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Volume 2: Studies in New Morphological Notation

4 Prologue

Volume 2 offers a study of selected extended techniques morphologies whose varied range of spectral quality is of prime importance for the development of a new notation. Both techniques and notation directly relate to the critique in Volume 1.

The choice of which techniques to be included in this volume is based on morphological and technical considerations. For example, in order to fit the author's envisaged soundworld, extended techniques are chosen for their intrinsic sound qualities. Moreover, physiological concerns are also taken into account, especially as hand actions have a bearing on performative and compositional deliberations. Therefore, as responsiveness to left- and right-hand interactions are paramount, direct hand contact with strings between the headnut and bridge is utilized. (See Volume 1 Introduction, chapter sections 1.9.1, and 3.1, plus Chapter 7 in this volume.)

Fusing spectral content with hand functions led to certain constraints that influence the creative process, the impact of controlling musical tension through manipulating morphologies on guitar technique, for instance. To manage these restraints, the extended techniques employed had to possess adaptive performance potential that accounted for their diverse noise to pitch ratio, as well as spectral quality and resonance values.

These chosen techniques fall between customary extended techniques, snap pizzicati for instance, and those that produce more extended morphologies. Existing extended techniques are considered with regard to the detail of their pitch and noise content, while new techniques (developed by the author¹⁴³) are characterised by their type of spectral activity.¹⁴⁴

In the Conclusions section of Volume 1 I argued that when it comes to sections of exclusive extended techniques usage of note, there is a void in the repertoire. Moreover, Corghi in *Consonancias y Redobles* (1974) is the only composer to combine two contrasting morphologies. Furthermore, there was no evidence of composers amalgamating three extended techniques for extended

¹⁴³ Every effort to check the veracity of this statement has been made. The author would be very happy to receive any conflicting information on the subject of his development of guitar techniques.

¹⁴⁴ Comprehensive details may be found in Figure 51, and explanations at the start each of section from 7.1. (See pages 193, and 217.)

sections. (See section 1.10, and Chapter 3.) Therefore, by examining the spectral possibilities from the selected extended techniques, including layering contrasting morphologies, processes that help produce new pieces may be contemplated. Consequently, the manipulation of consecutive, merged, and combined morphologies suggested to me a new notation that is more responsive to this soundworld.¹⁴⁵ The model for my system is based on appropriate guitar repertoire, the author's invention, and the work of significant composers who have written for other instruments.

For the player, this research is a resource for understanding how composers incorporate extended guitar techniques in their work, the resultant impact on performer actions, and the meaning of instrument-specific scoring. The composer can gain a wider view of what notational methods have been employed, how morphological detail is conveyed, and application of elements of freedom.

Before a set of didactic compositions are presented, a detailed taxonomy of certain chosen techniques is followed by an explanation of morphologies inherent in the guitar sounds and the process of using them to create the structures and principles underpinning the music composed for Volume 2; discussion of notation in the studies themselves centres on general and specific issues around these morphologies and compositional principles.

For the thirty-four studies composed for Volume 2 relevant information is centred on practical performance issues, where a specific method designed for using extended techniques is offered; amounting to an alternative view of how music based on the spectra from particular extended techniques can be exploited. Some of the numerous possibilities for further development are found in the final section.

The aim in Volume 2 is to unlock some of the mystery behind contemporary guitar playing from the unorthodox perspective of realising extended techniques morphologies. Guitarists can then learn to sculpt guitar sounds by focusing on a distillation of the energy and forces involved; pitch relations, rhythmic and durational elements, dynamics, articulation, phrasing and textual instruction, for

¹⁴⁵ The notion of manipulating consecutive, merged, and combined sounds was first mentioned in *Key repertoire*. (See chapter section 1.3.)

instance. The purpose of the scores is to serve guitarists' musicianship and intensify their perception of morphologies and response to sound.

The scores in Volume 2 form directives that facilitate the experiential aspects of music encountered through performing guitar morphologies. Here, the main attention is on comprehending and assimilating all necessary parameters. Through studying the detailed historical and notational aspects from the Volume 1 survey, guitarists interested in playing the Volume 2 music can obtain the necessary technical and theoretic skills. Learning to play the studies means engaging in music where the emphasis is on understanding this particular notational approach to performance sensibilities, critical listening, and morphological awareness.

Furthermore, by making relevant connections between the Volume 2 studies and key repertoire in Volume 1, the benefits of playing music comprising only extended techniques occurs on two enhancement levels. Firstly, through pushing performance boundaries further than normal, which means engagement with exploring the physical and/or acoustic nature of morphologies. (See section 1.10.) Secondly, engaging with the heightened awareness that occurs when personal technique and musical approach fuse with understanding the morphological structuring principles expounded in Chapter 5.

In addition, learning to develop elements of freedom within the area of structuring consecutive, merged, and combined morphologies will help towards enrichment of improvisational skills, as can be gleaned from sections 1.6 and 7.2.

4.1 Background to the studies

I have keenly explored new sound possibilities for the six-string classical guitar since the late 1960s, a preoccupation that intensified with the discovery of works such as Henze's *Memorias de 'El Cimarrón'* (1970), Brouwer's *La Espiral Eterna* (1971), and Bedford's *Asked for It* (1973). Further composition and improvisation study related to such avant-garde repertoire led over several decades to the idea of a soundworld based on the spectral content from certain guitar morphologies.

Various relevant topics will be discussed in this section; my personal motive for composing the studies and discovering notation systems, how composers

who have written for instruments other than guitar integrate extended techniques in their work, the notational implications of including only extended techniques in extended sections, and general conclusions on tablature-based notation usage.

Volume 2 has been produced in order to realize the author's extensive thinking on creating music that comprises only extended guitar techniques. The outcome is an exploratory study of one particular way of notating certain extended techniques, a method specific to the instrument. For the guitarist with an interest in investigating such a soundworld, a viable methodology for a working schema is offered. The resultant notation system is then used for a set of instructive compositions.

As Volume 1 shows, some contemporary composers who have written for the six-string classical guitar use only conventionally-played sounds, others include the occasional extended technique, whereas a number of composers mix extended techniques and conventionally-played sounds. For example, in *Elogio de la Danza* (1964) Leo Brouwer has infrequent golpé down beats, whereas in *Apnea* (2004-2005) Edgar Guzmán utilizes bottleneck and snap pizzicati with conventionally-played sounds, merged bi-tones and consecutive rapid mute morphologies alongside or combined with normally-plucked pitches. (See Figure 2, sections 1.5.1 and 1.6 for more information on *Apnea*.)

Volume 1 further cites three underlying methods adopted by composers to notate sections that involve only extended techniques; scores that comprise text only, combine standard notation with tablature, and tablature. Bryars' *The Squirrel And The Ricketty-Racketty Bridge* (1971), Lachenmann's *Salut für Caudwell*, and Corghi's *Consonancias y Redobles* (1974) are typical. Bryars uses a text-based system that amounts to a written form of tablature, Lachenmann utilizes a mix of standard notation and tablature running concurrently, and Corghi sometimes employs a tablature-based system to help the performer realize the musical designs. (See section 2.1.)

The *Notation in the repertoire* section provides the main reasons for developing the tablature-based notation offered in the Volume 2 studies. Key connected repertoire and existing notational possibilities are also used for the purpose of making appropriate morphological comparisons. (See Figure 40, and sections 2.3.1. and 2.3.2.)

When compositional thinking is allied to depicting spectral content, there is a strong tendency towards including schemes founded in tablature. The main arguments for adopting a tablature-based notation system were formed by exploring notation in the repertoire. (See Volume 1, Chapter 2.) Topics covered are thoughts on musical sound apprehension (section 2.3.1), discussion on significance of spectral content in the repertoire (section 2.3.2), and conveying information related to the inherent sound in the morphologies (section 2.3.3). Furthermore, examples are given in section 2.3.4 on the subject of melodic aspects, comparison of works by Durville, Riehm and Corghi in relation to the scoring system used in Volume 2.

When it comes to depicting extended techniques morphologies in notation form, tablature can be seen a more effective and useful vehicle for conveying morphological detail and information on elements of freedom, arguably more successful than the standard staff system. (See section 2.4.) Therefore, we will concentrate on tablature usage for the music in this volume, noting from Figure 2 and the discussion in section 2.3 that other guitar composers also use systems involving tablature.

My findings in Volume 1 further suggest that no solo six-string guitar pieces comprising only extended techniques exist that are depicted solely in a tablature-based notation. In this sense, the music presented in Volume 2 is perhaps a new venture. That said, there are other composers who have employed forms of tablature for other instruments in order to convey morphologies from extended techniques, and we shall indeed be examining the connections between their work and the studies.

The two examples discussed here are Helmut Lachenmann's groundbreaking work *Pression for Cello* (1969) and the recently composed *no one both, for violin, viola and cello* (2013) by Charlie Sdraulig. The key areas in these works are the visual representation of procedures, which impacts on generating morphologies, instrument-specific scoring, the importance of physicality in relation to resultant sound, offering a schema for performer interaction, and responses where actions and listening are critical.

In her article *Pression – a performance study*, Tanja Orning tells us that: “*Pression* is one of Lachenmann's first works introducing the concept of

musique concrète instrumentale” (Orning 2012: 12).¹⁴⁶ Except for one central normally-played sound, Lachenmann uses only extended techniques for the Cello in this work. Rather than functioning in a traditional way, Lachenmann establishes and conveys musical information in the score through mapping actions for the performer. The player is asked to create sounds using various forces, for example, squeezing, pressing, jerking, sliding, hitting, as well as stroking various parts of the instrument and the bow. Orning encapsulates Lachenmann's style as: “an aesthetic direction that, by using traditional instruments in non-traditional ways, avoids classical hierarchical structures such as prioritizing work over performance and compositional traditions over pure sound” (Orning 2012: 13). We can see in Figure 49 that the notation used by Lachenmann is a tablature-based system.

