termination function in various ways. For example, the attack phase can work as a downbeat, typically as in a *snap pizzicato (long)* morphology. Alternatively, the multiple attacks of a *cross-stroke* morphology can operate as an anacrusis. Morphologies terminate naturally when the sound reaches relative silence, or prematurely through performer intervention.

The pitch content of archetypal and variant damped morphologies is fixed, whereas the other variants are refracted glissandi, whose contours are either linear or curvilinear.

The pitch content of archetypal and variant damped morphologies is fixed, whereas the other variants are refracted glissandi, whose contours are either linear, in a direct line between two pitches – ascending or descending – or curvilinear. A curvilinear morphology may follow a uniformly curved path – *oscillation*, or be an irregular pattern – undulation. Refracted morphologies may be symmetrical or asymmetrical.

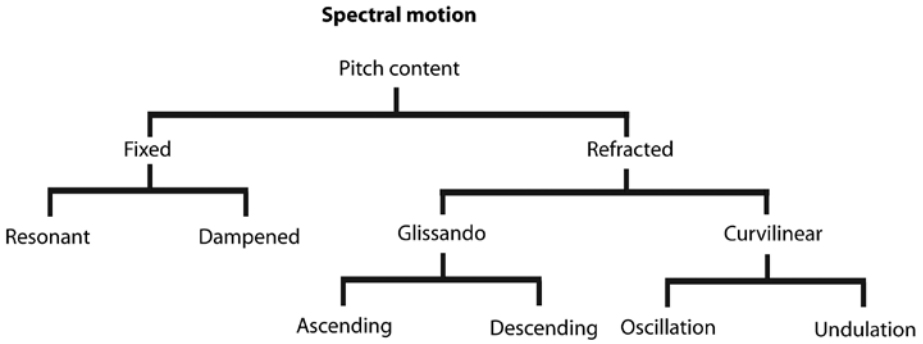

Figure 2. Shaping of spectral content

1.4. Morphological structures

As well as drawing attention to the nature of spectra and pitch-to-noise content, the main function of the following diagrams is to show *morphological structures;* how the combining of morphologies results in the integration of spectral components creating more complex sound qualities. In particular, the player is encouraged to work towards an awareness of the subtle intrinsic nature of resonances, where the spectral content of several morphologies is frequently blended, to the extent that the participating morphologies are not aurally separable. In order to interpret my studies, the player needs to be fully sensitized to the progress of spectral and morphological shaping.

The morphological diagrams highlight the following:

- how merging and superimpositions work, something that is not so apparent in conventional tablature-based or standard notation systems, which are more concerned with providing information on how to execute morphologies;
- such graphic representation shows the continuity of dynamic shaping more immediately than is possible with conventional notational indications like the Italian dynamic abbreviations.

1.5. Integrating morphologies

To help establish a basis for building compositional strategies, the archetype and its variants may be incorporated into more complex structures. For example, in Figure 3 multiphonic harmonic morphologies are used to illustrate three possibilities for connecting similar morphological types.

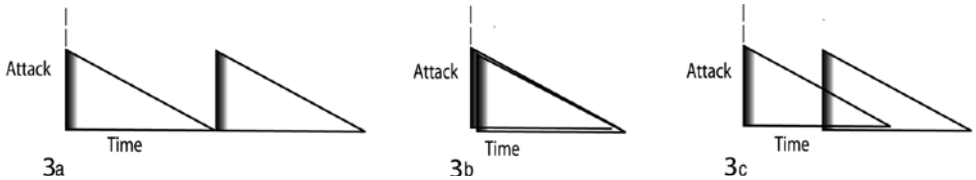

Figure 3. Consecutive and merged *multiphonic harmonic* structures – from relative separation to merging

Figure 3a shows relative separation – two morphologies are juxtaposed, the second starting near the termination point of the first decay period. Figures 3b and 3c show merged morphologies, composite sounds that arise when morphologies are superimposed. In Figure 3b the second morphology is initiated soon after the attack of the first, the resonances therefore merge. The second morphology in Figure 3c begins approximately two-thirds of the way through the first's resonance; both morphologies are discerned. However, as an imbalance of dynamics is indicated, the final stages of the first morphology's decay will be masked.

Merged morphologies may be synchronous, as in simultaneous attacks on two strings, or may occur at different times (as in Figure 3). Two main features of merging similar morphologies are firstly, closely related recurring sounds, and secondly, a contour of dynamic levels initiated by a varying attack force. Figure 4 shows a structure of natural harmonics morphologies with varying dynamic levels and degrees of merging.