Page 4 of Lachenmann's *Pression*

*) Bogen mit Haaren normal streichend auf Corpus bis herauf direkt unter die Saiten verlagern

*) Bogenstange von unten gegen die Seite prallen lassen. Tonhöhenveränderungen durch Verlagerung der springenden Saiten zum Steg (höher) bzw. vom Steg weg (tiefer)

*) Linke berührt leicht die Saiten (quasi flag.) um sie am Klingen zu hindern.

Figure 49: Sample from *Pression* by Lachenmann, page four of the score.

¹⁴⁶ Tanja Orning *Pression – a performance study* (2012), Music Performance Research, Volume 5, Royal Northern College of Music, UK. Orning’s article contains an explanation of *musique concrète instrumentale*. (See Orning 2012: 13.)

There are several connections with the notation system used in Volume 2, of which two stand out. Firstly, the scoring is instrument-specific. In order to produce morphologies, Lachenmann's tablature shows where to place the fingers: designed for navigating a cello in a related form to my guitar usage. (See Chapter 6.) Secondly, comparable to the durational system applied in the Volume 2 studies, Lachenmann transcends the traditional limitations of tablature by adding horizontal lines to indicate start and end points. (The scores start on page 328.)

Furthermore, there is a significant correlation between musical notation and producing gestures and phrases, especially in the realm of physical movement. The notated sign evokes an inherent performative action that gives life to the music; descriptive representation of sound and corporeal actions are intertwined. Similar to the scores in this volume, performance and score are linked through the body of the musician and the structure of the instrument. For example, applying downward energy from fingertips against the guitar fingerboard creates bi-tone morphologies. (See section 7.9.1.)

In *no one both* by Charlie Sdraulig, the performers play a small repertoire of very quiet sounds that are varied in a number of ways. The music is created around a system of interactions and responses. In the score, a fixed linear tablature notation gradually gives way to a modular system of interaction.

Analogous to *Pression*, the notation provides a schema for navigating through and responding to sounds produced exclusively by extended techniques, creating an environment that prioritises action and close listening. Sdraulig requests that each performer plays only on string IV throughout the entire piece, and this is reflected in the vertical line of the tablature; the richest morphologies are produced on this string. Horizontal lines indicate bridge, the end of the fingerboard closest to the bridge, middle of the fingerboard, and nut positions. Figure 50 is a copy of Sdraulig's tablature instruction.¹⁴⁷

¹⁴⁷ Taken from the performance notes for *no one both* (Sdraulig 2013: 4).

The tablature notation

Tablature

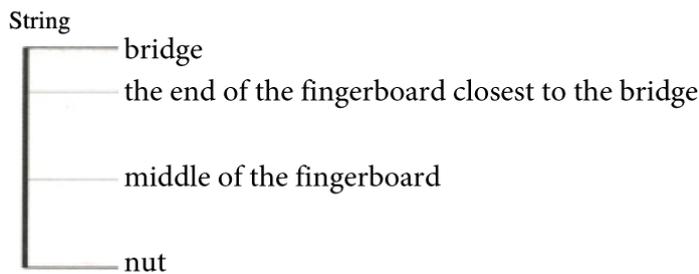


Figure 50: Sdraulig's tablature system for *no one both*.

There are similarities here with the rapid mute playing in Volume 2, which produce unfretted noise-oriented morphologies; especially in the area of hand positions that span the guitars string length between bridge and nut. (See section 7.11.) Other connections to the Volume 2 studies include use of scordatura, and varying the amount of finger pressure employed to depress strings towards the fretboard.

In a comparable manner to the Volume 2 studies, Sdraulig utilizes text for performer instruction. He gives the performers appropriate performative guidance, with an emphasis on aural perception. For example, Sdraulig advises: 'It will be necessary to aurally assess your own sound'. This is akin to the instructions on perception of pitch contour that occur later in this volume. See section 7.2.4, for example. Further to Sdraulig's usage, text instructions found in the Volume 2 scores sometimes include technical detail and advice on making improvisatory decisions. (See Chapter 7, and section 7.2.5.)

To summarize, the contents of Volume 1 can be seen as an examination of how the morphological approach to apprehending spectral content adopted in Volume 2 connects to composers who have used extended guitar techniques. The results of my findings have led to theorizing the possible methodology expounded in this volume, which is based on the interconnectedness of experiencing and observing guitar morphologies.

For the performer, this means gaining theoretical knowledge, mainly through studying Chapter 5, and learning about the notation system explained in Chapter 6. Relevant information about the thirty-four studies that center on practical performance issues can be found chiefly in Chapters 7 and 8, where

developing technical, performance, compositional, improvisational, listening, and awareness skills are expounded. Then ideas for fostering future development and use of amplification are elucidated in the final section, Chapter 9.

The main ambition of this volume is to push the existing performative boundaries of extended techniques by exploring combinations of the physical and acoustic aspects of producing particular guitar morphologies. This can be seen as cultivating the work of some of the groundbreaking composers discussed in Volume 1; musicians such as Ferneyhough and Kampela for physicality, Durville and Murai for maintenance of sound, Scelsi and Lachenmann for resonance, Riehm and Corghi for a fusion of physicality and resonance.¹⁴⁸ However, the Volume 2 scores also contain a mixture of all three aspects, resonance, physicality, and maintenance of sound. (See section 1.10, and from Chapter 7 Studies onwards.)

4.2 Apprehending sound

Critical listening skills are essential for heightened perception of extended techniques morphologies. The musical components that form a sound event are interdependent. However, in standard notation, frequency level and length of morphologies are presented as the principle factors, whereas dynamic levels and quality of sound are subordinate. This is in line with the detailed elucidation given by Pierre Boulez in *On Music Today*. He explains:

“It seems to me essential to think of the interchangeability of the sound-components as a basic structural phenomenon: at the same time, it should be stressed that they can be graded according to a scale of decreasing importance. Pitch and duration seem to me to form the basis of a compositional dialectic, while intensity and timbre belong to secondary categories” (Boulez 1971: 37).

The traditional hierarchies described by Boulez above are re-ordered for the Volume 2 scores. Introducing morphological quality takes the notation into an

¹⁴⁸ 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.

added dimension, especially as the underlying purpose of the notation system is to describe sound morphology and facilitate learning to articulate morphologies in the time-continuum. Consequently, musical parameters are founded on apprehending sound; depicting the behaviour of sound events through time, based on the archetypal attack/resonance morphology and variants of the archetype. (See Chapter 5.)

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, my notation for the studies 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.

In *On Sonic Art*, Trevor Wishart describes how standard notation appears to show music occurring primarily on a two-dimensional plane (vertical and horizontal). He reminds us that, “music does not have to be lattice-based at all” (Wishart 1998: 11). Furthermore, Wishart asserts: “musical notation has intrinsic limitations” (Wishart 1997: 1). Relating this to guitar playing, in various musical situations it is possible to vary the pitch of a guitar sound by a variety of means, among the possibilities are detuning, depth of vibrato, glissandi, and microtonal fluctuations. In the conventional notation system, however, this can only be communicated approximately, due to the use of discrete frequency levels (vertical); moreover, in the time continuum units are divided mathematically (horizontal).¹⁴⁹ Wishart refers to the vertical and horizontal aspects of stave notation as a, “restraining grid (of) the pitch-duration lattice” (Wishart 1997: 1).

In standard notation, symbols may occur that have no information about how the performer accomplishes the articulation. For example, ornaments are sometimes employed, representing subtle articulations of pitch. Graphic symbols are usually used, indicating which pitch is to be ornamentally articulated. The performer learns what to do through performance practice

¹⁴⁹ Conventionally notated music is tied within the restrictions of a summative rhythm; durations can be expressed as the sum of smaller equal values.

convention. In a tablature-based system, subtle variations in pitch material can be incorporated into the overall design. Therefore, the composer or guitarist can think of writing or organising pitch articulation over the full possible continuum in an unrestricted fashion, and also think in terms of a soundworld that includes the spaces between the ‘lattice’.

For this research therefore, developing a method for expressing the quality of the sound itself was essential in giving an impression of the noise content and spectral detail from extended techniques morphologies. Moreover, the symbols used in the notation can help the player learn to orientate and engage with all aspects of the sound - pitch, noise, duration, dynamics, and structure. For example, this interaction with the spectral aspect can be clearly seen in the two types of *cross stroke* technique. (See section 7.6.)

As the notation looks at and describes morphology, and the guitarist is encouraged to progressively learn about engaging with inherent morphological properties, it may give the wrong impression of allowing very little interpretative freedom in execution. In fact, human agency is not minimised but rather enhanced through a learning process. As the performer becomes involved in the process of deciphering symbols and then working towards a performance, the notation helps to direct a realisation of the appropriate soundworld by describing the composer’s sonic intentions and expressing the grammatical structure of the music. Similar to reading from standard notation, for the simpler scores this may happen in real time after a basic level of performance is attained. However, for the more complex scores, a carefully planned preparation regime is advocated.

Akin to conventional notation, the performer has a limited amount of interpretive freedom in the fixed sections of the Volume 2 studies; he or she endeavours to understand and follow the given directions. Hugo Cole reminds us that: “The function of a sign is to serve as a trigger to action” (Cole 1974: 15). However, a ‘trigger to action’ does not mean unimaginative, robotic execution. The morphological symbols used in the Volume 2 scores act as a guide, they are not absolute. The player must be free to examine the relationship between the graphic representations presented in the score and the sound outcome. See section 8.1.6, which illustrates this point by discussing varying

microtonal refractions of *'snare drum' lateral glissando* morphologies, and interpretive freedom.

When interpreting the improvised sections in the studies, the player can learn to indulge in articulations of time aurally. Trevor Wishart states: "Notated rhythm is limited by the problem of notational economy. We can divide time infinitely and in performance can judge directly the effectiveness of the most subtle placements of sounds." (Wishart 1998: 23). One important aspect of the studies in Volume 2 is to train the guitarist to evaluate and engage in the placement of morphologies naturally and effectively. For example, there are occurrences where the player has the freedom to choose one or more parameters while all other relevant information is given. (See sections 4.1, 3.2.2, and 5.2.4 for more details.)

The convention of music notation is to describe an array of musical facets that the composer requires from the performer. The further intention here is to supplement this function by helping the performer to heighten his or her awareness and perceiving of the inherent soundworld. Therefore, the scores are a set of instructions for engendering a musical experience through the apprehension of guitar morphologies.

After an explanation of inherent guitar sounds and structuring morphologies, which will centre on the archetype and variants, the principles of combining morphologies into musical contexts are then expounded. This is followed by discussion on the notation system used, then practical realisation in the form of studies.

5 Morphology and morphological structures

The discussion for Chapter 5 *Morphology and morphological structures* will centre on the intrinsic structure of guitar sounds, an examination that facilitates an understanding of the compositional strategies used in this volume.

A table that indicates morphological and notational information has been devised as an aid to understanding guitar morphology (Figure 51). 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 through time. With the creation of variants, this archetypal attack/resonance model can be developed further. 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.

5.1 Table of morphologies; archetype and variants

A table of twenty-one morphologies is set out in Figure 51. Spectral content is used as a basis to order morphologies, starting with the *natural harmonic*, where a fundamental pitch dominates the spectrum, finishing with the noise-oriented *pinch mute*. Morphologies with a balanced mix of pitch and noise, like 'snare drum', occur mid-way. The letter A indicates archetypes and the letter V is used for variants. (See Figure 51 *morphology* column.)

The morphological diagrams represent the progress of spectral content through time, each morphology being depicted at the loudest level of sound it is possible to produce for each technique. The *Level of dynamics key* (Figure 51: 5) shows that six gradations, which correspond to six vertical lines indicating attack force, are employed to represent dynamic range. To aid comprehension, two examples are given as part of the key. A *mute tap* morphology is expressed in the first shape. As the loudest mute tap morphology is moderately soft, the attack phase covers only half the possible dynamic range. The loudest *snap pizzicato (long)* level is very loud, and so no visible vertical lines can be seen in the second shape.

Alongside the morphological diagrams are the notational symbols used in the scores.¹⁵⁰ Some symbols are based on standard notation, while others

¹⁵⁰ Notation symbols from Figure 51 are dealt with in detail for each technique, starting at chapter section 7.1.

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. These are the '*snare drum*' group, and *bottleneck (plucked)*, which both employ two strings, and *soundhole resonance (palm, fist, or thumb)* that use up to six strings.

Figure 51: Table of morphologies

1

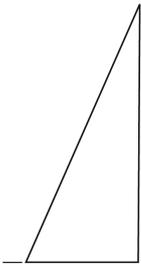
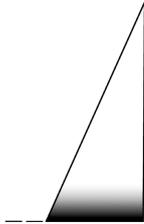
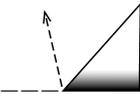
Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
Natural harmonic	A 		Percussive attack, decaying spectral activity (higher harmonics have shorter resonance). Duration; 4" to 15".	Loud to very soft, (higher harmonics softer).
Multiphonic harmonic	A 		Percussive attack, decaying spectral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

Figure 51: Table of morphologies

2

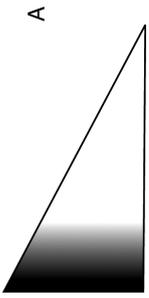
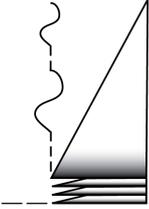
Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
Snap pizzicato (long)			Percussive noise attack, long decaying spectral activity. Duration; 10" to 15".	Very loud to moderately loud.
Snap pizzicato			Percussive noise attack, short spectral activity. Duration; 0.5" to 1". Rapidly terminated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

Figure 51: Table of morphologies

3

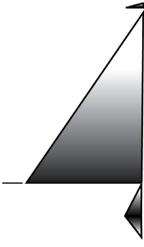
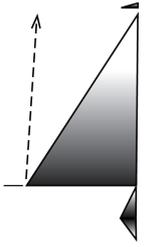
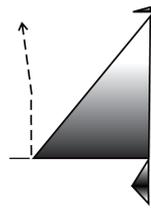
Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
'Snare drum' (normal) <i>Extended</i>			Three phases - textural preparation - percussive noise attack (may be multiple), decaying spectral activity, noise release. 2nd phase duration 2" to 6".	Soft, always subtle loud to soft - soft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

Figure 51: Table of morphologies

4

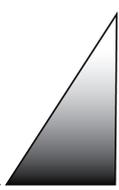
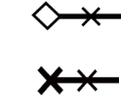
Taxonomy	Morphology	Notation	Morphological attributes	Dynamic range
Soundhole resonance (palm, fist, or thumb)	A 		Percussive noise attack, decaying spectral activity. Duration; 3" to 6".	Moderately soft to very soft.
Soundhole resonance (buzz)	A 		Percussive noise attack, decaying spectral activity. 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) <i>Damped</i>	A 		Percussive attack, decaying spectral activity. Duration; 4" to 6".	Moderately soft to very soft.
Tapping, mute <i>Damped</i>	V 		Short spectral activity. Rapidly terminated mute tap (long)	

Figure 51: Table of morphologies

5

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

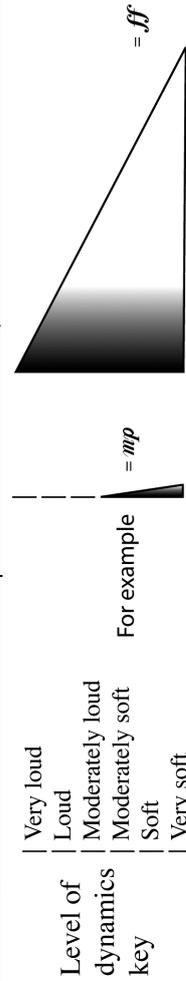


Figure 51: Table of morphologies

5.2 Archetypal morphology

The archetypal morphology occurs when a percussive attack gesture, activated by the left or right hand, sets a spectrum resonating; a fixed fundamental pitch emerges. The resultant contour embodies internal spectral behaviour, where the richness of the spectrum is allied to its gradual decay towards termination.

The contour of a natural harmonic morphology reflects an unimpeded attack/resonance archetypal model. Other morphologies that follow the same design are, multiphonic harmonic, snap pizzicato (long), soundhole resonance (palm, fist, or thumb), soundhole resonance (buzz), bi-tone (long), mute tap (long) and nut-side.

5.2.1 Variants

Although several morphologies follow the archetypal shape, others possess different qualities. In the four variant types, an action alters the progress of the spectral content whether by *refraction*, *extension*, *dampening*, or *interruption*.

5.2.2 Refraction

Refracted morphologies follow the archetypal shape but possess a different pitch trajectory (denoted as *refracted* in Figure 51). The player causes spectral change by altering the fundamental pitch with the left hand, resulting in ascending or descending glissandi, as in *bottleneck (plucked)* and *(unplucked)*, as well as *'snare drum' (glissandi)* morphologies.

5.2.3 Extensions

Realising *cross stroke* and *'snare drum'* techniques involves the shaping of additional phases (denoted as *extended* in Figure 51). For instance, *cross stroke* morphologies have two phases; the second is an extension of the first. The first phase is caused by repeated intervention with the right hand, creating a series of iterative attacks that act as an upbeat to the second phase, which is a release of energy. *'Snare drum'* morphologies have three phases, a preparation that induces a soft and subtle texture, followed by a percussive noise attack (this may be multiple attacks), which is released into the decaying spectral activity, then a noise termination. (See sections 7.6 and 7.7.)

5.2.4 Combining refraction and extension

Refraction and extension can be combined to create further variants, for example, *cross stroke (active scordatura)*, which includes a multiple attacks phase, followed by a resonance where the contour is shaped by left-hand intervention. '*Snare drum (lateral glissando)*', and '*snare drum (slide glissando)*' morphologies consist of a percussive noise attacks, followed by a refracted resonance, and a noise cessation.

5.2.5 Damping

Damped morphologies involve an action to subdue the sound, using a particular part of the right or left hand to reduce the amplitude of string oscillation (denoted as *damped* in Figure 51), thereby shortening the duration. All damped morphologies are dominated by attack noise. For instance, through active control of the vibrating string in *rapid mute*, the performer produces a morphology that filters frequencies. The result is a noise-oriented morphology with a relatively small amount of pitch content.¹⁵¹

5.2.6 Interruption

Interruption is always a dormant possibility for all resonances. Of the many possibilities, Figure 52 shows a typical example of a *snap pizzicato (long)* morphology interrupted by a *snap pizzicato*.