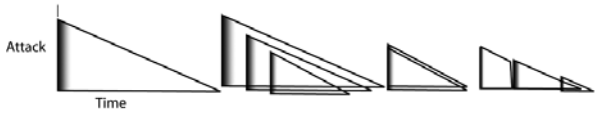

Figure 4. *Natural harmonic* structures

Here is an analysis of Figure 4:

a loud attack downbeat / fixed resonance
↓
three merged morphologies of decreasing dynamic level
↓
two moderately soft synchronised morphologies – short pause (breath)
↓
a moderately soft morphology where the resonance is interrupted about half way through by a soft morphology whose resonance is masked (by a very soft morphology) before it reaches termination. Termination of this final (very soft) morphology closes the phrase.

Figures 5 and 6 are examples of configurations that could arise when *multiphonic harmonics* and *snap pizzicati* morphologies occur in consecutive, merged, and combined situations. Although they both share a percussive attack, snap pizzicati are more noise-orientated. Moreover, multiphonic harmonics and snap pizzicato (long) both have decaying spectral activity. Also, the dynamic ranges of snap pizzicati and multiphonic harmonics have a contrasting nature, and the duration of multiphonic harmonics is shorter than snap pizzicato (long).[1]

Figure 5 shows attack/resonance/termination of morphologies, spectral activity, timeline, and dynamic levels. The consecutive and merged morphologies are aligned under the relevant score extract, acting as a guide to spectral quality; a continuation of the ideas formulated in Figures 3 and 4.

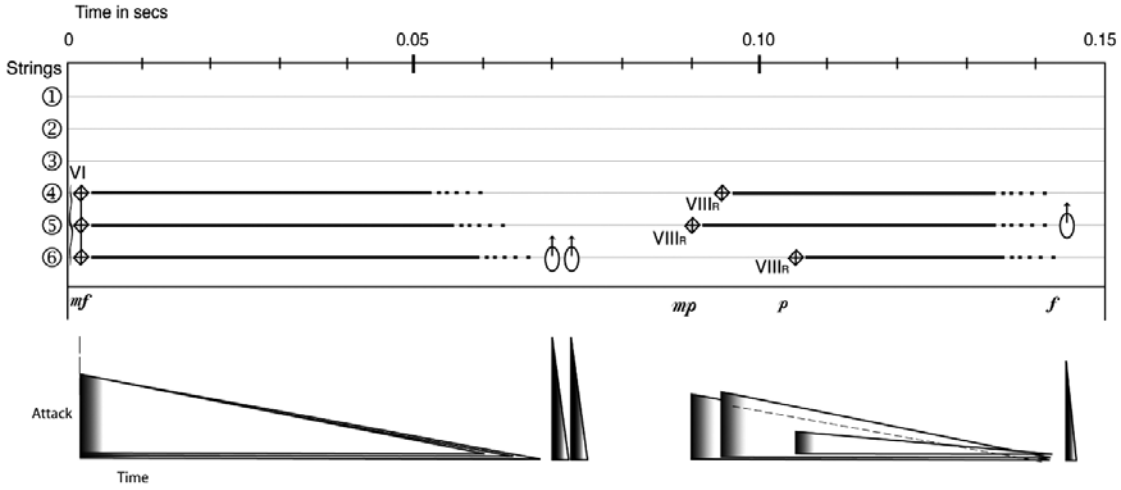

Figure 5. Consecutive *snap pizzicato* and merged *multiphonic harmonic* morphologies

[1] Note that all diagrams may be analysed in a similar fashion to Figure 4.

Figure 6 demonstrates a more complex situation, the combining of multiphonic harmonics and snap pizzicati resonances over a period of 15". The lower section shows the resultant superimposition of morphologies; resonances are combined.[2]