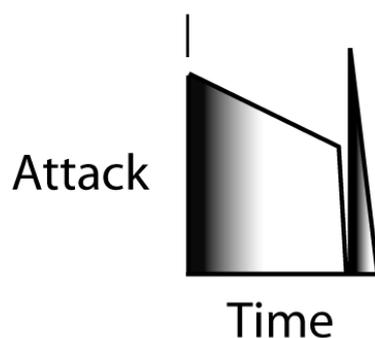


Figure 52: Interrupted resonance.

¹⁵¹ The effect of filtering frequencies in relation to string length and harmonics node points is explained in more detail between 7.1.1 *Higher harmonics*, and 7.2 *Natural harmonics*.

5.3 Spectral variety

In Figure 53, the possibilities for shaping the spectral content of morphologies are summarised. The way that pitch content is manipulated, whether left to resonate, refracted, extended, or interrupted, 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 or the preparation phase of a ‘*snare drum*’ morphology can operate as an anacrusis. Morphologies terminate naturally when the sound reaches 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, 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. A symmetrical example might be a glissando of approximately a semitone upwards, followed by a return downwards to the starting point. With an asymmetrical contour, the upwards and downwards distances of the glissando would not be the same.

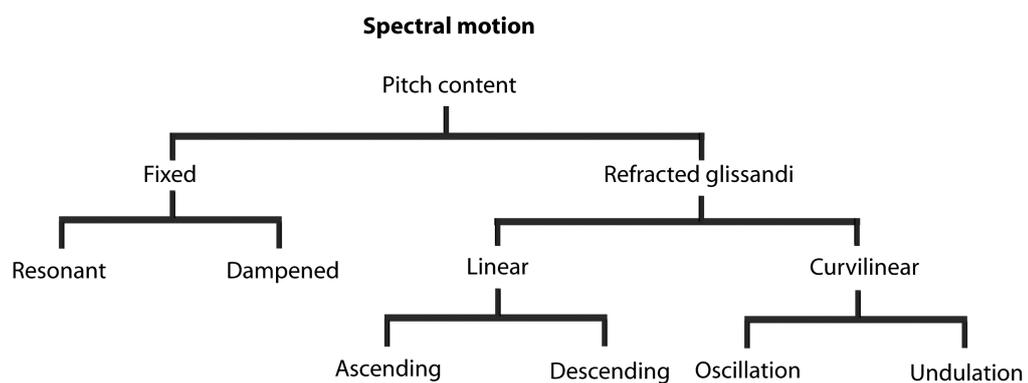


Figure 53: Shaping of spectral content.

5.4 Morphological structures

The purpose of the morphological diagrams is to draw attention to the temporal evolution of spectra and pitch-to-noise content produced by playing particular techniques. However, their main function is to show how the combining of

morphologies results in the integration of spectral components, creating more complex sound qualities. In particular, the player works 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. The diagrams therefore highlight how merging and superimpositions work, something that is not so apparent in standard tablature-based or notation systems, which are more concerned with providing information on how to execute morphologies. Furthermore, such graphic representation shows the continuity of dynamic shaping more immediately than is possible with conventional notational indications like the Italian dynamic abbreviations. In order to interpret the studies in Volume 2, the player needs to be fully sensitised to the progress of spectral and morphological shaping.

Listening to the sound examples in conjunction with the morphological diagrams will help train the guitarist in understanding subtleties of spectral detail and verify accuracy of sound image apprehension.

5.4.1 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 54 multiphonic harmonic morphologies are used to illustrate three possibilities for connecting similar morphological types, from relative separation to merging.

Figure 54a shows relative separation - two morphologies are juxtaposed, the second starting near the termination point of the first decay period. Figures 54b and 54c show merged morphologies, composite sounds that arise when morphologies are superimposed. In Figure 54b the second morphology is initiated soon after the attack of the first, the resonances therefore merge. The second morphology in Figure 54c 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.

Combining morphologies

Similar type

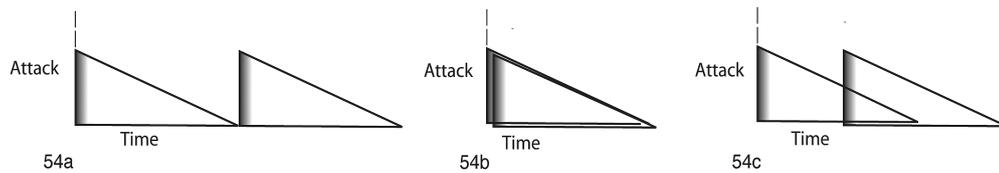


Figure 54: Consecutive and merged *multiphonic harmonic* structures.

Merged morphologies may be synchronous, as in simultaneous attacks on two strings, or may occur at different times (as in Figure 54). 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 55 shows a structure of natural harmonics morphologies with varying dynamic levels and degrees of merging.

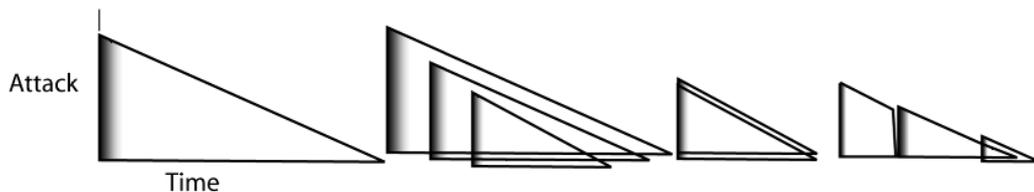


Figure 55: *Natural harmonic* structures.

Here is an analysis of Figure 55:

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 56 and 57 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). (See Figure 51: 1 and 2.)¹⁵²

Figure 56 shows attack/resonance/termination of morphologies, spectral activity, timeline, and dynamic levels. The morphologies are aligned under the relevant score extract, acting as a guide to spectral quality; a continuation of the ideas formulated in Figures 54 and 55. *Sound example, track 13* is a realisation of Figure 56.

¹⁵² Note that all diagrams may be analysed in a similar fashion to Figure 55.

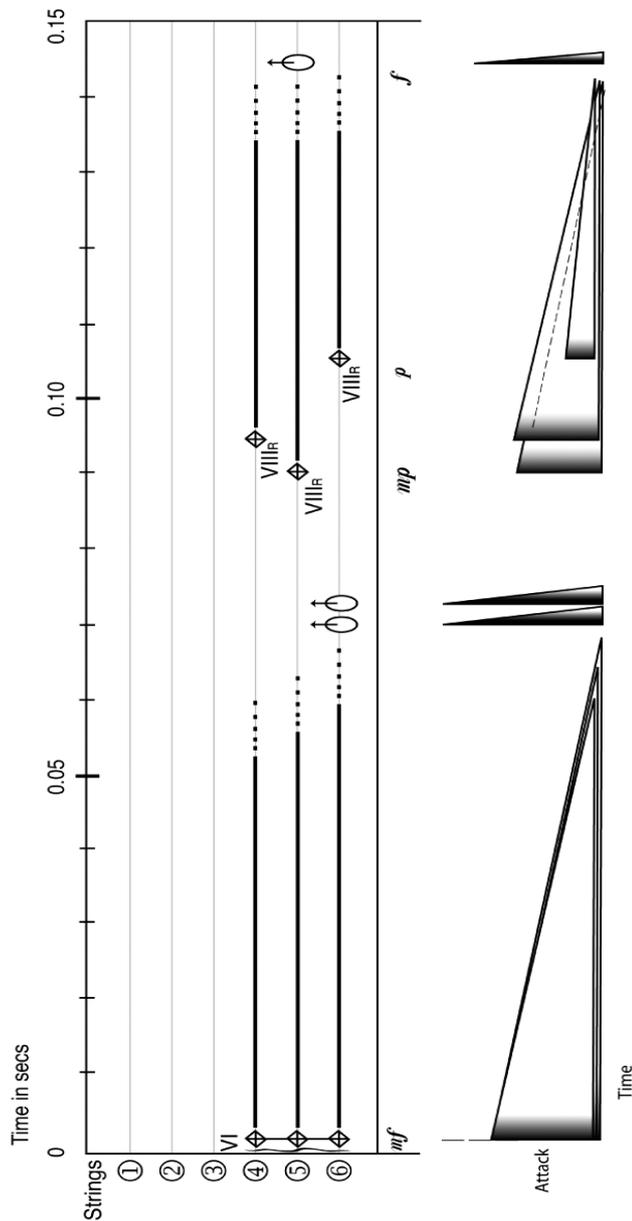


Figure 56: Consecutive *snap pizzicato* and merged *multiphonic harmonic* morphologies.

Figure 57 shows the combining of multiphonic harmonics and snap pizzicati over a period of 15". The lower section shows the resultant superimposition of morphologies; resonances are combined. *Sound example, track 14* is a realisation of Figure 57.

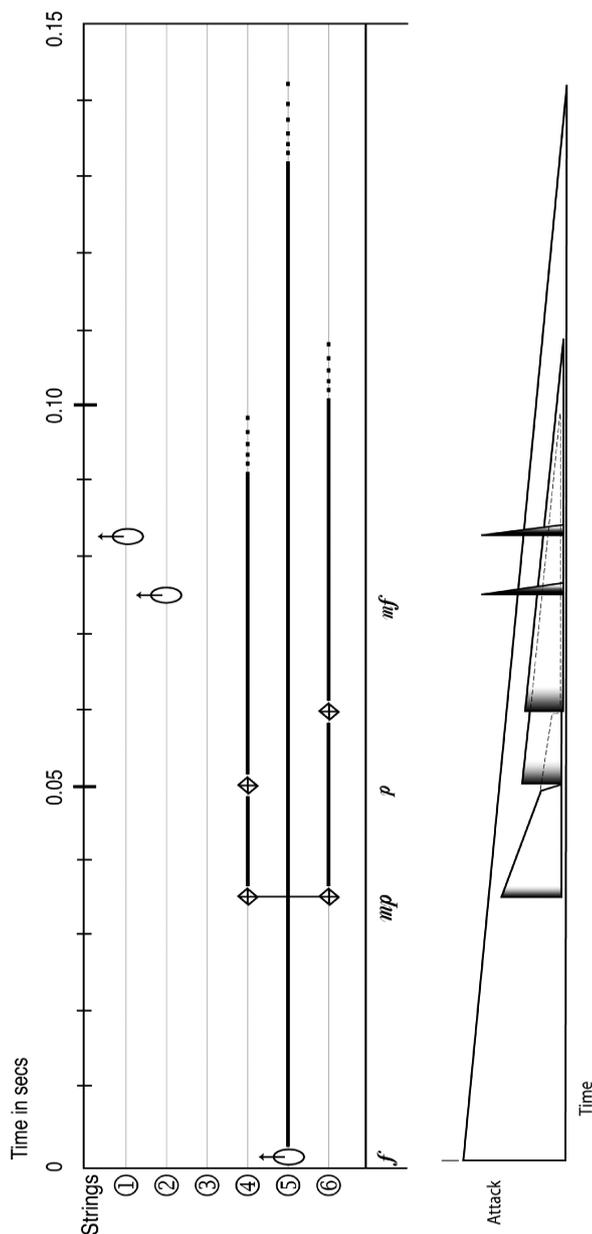


Figure 57: Combined *multiphonic harmonic* and *snap pizzicato* morphologies.

Figures 56 and 57 represent the cumulative complexity of sound spectra. While Figure 56 shows a string of morphologies that are consecutive, or merged, Figure 57 demonstrates a more complex combining of resonances, layering extended technique on extended technique.

Having established a context for the emergence and usage of extended guitar techniques (see Volume 1), the compositional principle of manipulating consecutive, merged, and combined morphologies, referred to in this chapter, will be used as a concept that underpins the investigation into notational and performative aspects of the studies.

Learning to play the guitar using these principle as a foundation is not conventional, as the research is centred on seeking to establish new ideas based on prior and acquired knowledge; an approach to comprehending guitar sounds that enables musicians to engage with spectral and morphological representations and procedures.

The following text, Chapters 6, 7, and 8, offer a framework for understanding the notation used for the studies as well as structural relations and responses to the way morphologies unfold during the temporal aspect of music.

6 Notation in the studies: General and specific

The aim was to generate an appropriate notation system that facilitates learning music based on the principles expounded in the *Morphological structures* section, which underpins all the scores. (See Chapter 5.) Most importantly, any new schema had to have ties with guitar tradition. This necessitated devising a method that is both instrument-specific and practical when indicating where to execute sounds.

My notation for the Volume 2 studies is the result of an exploration into developing an alternative to the standard five-line stave system, aspiring to produce lucid and uncluttered scores. The resultant tablature-based system is not conventional, and some aspects of it may even appear at first sight to be counterintuitive. For instance, pitch is not conveyed on a vertical axis, which is prevalent in the usual Western system.¹⁵³ However, learning to master new notation systems and signs are common practice for guitarists and other instrumentalists, a matter of course in the area of contemporary music.

The notational scheme here is related to recent developments. Most pertinently, the approach to apprehending sound was inspired by the pioneering researchers in the field of *Acousmatic* music.¹⁵⁴ Furthermore, the notation used in this dissertation is necessarily new because it focuses on morphological properties for which there were no pre-existing signs in music notation.

An approach that has its origins in early guitar tablature has been developed. It is intended as a comprehensible scheme, open to all guitarists whatever their musical backgrounds, including classical, folk, jazz, world, country, and popular musics, from the classical guitarist who possesses a seeking spirit, to electric players where the notion of extending guitar techniques, and noise as an inherent constituent of morphologies, may be regarded as common practice.

When referring to the electric guitar, Barry Seroff mentions, "...extended technique is built into the DNA of the instrument. Noise is so inherent in electric guitar music that it is regularly taught not as *extended technique*, but

¹⁵³ See chapter 4.2 for an explanation of why my notation was extricated from the conventional pitch (vertical) and duration (horizontal) paradigm.

¹⁵⁴ The expression *acousmatic music* is "music intended for performance on an 'orchestra' of loudspeakers and without an accompanying visual component". This definition is taken from <http://www.peimankhosravi.co.uk/about.html> (with permission from the author).

simply *technique*” (Seroff 2010).¹⁵⁵ Indeed, today there are many adventurous professional guitarists who play in more than one style and use extended techniques in their compositions and improvisations. For example, Fred Frith, Maurizio Pisati, and Marc Ribot are cited in this dissertation.

Building a tablature-based system has enabled an opportunity to re-evaluate how resonance durations are expressed, especially in regard to placing morphologies in a time continuum, and learning to improvise using extended techniques. For example, when precision is needed, unlike conventional notation where noteheads are not string-specific, start points of sound event symbols can be placed accurately on particular strings at points in time, making the time-line a form of proportional notation. Moreover, as well as being left to resonate and decay to silence, morphologies can merge with similar resonances or combine with contrasting morphologies, and terminations may be specifically positioned to show, for example, the desired termination points of overlapping resonances.

In Volume 1, *Notation in the repertoire* is a detailed investigation into how key composers use tablature to indicate the actions necessary for conveying morphological detail in terms of spectral content and performance technique. (See Chapter 2.) By making relevant evaluations, all of the points discussed have an impact on the music presented here - 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.

Observation of any Volume 2 score will show these points. Taking the placement of spectral content as an example, the opening morphology in *Natural harmonics Study 1: Dynamics*, 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. (See section 7.2.1, and Volume 2, page 328.)

¹⁵⁵ Taken from personal email correspondence of 9th April 2010. Barry Seroff is a guitarist, composer and teacher based in New York.

Before discussing the studies in further detail, we will have a more specific look at my notation. In the standard historical model of tablature depiction, which is based on fret indication, conventionally plucked pitches are located in the horizontal or vertical planes. (See Figure 38.) However, in the Volume 2 scores, the horizontal aspect is used primarily for placing sound events. This enables a system that opens up the potential for developing pitch- or noise-biased morphologies that emanate from extended techniques. Related extended techniques morphologies are now depicted in the horizontal and vertical aspects, natural and mutliphonic harmonics are an example. Moreover, combining contrasting extended techniques can occur through layering morphologies in the vertical aspect, bottleneck and soundhole resonances for instance. (See Chapter 8.) In other words, the tablature system used here is a vehicle that facilitates the structuring of morphological contours.

String numbers are vertically positioned and aligned with each other at the end of each system, enabling a clear visual reference when interpreting morphologies. Symbols and text are located under the top horizontal time-line; corresponding string and fret indications are positioned vertically for left- and right-hand placement. As in conventional tablature, standard units that indicate rhythmic activity may be placed above or below in the horizontal plane when needed. Dynamic levels are positioned in the area under the bottom horizontal line.

From the authors' perspective, it is the pictorial aspect of tablature that makes it an imaginative model for depicting guitar morphologies. This research has shown that graphic representations are used to convey information in scores that incorporate tablature systems. Figure 58, for instance, shows how Mauricio Kagel depicts bi-tone and nut-side playing in *Faites votre jeu II* (1964).¹⁵⁶ Moreover, similar to some symbols used in the Volume 2 scores, physical actions are sometimes expressed using graphic shapes. For example, Helmut Lachenmann's symbol for a cross stroke morphology with no resonance in *Salut für Caudwell*, is simply an initial attack. (See Figure 58.)

¹⁵⁶ Taken from 'Pro Musica Nova' studies for playing contemporary music for guitar by Wilhelm Bruck (Bruck 1992: 8b).

Faites votre jeu II

Tablature (a) Bi-tones

Rechte Hand
Linke Hand

III → VI | IX → II

XXI → XII | XX → XI

staccato
Barré

R → P (P) → T NP AP

(0'36")

IV → XI | XX → II | I AC

B B

gliss.

1. volta P
2. volta R

staccato, accelerando

XVI

Zwischen V und XVIII heftig bewegen

Nut-side

NP (112°)

XXI XX → VII

Barré

Instrument auf den Schoß legen
(wie Hawaiigitarre spielen)

Tip of thumb
Thumb nail

simile XII III
X I

*) Lautstärke (durch Fußpedal) fortwährend verändern; Klangfarbe-Schalter (zwischen sehr hell und sehr dunkel) ständig betätigen. (n)

**) Ab und zu einige Anschläge auf den Fellinstrumenten, sowie kurze Töne mit geschlossenem Munde in sehr verschiedener Tonhöhe und Intensität hinzufügen.

Salut für Caudwell by Helmut Lachenmann

93

I

(G →) (Arm heben)

es es

es gibt p t' kai -le

II

Cross stroke, one initial attack

3 Finger (scharfe kurze Wischbewegung) sim. sim.

kann k re tan pro p' Le: man des Le bens ge jä fe ne k ra f t' ne moy t ra konkreten Problemen des Lebens geschaffene Kraft. -ne neutra(Le)

Figure 58: Example of graphic representation from *Faites votre jeu II* by Kagel and *Salut für Caudwell* by Lachenmann.