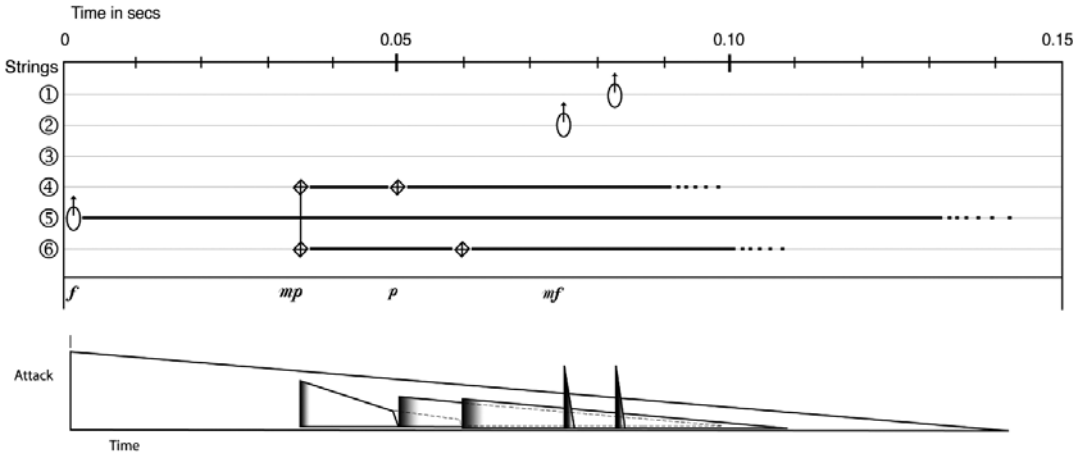

Figure 6. Combined *multiphonic harmonic* and *snap pizzicato* morphologies

Figures 6 and 7 represent the cumulative complexity of sound spectra, which includes layering extended technique on extended technique.

2. Melodic development

In my work compositional structures are developed through melodic aspects that manifest as a consequence of manipulating the placement of consecutive, merged, and combined morphologies. This is tied to the relationships that occur in shaping phrases, being aware of pitch relations, and exploring dynamic levels. Melodic contours of phrases are mostly derived from the archetypal or variant models; however, deviations to this are formed by manipulation of dynamic levels.

The perception of melody in my music is connected to sonic outcome in relation to pitch-based designs and interactions involving noise-biased morphologies. This sound-based dichotomy of capturing and maneuvering spectral content in respect to pitch and noise is used as a compositional tool. For example, the spectral content of a sound morphology is implied in the conventionally notated pitch/duration model. However, even in extremely detailed scores there are important aspects of the sound experience that conventional notation is simply not designed to capture. In order to convey the necessary information for viewing melodic development, I developed a notation for my studies that had to be liberated from the traditional pitch (vertical) and duration (horizontal) paradigm. The aim was to investigate moving away from this usual emphasis contained in the standard Western system and focus on what contributes to musical sound apprehension.

To help explain melodic structures and set a context, examples from relevant key repertoire and my compositions will be given where appropriate. For example, we can look at composers who have explored and developed existing acoustic characteristics. Although I will mention a few key works here, for further detail see sections 1.5.1, 1.5.3, 2.3.3, and 2.4 of my dissertation (Vishnick 2014: 51, 60, 146, and 154).

My work is aimed at helping guitarists to discover the fullest range of morphological variation by varying the intensity, durations, and the intervallic nature of pitch content; a system designed to help the performer learn to express spectral content in relation to the temporal placing of morphologies.

Part of the *notation in the repertoire* investigation in my research looks into how key composers indicate the actions necessary for conveying morphological detail in terms of spectral content and performance technique (Vishnick 2014: 121–155). By making relevant evaluations, all of the points discussed have an impact on my music – apprehension of sound, spectral content in the repertoire, relations to standard notation, compositional structures in relation to melodic contours, rhythmic strategies, and signs and symbols – in particular, actions involving the pitch/noise paradigm and their associations with spectral components.

[2] Listen to audio *sound example's, track's 56 and 57,* which are a realisation of Figure's 5 and 6 – http://openaccess.city.ac.uk/4164/

Taking the placement of spectral content as an example, the opening morphology in *Natural harmonics Study 1: Dynamics* is a merged pitch-based melodic structure. Here the player sculpts three morphologies on adjacent strings in the opening phrase, forming a contour that follows the archetypal attack/decay model through given descending dynamic levels. The opening morphology in this study, which is played on string 2 1.5" before the second on string 4, comes to a natural termination just before 5". A composite resonance occurs when the third morphology (on string 3), which is initiated after 3.5", merges with the previous two resonances (Vishnick 2014: 228); see Figure 7.[3]