The method used to describe musical language in the Volume 2 scores contains more graphic representations than text. Although conventional symbols are sometimes used (such as the practice of using a diamond-shaped head for harmonics), illustrative constructions focus on the intrinsic qualities of the particular extended techniques. For example, the symbol used to depict the three phases of cross stroke morphologies provides a means of conveying their distinctive characteristics. Additionally, the player can acquire a sense of morphological outcome from the visual image, and this extends to each extended technique. (See section 7.6.)

It is a fact that extended guitar techniques are used frequently today in many styles. Moreover, the pedagogical value of tablature being easy to learn was outlined in Volume 1, and the all-encompassing thinking behind my scheme is explained above. (See section 2.2.) For the studies found later in this volume, the key musical point is forging a method for expressing spectral content temporally; the system must allow depicting morphologies in the horizontal or vertical aspects within the axis of simple to complex. Furthermore, we have seen that a benefit of tablature is its usefulness in communicating morphological detail and improvisatory elements. (See section 2.4.)

7 Studies

From Volume 1 it is evident that existing sections comprising only extended techniques exist. The research in Volume 2 takes this idea a stage further by including studies that intensify in nature and are based on the spectral content from certain selected extended techniques morphologies. The aim is to initiate the possibility of producing a new repertoire.

The studies provide a basis for exploring the techniques listed in Figure 51 (pages 194-198). It is intended that learning the music will enable guitarists to gain experience in performing and apprehending guitar morphologies, thereby developing a deeper level of awareness in regard to spectral content. Listening to guitar morphologies can also help the guitarist, or guitarist-composer, in the areas of practicing, and composing. The emphasis will be on developing a practical means of working exclusively with extended guitar techniques.

The choice of which extended techniques to include is based on two factors, first, their intrinsic sonic attributes (spectral content), and secondly, the type of hand actions needed in performance situations. In other words, inclusion is founded on morphological and technical considerations. Furthermore, the tablature-based system employed in this volume is designed to help the performer learn to express spectral content in relation to the temporal placing of morphologies. For example, 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 the use of dynamic levels.

One of the explanations of a merged pitch-based melodic aspect may be found in the *Natural harmonics study 1: Dynamics* (See section 7.2.1.) For example, 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. (See Chapter 5, for an explanation of archetypal morphologies). This study is created around eight phrases in total. Apart from the final phrase, the pitches from this first one form

a composite resonance with the least spectral density; pitches involved are F#6, A5, and B5. (See Volume 2, pages 329 and 330.)

In the Volume 2 scores, elements of freedom are developed in a progressive manner. There are many instances. For example, the first occurrence of an improvisation aspect may be found in *Natural harmonics study 3: Arpeggios, interruption and echoes*, a section where the player chooses dynamic levels; location of pitches on the guitar are given along the time-line. (See section 7.2.3.) The next case in point occurs during *Natural harmonics study 4: Improvisation* where greater freedom is given to the performer; free choice of frets is added to dynamic levels, while instruction on which strings to use and resonance values of morphologies are intimated. (See section 7.2.4.) This leads to Study 5, where the performer endeavours to improvise freely on the given musical ideas. (See section 7.2.5.)

To summarize, the studies concentrate on the manipulation of consecutive, merged and combined morphologies, the principles of which were discussed in the chapter that outlines morphological structures. (See Chapter 5.) They are to be regarded as a starting-point for practicing the chosen extended techniques in a musical context as well as discovering their compositional possibilities. The performer is expected not only to interpret fixed notation appropriately, but also to engage in improvisatory decision-making, thereby taking on an active compositional role. Elements of freedom occur in passages where decisions need to be made about choosing fret positions, dynamic levels, placing of morphologies in the time continuum, or a mixture of the three. The player will learn to start building phrases by establishing a method for making apt performance decisions.

To strengthen the compositional principles mentioned above, a number of other organisational devices are employed in the studies. They are designed to help the guitarist to recognise relationships through listening; for example, contrasting elements, incorporating relative silence, building and releasing tension. By encouraging guitarists to experiment with the sonic outcome from the extended guitar techniques, the notion of a music based on the intrinsic texture of sound emerges.

Also important is placing morphological events in time, which may be interpreted as rhythmic invention. For example, the majority of studies found in

Volume 2 have an underlying pulse. There is no need for conventional rhythmic configurations. From observing the first study in Volume 2, *Natural harmonics study 1: Dynamics*, pages 329 and 330, it is obvious that the temporal movement is in seconds, indicating a pulse equal to 60 bpm; placement of sound events clearly align with the temporal indications. In contrast, in *Mute tapping study 2: Iterative rhythmic patterns*, pages 375 and 376, specific Bach-type rhythm indication is employed. However, note that this pulse that underlies the music in the timeline scores should be strictly adhered to. In both the above cases the player is encouraged to work towards interpretation by using a metronome and stop watch as part of practice methodology.

When there is a compositional need to give the performer extra clear-cut rhythmic indication, a more emphatic pulse occurs. An example is *Rapid mute study 2: Synchronous morphologies*, which is built around a network of precise rhythmic figures that denote rapidly repeated and arpeggiated morphologies. (See Volume 2, page 379, and listen to *sound example, track 82*.) Although resonance value is present, the player is encouraged towards the idea of more established rhythmical units.

For most of the music in Volume 2 an underlying pulse relates to working towards an awareness of seconds in a performance situation. In *Natural and multiphonic harmonics combined study: Improvisation*, which is a prime example, the pulse is obviously given and constitutes an underlying factor. In this case, for the performer it translates into the importance of engaging with the interrelations of spectral components and resonance values. (See section 8.1.2, and Volume 2, page 387.)

Furthermore, although a rigorous and thoughtful compositional approach has been applied, by design the music that results has a spontaneous sounding nature; listen to *sound example, track 90*. On the other hand, an emphatic pulse is employed when it is important for the player's attention to be drawn away from an improvisatory-type outcome and engage with a more defined pulse. In *Rapid mute (normal) study 1*, for example, the emphasis is on right-hand articulation; the player concentrates on clearly defined groups of repeated and arpeggiated patterns. (See section 7.11.1, and Volume 2, page 378.)

In addition, from the *Mute tapping study 2: Iterative rhythmic patterns* example above, it is apparent that forms of metrical signs may sometimes also

be used when elements of freedom are present; helping to point the way towards a successful interpretation. To elucidate further, when an even greater degree of performer decision-making occurs in the studies, boxes are sometimes used to convey musical information that includes rhythm indications; allowing and helping the performer to concentrate on developing improvisational components, and engage with the structural outcome.

These improvisational ideas are most potently manifested in some of the combined studies. For example, conventionally-based rhythmic information in the opening box of the *Rapid mute and pinch mute combined study* is built around smooth transformations of consecutive morphologies involving both techniques, and freely improvising on given configurations. (See Volume 2, page 391.) Rhythmic figures are based on conventional usage and textual information is used to instruct the player further. As *pinch* mute is a newly devised technique, it would appear that moving imperceptibly between rapid mute and pinch mute morphologies is unique in the repertoire. For more information, see section 8.1.4.

Discussion on the three sets of studies will focus on the pedagogical and compositional points that apply to playing the extended guitar techniques individually and in combinations of two or three. Performance instructions relate to technical detail about left- and right-hand usage, perception of pitch contour, as well as advice on making decisions.

Relevant connections between the studies and the repertoire surveyed in Volume 1 will inevitably occur. When these relationships arise, they will be explained in the appropriate chapter sections; note that composers cited in Figure 48 (works that have the closest links to my studies) dominate these associations.

Consecutive and merged morphologies are used in the first set of studies, following the order set out in Figure 51, leading to the second and third set, which are based on forming combined morphological relationships. To add musical variety and interest as the first set of studies progresses, related morphologies are introduced.

The player is encouraged to practise every study until the goals of articulating accurate morphologies and achieving fluid hand actions are attained. The following points should be borne in mind:

- Figure 51 - learn all the archetypal and variant morphologies listed. Utilize the given information in conjunction with the studies.
- Morphologies - for each technique, strive to discover the fullest range of morphological variation by varying dynamic levels, durations, and intervallic nature of pitch content. For example, when appropriate, experiment with varying right-hand positioning and angles of onset attacks, and examine the distance between onsets of morphologies: changes in tempo can help build tension. Keep listening to the detail of spectral content, extend knowledge of the fretboard, and develop sound quality.
- Phrases - construct varying phrase-lengths using slurs, vibrato, iteration, and glissandi appropriately. Think in terms of building phrases into phrase groups. Although the scores are pictorial-based, resultant pitch contour is embedded in the system. Therefore, by fully comprehending the instructions given below, the guitarist will learn to understand about extracting and shaping the musical phrases. Use rests to frame phrases.
- Listen to other practitioners.¹⁵⁷

7.1 Harmonics

Natural harmonics produced on or near frets XII, VII, V, IV, and III have been extensively used in Western classical guitar music. Mauro Giuliani (1781-1829) and Fernando Sor were the first guitarists and composers to use natural harmonics. They composed the first known extant pieces to feature harmonics. For example, in order to play a triadic melody in variation number seven of his *Eight Variations* Op. 6 (1811), Giuliani used the third, fourth, fifth, and sixth harmonics on the guitar A-string. (See Figure 59.)

¹⁵⁷ There are a number of musicians listed in the Reference section. See page 410 onwards.

Eight Variations Op. 6 by Mauro Giuliani

Per bene esprimere li armenici, o flaggiolotti, bisogna appoggiare le dita sulle corde a misura de tasti, i quali veranno indicati con numeri al disopra delle note, si previene, che i numeri che sono al disotto delle note, mostrano le corde della chitarra.