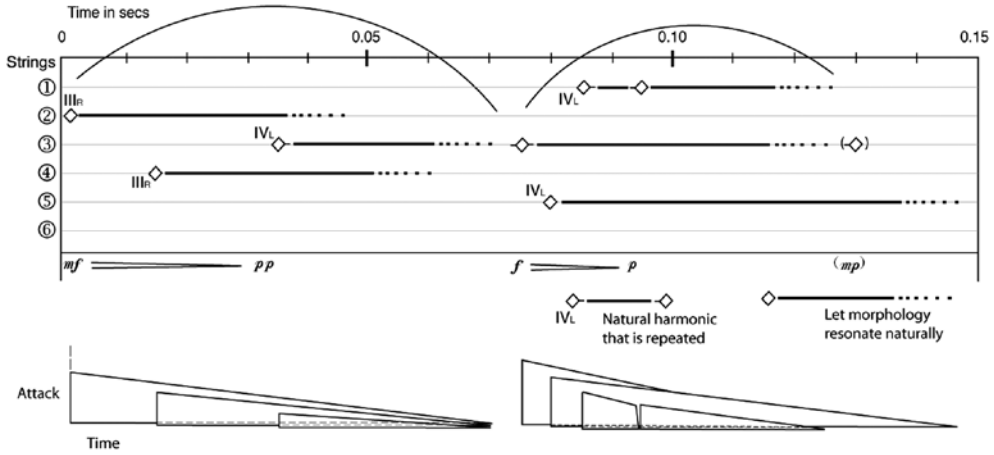

Figure 7. Natural harmonics study 1: Dynamics – page 1

Another example, which is more noise-based, is the opening phrase of the *Soundhole resonance Buzz study.* The player engages with phrases of varied durations, where the emphasis is on producing merged morphologies and composite resonances; delicate operations that involve both hands are needed. For example, a single interrupted harmonic morphology, on string 6, initiates the opening phrase. This is followed at 2" by the first of three merged *buzz* configurations that dovetail; string 6 using the right-hand finger *i*, followed by *a* on string 4, then *m* on string 5 (Vishnick 2014: 270–274).[4] Moreover, John Schneider includes a section on my *Bottleneck and Soundhole Resonances Combined Study* in his groundbreaking book (Schneider 2015: 241–242).[5]

A number of my studies combine two or three extended techniques. The intention is to start providing a repertoire for guitarists that centres on integrating extended guitar techniques. Again, the compositional focus is on forming relationships through combining consecutive, merged, and combined morphologies. Researching I have noted that three composers have combined two extended techniques in ways that link closely to my studies: Azio Corghi in *Consonancias y Redobles* (1974), Rolf Riehm in *Toccata Orpheus* (1996), and Helmut Lachenmann in *Salut für Caudwell* (1977). (See Vishnick 2014: 82, 92, 118, and 131.) However, it would appear my studies that combine three extended techniques are unique to the repertoire. The result can be an overlaying of three extended techniques; the *Harmonics, 'snare drum' and pinch mute combined study* have a significant amount of pitch content.[6]

In my studies the emphasis is on phrase construction, which can be seen as incorporating the development of melodic content of combined morphologies by involving various ways of layering extended techniques; devices include the superimposition of similar and different morphological types resulting in a more polyphonic texture, where phrases are based on the archetypal, variant, and deviations to the archetypal and variant models. In the performance domain, this also means developing the technical skills necessary to deal with melodic contours that occur concurrently. Another of the many examples can be found in the *Soundhole harmonics, bi-tones, and nut-side combined study* (Vishnick 2014: 313, and 399–403).[7]

3 Ibid. Audio *Sound example, track 19* is a realisation of Figure 7.

4 Ibid. Audio *Sound example, track 60* is a realisation of the *Buzz study,* opening phrase.

5 Schneider has recently revised The Contemporary Guitar.

6 Ibid. Listen to audio *Sound examples, track's 96, 97, 98, and 99.*

7 Ibid. *Sound example, track 100* is a performance of the whole study.

3. Final comments

To summarize, I have sought to show how the examination of the morphological approach to apprehending spectral content adopted by certain composers who have used extended guitar techniques connects to the music composed for my research. The results of my findings have led to theorizing a possible methodology, which is based on the interconnectedness of experiencing and observing guitar morphologies.

For the performer, this means gaining theoretical knowledge through studying guitar morphology and morphological structures, and learning about notation systems. Composers can look at pushing the existing performative boundaries of extended techniques by exploring combinations of the physical and acoustic aspects of producing particular guitar morphologies. For me, this can be seen as cultivating the work of some key groundbreaking composers, such as Brian Ferneyhough's *Kurze Schatten II* (1983–9) and Arthur Kampela's *Percussion Studies I, II* and *III* (1995–7) for physicality, Philippe Durville's *Mouvement apparent* (1988) and Tristan Murai's *Tellur* (1977) for maintenance of sound, Giacinto Scelsi's *Ko-Tha - "A Dance of Shiva"* (1967) and Lachenmann's *Salut für Caudwell* (1977) for resonance, Riehm's *Toccata Orpheus* (1990) and Corghi's *Consonancias y Redobles* (1974) for a fusion of physicality and resonance (Vishnick 2014: 118–120).[8] However, it should be noted that my scores also contain a mixture of all three aspects, resonance, physicality, and maintenance of sound (Vishnick 2014: 213–315).