Var: VII

C

Corda. 5

Tasto

Figure 59: Harmonics extract from variation number seven of *Eight Variations* Op. 6 by Giuliani.

From around the middle of the last century onwards, composers have occasionally employed natural harmonics on fret V or near frets III and IV to act as a contrasting timbre. *Prelude no. IV* (1940) by H. Villa Lobos, and *El*

Polifemo de Oro (1949) by R. Smith Brindle are two examples taken from the repertoire listed in Index II. (See page 172.)¹⁵⁸ In the opening movement of *El Polifemo de Oro*, natural harmonics are used as an integral part of the lyrical serial texture. Natural harmonics on fret XII, strings 5 and 3, occur on either side of predominantly dissonant intervals. *Sound example, track 15* is a recorded performance of the opening section.¹⁵⁹ In *Prelude no. IV*, H. Villa Lobos uses natural harmonics (on frets V and just behind IV) to form part of the melodic *moderato* section; they act as a contrast to the opening *lento*. *Sound example, track 16* is a realisation of both sections.

Harmonics played on frets XII (an octave above the fundamental pitch) and VII (a perfect twelfth higher than the fundamental) are the closest to normal sounds. However, for the studies in Volume 2 we move away from typical harmonics and focus on those that begin two octaves higher than the fundamental, and above. Moreover, hitherto relatively unexplored natural harmonics are utilized.

7.1.1 Higher harmonics

Harmonics found between frets I and III, mostly located on the three lower strings, produce high-pitched sounds termed *higher harmonics*. (See Figure 61: 2.) As they tend to have less intensity than ordinary natural harmonics - those found between frets XII to V for example - higher harmonics are dominated by the attack phase; therefore, pitch content will be less prominent. (See 7.2.2, and Figure 61: 1.) Higher harmonics should be used with care. They may be affected by inherent random elements, an example being the risk involved in achieving an appropriate amount of clear pitch content during execution; the margin for error is very small.

Higher harmonics are occasionally found in the repertoire. One example is Murail, who uses a single morphology in the Figure C section of *Tellur* (1977). (See Figure 2, and chapter section 1.5.4.) Another is Durville's inclusion of higher harmonics with conventionally plucked pitches in *Mouvement apparent* (1998). (See Figure 2, and chapter section 1.4.1.)

¹⁵⁸ Index II comprises conventionally played solo guitar works with standard notation.

¹⁵⁹ Eduardo Pacual *Il Festival International de Guitarra Ramon Roteta de Irun Vol. 1*, 2002.

7.1.2 Soundhole harmonics

Explorations of harmonics found around the soundhole area, termed *soundhole harmonics*, are scarce. As location of node points differs on each instrument and is dependent on constructional positioning of the soundhole, the hazards involved in performing soundhole harmonics are similar to higher harmonics.

As there are no frets, orientation is difficult. However, the player will become familiar with location through practice and studying Figure 60: 5 (page 225). Soundhole harmonics (SH) have their equivalent normal harmonics. One example is *fret V* and *SH* on string 6 - both produce an E₄ pitch. However, the difference in string length between node point and bridge affects the resultant sound; the shorter string length of soundhole harmonics results in a less rich morphology, filtering of some partials occurs. Apart from the Volume 2 music, it appears that Durville is the only composer to have used them. (See section 1.4.1.)

7.1.3 Locating harmonics

Figure 60 shows how the pitches correspond to strings and frets.¹⁶⁰ For example, an E₄ natural harmonic can be located on string 6 fret V, whereas plucking the multiphonic harmonic just to the right of fret IV on string 5 produces four partials, A₄, C_{#4}, B₅, and G₆.

Fret positions, in terms that help the performer to locate precise node points using appropriate left-hand fingers, are set out in the *fret key*. (See Figure 60: 1.)¹⁶¹ Harmonics found directly over the frets use Roman numerals only. However, as many of the harmonics are located between frets, a more complex system has been devised. The result is that harmonics found just before or after frets are expressed with a small L or R, to indicate left or right; III_L for example. Those found mid-fret use a forward slash, III/IV for instance, and between mid-fret and just before or after are termed LL, or RR.

To indicate the varying degree of *presence* when played loudly, three different noteheads are used: *most*, a normal diamond shape - *less*, a black

¹⁶⁰ Figure 60 consists of five pages. It is laid out in a similar way to most guitar tutors, charting the relationship between strings, from open strings (to the left) and bridge (to the right), with string 6 at the bottom.

¹⁶¹ See chapter section 7.2 for a detailed explanation of *node* points.

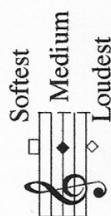
diamond - and *least* present, a rectangle. (See Figure 60: 1.) Presence is defined in terms of relative clarity, relating to the most resonance.

For natural harmonics, which adhere to the harmonic series, the order of overtones is indicated under each partial; open string fundamental pitches (1) are placed at the beginning of each string, an octave above the fundamental (2) at fret XII, a fifth of the octave (3) at fret VII, and so on. A capital *M* is used for multiphonic harmonics. (See Figure 60.)

Figure 60: Natural and Multiphonic Harmonics key

- Fret key:
- Harmonics on frets are indicated as Roman numerals only, VI for example;
 - Positions just before frets are termed (L) and just after frets (R), III_L and IV_R for instance;
 - A mid-fret position is indicated as follows - III/IV;
 - Positions between just before and mid are termed (LL) - III_{LL}, between just after and mid (RR) - II_{RR}.

Intensity of harmonics,
in terms of presence



For natural harmonics, which adhere to the overtone series, the order of overtones is indicated under each partial. Open string fundamental pitches (1) are placed at the beginning of each string, an octave above the fundamental (2) at fret XII, a fifth of the octave (3) at fret VII, and so on.

Multiphonic harmonics are indicated as M.

All harmonics sound an octave higher than written.

Note that the American Standard system is used to clarify pitches, therefore Middle C = C₄.

Figure 60: Natural and Multiphonic Harmonics

The figure displays six musical staves, labeled String 1 through String 6, illustrating natural and multiphonic harmonics. Above the staves, various harmonic symbols are placed, including diamonds (representing natural harmonics) and triangles (representing multiphonic harmonics). A vertical line on the right side of the staves is labeled with Roman numerals (I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII) and circled numbers (1) through (12), indicating the positions of the harmonics on the strings.

Figure 60: Natural and Multiphonic Harmonics

The figure displays six staves of musical notation, each representing a different harmonic series. The notation is as follows:

- Staff 1:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "IV".
- Staff 2:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "V".
- Staff 3:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "VI".
- Staff 4:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "VII".
- Staff 5:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "VIII".
- Staff 6:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "M".

Below the staves, there are several Roman numerals and their corresponding harmonic structures:

- IV^R:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "M".
- IV/V:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "M".
- V:** A vertical line with a diamond at the top, labeled "(4)".
- V/V:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "M".
- VI:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "M".
- VII:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "(3)".
- VIII:** A diamond symbol followed by a vertical line with a diamond at the top, labeled "M".