My pictorial-based tablature notation is the result of an exploration into developing an alternative to the standard five-line stave system, aspiring to produce lucid and uncluttered scores. Moreover, until now there has been no contemporary guitar literature that seeks to comprehensively examine performance, improvisation, pedagogy, and composition in relation to guitar morphologies; indeed, propagating the values of the morphology of guitar sounds appears at present to be a distinctive endeavour.[9] However, this alternative view of how to play the guitar, offers the musician a different way of apprehending guitar music.

This research does not replace the importance of existing work, its contents are aimed at broadening current thinking. The intention has been to provide a thorough understanding of the morphology of guitar sounds. However, there is much future work to be done in this area. For example, continue to tackle the thorny issue of showing vertical pitch content within a pictorial-based system, develop a sound-based rather than note-based aesthetic, and investigate the lack of terminology for understanding and categorisation of sound based music.

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Melodinė plėtotė spektriniu požiūriu klasikinės gitaros garso apdorojimo aplinkoje

Santrauka

Straipsnyje gilinamasi į klasikine gitara išgaunamą garsyną. Pirmiausia paaiškinama vien garsine medžiaga grįstos muzikos kūrybos samprata, trumpai aptariamas istorinis autoriaus idėjų raidos kontekstas. Toliau kalbama apie gitara išgaunamų garsų morfologiją ir kaip ji siejasi su jo muzika, ypač išskiriant melodinį kontūrą. Melodiniai aspektai aptariami atsižvelgiant į repertuarą ir morfologinės sandaros principus, suformuotus autoriaus pastarųjų metų tyrimuose. Skirtingos garso išgavimo technikos klasifikuojamos remiantis archetipinės gitaros garso morfologija (ją sudaro ataka ir garso rezonansas); kitos technikos gali būti laikomos šios archetipinės morfologijos variantais ar vediniais. Straipsnyje svarstoma, kaip garsinio rezultato suvokimas priklauso nuo garsų aukščiais pagrįsto dizaino ir skirtingų garso morfologijų sąveikų, įtraukiant ir triukšmus. Dichotomija tarp spektrinio turinio fiksavimo ir manipuliavimo (tiek apibrėžto aukščio garsų, tiek triukšmų) autoriaus pjesėse pasitelkiama kaip kompozicinė priemonė. Pavyzdžiui, įprasta notacija užrašytame garso aukščių–trukmių modelyje spektrinis garso morfologijos turinys yra numanomas. Tačiau net labiausiai detalizuotoje partitūroje esama svarbių garsinio patyrimo aspektų, kurių tradicine notacija tiesiog neįmanoma užfiksuoti. Siekdamas perteikti šią informaciją, savo naudojamoje notacijoje autorius turėjo atsiplėšti nuo tradicinių garso paradigmų – aukščio (vertikaliosios) ir trukmės (horizontaliosios). Tyrimo tikslas buvo atitolti nuo standartinei Vakarų sistemai įprastų perskyrų ir sutelkti dėmesį į tai, kas praturtina muzikinio garso suvokimą.

Analizuojant melodines struktūras buvo pasitelkti pavyzdžiai iš kanoninio gitaros repertuaro kūrinių ir paties autoriaus kompozicijų; jo pjesėse atlikėjas parodo platų morfologinių variacijų spektrą keisdamas dinamiką, trukmes, intervalinę naudojamo garsyno sudėtį. Visa tai iliustruojama schemomis ir natų pavyzdžiais, papildoma nuorodomis į garso pavyzdžius. Autorius aptaria žinomų kompozitorių sukurtas išplėstines gitaros technikas ir sąsajas su tyrimu. Apžvelgdamas įvairias gitaros morfologijas, formuluoja teorijas ir tyrimo metodus. Taip pat užsimenama apie pastangas sukurti piktogramomis grįstą tabulatūrą, kaip alternatyvą įprastai penklinių sistemai. Glaustai pristatoma darbo apimtis ir tolesnių tyrinėjimų galimybės.

[8] It is understood by the author that resonance, physicality, and maintenance of sound aspects may be considered mutually inclusive; they are mentioned here in terms of dominant features.

[9] To the best of the author's knowledge.