Figure 60: Natural and Multiphonic Harmonics



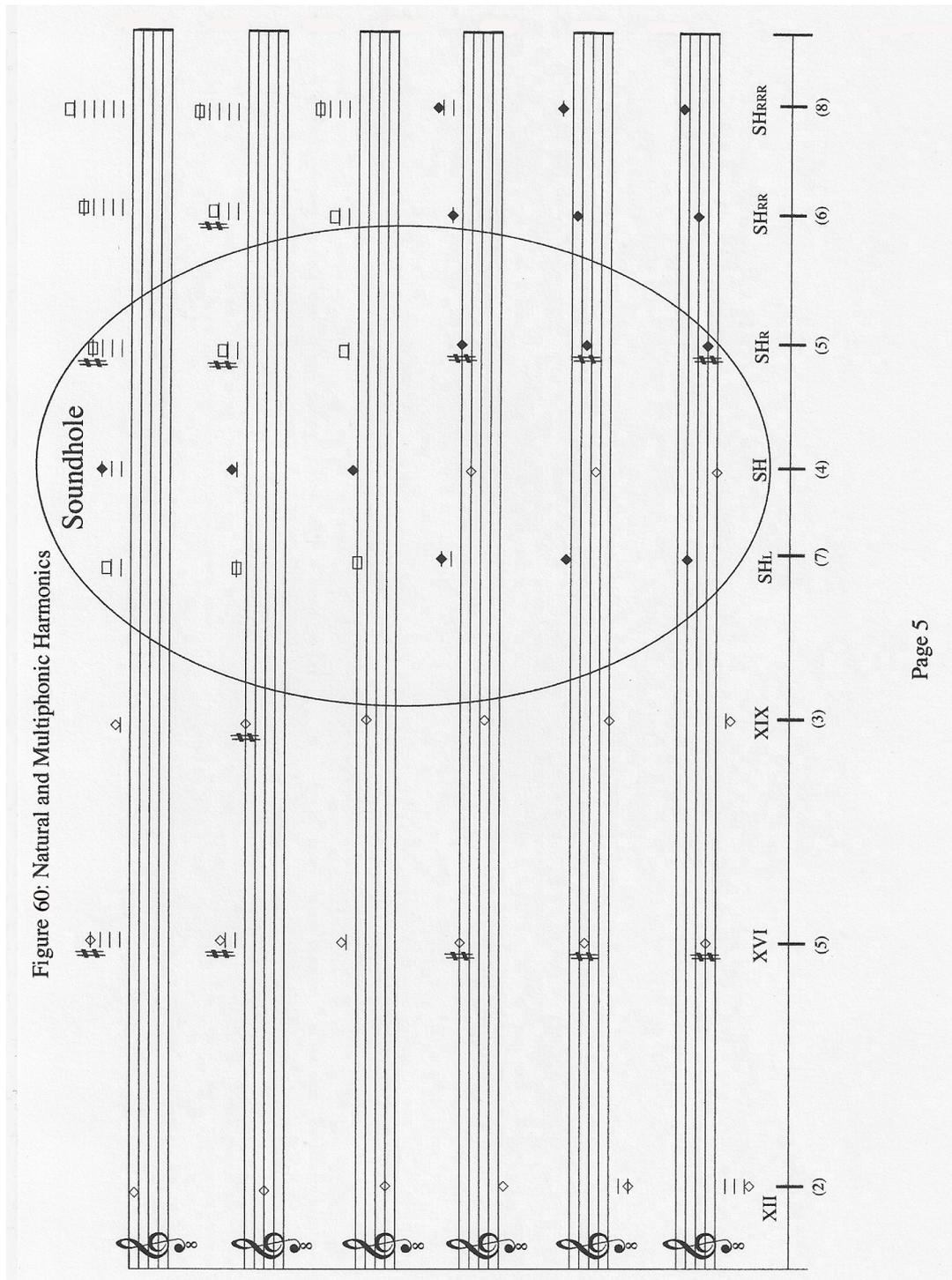


Figure 60. Natural and Multiphonic Harmonics

Figure 60: Natural and multiphonic harmonics.

It is possible to produce ninety-nine natural harmonics - fifteen across the three lower strings between frets I and II/III, fifty-four across six strings between frets II/III and XIX, and thirty between the soundhole and bridge. Development of natural harmonics may be extended by the addition of

multiphonic harmonics. (See Figure 60.) There is a choice of thirty-nine across the three lower strings.¹⁶²

In the scores, all harmonics pitches are indicated by where they are plucked, not by the resultant pitch. For example, a natural harmonic that is an octave above the fundamental on string 6 is found on fret V, whereas a Major 10th above the fundamental is played at IV_L. (See 7.2 below.)

7.2 Natural harmonics

The sound of a guitar harmonic conforms to the attack/resonance archetype. This comprises an initial attack that contains noise, caused by the nail, flesh, or mixture of the two striking the string, followed immediately by a decaying resonant phase that has a fixed pitch content. The decay time varies according to which string is plucked, and is directly proportional to thickness of string and materials used to make it.¹⁶³ Timbral variation is limited because the right-hand attack will need to make sure it avoids any sympathetic node points.¹⁶⁴ For this reason guitarists tend to play harmonics near the bridge. However, with creative use of the right hand, a certain variation in tone colour is possible, for example by changing the angle of attack when a string is plucked, or using only the flesh of the right-hand fingertip.

A player executes this technique by placing a left-hand finger lightly on the string exactly over a node point, before attacking that string with the right hand. Figure 61 shows that fundamental guitar harmonics are found on fret XII, dividing a string into two equal vibrating lengths; a harmonic one octave higher results. Dividing a string into three equal lengths produces two nodes, where the harmonics at both points, frets VII and XIX, will sound one octave and a fifth higher than the open string.

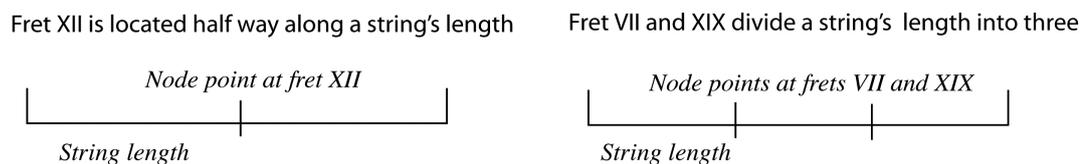


Figure 61: Natural harmonics node points.

¹⁶² For a detailed explanation of *multiphonic harmonics*, see 7.3 (page 239).

¹⁶³ Traditionally, nylon is used for upper strings and a mixture of metal - for outer windings - with an inner core of nylon for the lower strings.

¹⁶⁴ Node points from harmonics played near frets II, III and IV occur in the area between the soundhole and towards the bridge.

Natural open-string harmonics are notated in the conventional diamond-shaped manner, and the range of harmonics sounds (using conventional tuning) is E₄ to E₈. (See Figure 51: 1.) Learning to perform the technique well is exacting. Inexperienced players should start by exploring harmonics on frets XII and VII, before progressing to frets V, IV_L, and III_R; in all other Figure 60 harmonics, the margin for error is even greater. Listen to *sound example, track 17*, which is a loud natural harmonic on string 6 fret V (an E₆ pitch). Figure 62 shows the left-hand position, using finger 1 in this instance.¹⁶⁵



Figure 62: Natural harmonic on fret V (E₆).

Full performance information is given in Study 1, and elements of freedom are subsequently specified, *free choice of frets* (from 39”) in Study 2. (See pages 329 and 331.) Studies 4 and 5 involve further interpretative decision-making. Three factors characterise the soundworld of the studies - the archetypal character of harmonics morphologies (mentioned above), the dominance of pitch in spectral content, and the intrinsic quality that emanates from composite resonances, stemming from initial attacks.

¹⁶⁵ Left-hand fingers are numbered 1 *index*, 2 *middle*, 3 *ring*, and 4 *annular*.

The player is encouraged to work towards memorisation as well as developing an awareness of timing and time boundaries. For example, at the point where fixed notation sections are close to being memorised and preliminary work on improvised areas has been done, the player should practise using a stopwatch and/or a metronome.¹⁶⁶ To help locate pitches and natural harmonics positions, practise the studies in conjunction with Figure 60. (See pages 221-225.)

Prior to tackling the studies, the player should strive to examine as many natural harmonics node points as possible, listening to spectra resulting from varying dynamic levels. Start by choosing a natural harmonic that is relatively easy to locate, fret V string 6 (an E₆ pitch) using left-hand finger 1 for instance; play the morphology loudly, as this will produce a resonance with the richest spectrum. Listen to spectral content and observe the duration, richness of spectra, and decay of the resonance to relative silence; then compare the results to *sound example, track 17*. To explore differences in duration and spectra, use fret IV_L on string 5 (an C#₇ pitch) with a contrasting dynamic level. Play the natural harmonic with a softer dynamic level and listen to the contrast of durational value and spectral content in comparison to the earlier loud morphology.

7.2.1 Natural harmonics study 1: Dynamics

The main focus for the performer in this study is on how manipulating dynamic levels can influence the duration of morphologies and richness of composite resonances. A further facet of this relatively easy study is to enable the player to become acquainted with the method of notation. (See Chapter 6.) Eight short phrases are presented, where merged natural harmonics are used to generate composite morphologies. Merging harmonics is connected to *campanelas*-style playing, using adjacent strings to create amalgamated sounds. (See section 1.1.) For example, Maurizio Pisati employs brief phrases of merged harmonics that link to this study in *Sette Studi* (1990). (See section 1.4.1.)

For Natural harmonics study 1: Dynamics, the guitarist is concerned with comprehending the merging of pitches and resonances, which result in

¹⁶⁶ The idea of memorising and use of a stopwatch may be applied to all studies.

variations of spectral density (the sixth phrase being the most intense).¹⁶⁷ Within the phrases, dynamic levels are explored in two contrasting ways - balanced contours of composite resonances that result from morphologies following the archetypal shape, and imbalanced contours that are created by varying dynamic levels. Note that all morphologies are left to decay naturally unless stopped by the next morphology.

In *Natural harmonics study 1*, the player uses frets III_R, IV_L, and V. Notice that only one left-hand position is required.¹⁶⁸ For example, a phrase comprising three natural harmonics, played on adjacent strings, opens the study; two are on fret III_R while the third is on IV_L. Through a thorough knowledge of Figure 60 and listening to the outcome, a feeling for pitch contour may be developed. Fret V is used for the first time during the third phrase, which starts at 13". Note that horizontal lines, which occur after the natural harmonics symbols, provide information on resonance duration; enabling the guitarist to visualise the decay.¹⁶⁹

Figure 63 is a diagram of the opening 13", consisting of composite morphologies from two phrases. To help, phrase marks are given. Listen to *sound example, track 18*. Both phrase-shapes are influenced by the archetypal structure, that is, they follow the tendency towards silence. The first phrase is a composite morphology consisting of three pitches - an interval of a Major 6th (F#7, and A6), with the addition of a B6 towards the end. Starting at 5.5", the second phrase comprises B6, G#7, and C#5 played twice. Repeated morphologies are indicated with an additional short horizontal line (shown at the bottom of Figure 63, score section).

The phrase that starts at 45" has a contrasting dynamic contour. As the two louder morphologies will tend to mask the three softer ones, the resultant composite morphology will be more complex. *Sound example, track 19* is a realisation of the phrase starting at 45".

¹⁶⁷ To help the performer, a strings, fret, and pitch key is included in the scores of Studies 1 and 2.

¹⁶⁸ I would advocate that the thumb be positioned somewhere between frets III/IV. In standard classical guitar technique, the left-hand thumb is located in a comfortable position at the back of the neck opposite fingers 1 or just to the right. Look at Figure 63.

¹⁶⁹ Horizontal lines, which end with dashes that represent the ambiguity of determining precise trail-off times, are used to depict the duration of morphologies in all of the studies scores; they are always tied to dynamic levels. However, when dynamic levels are left to the performer, the horizontal lines are set to a mean duration.

Natural harmonics study 1: Dynamics
Page 1

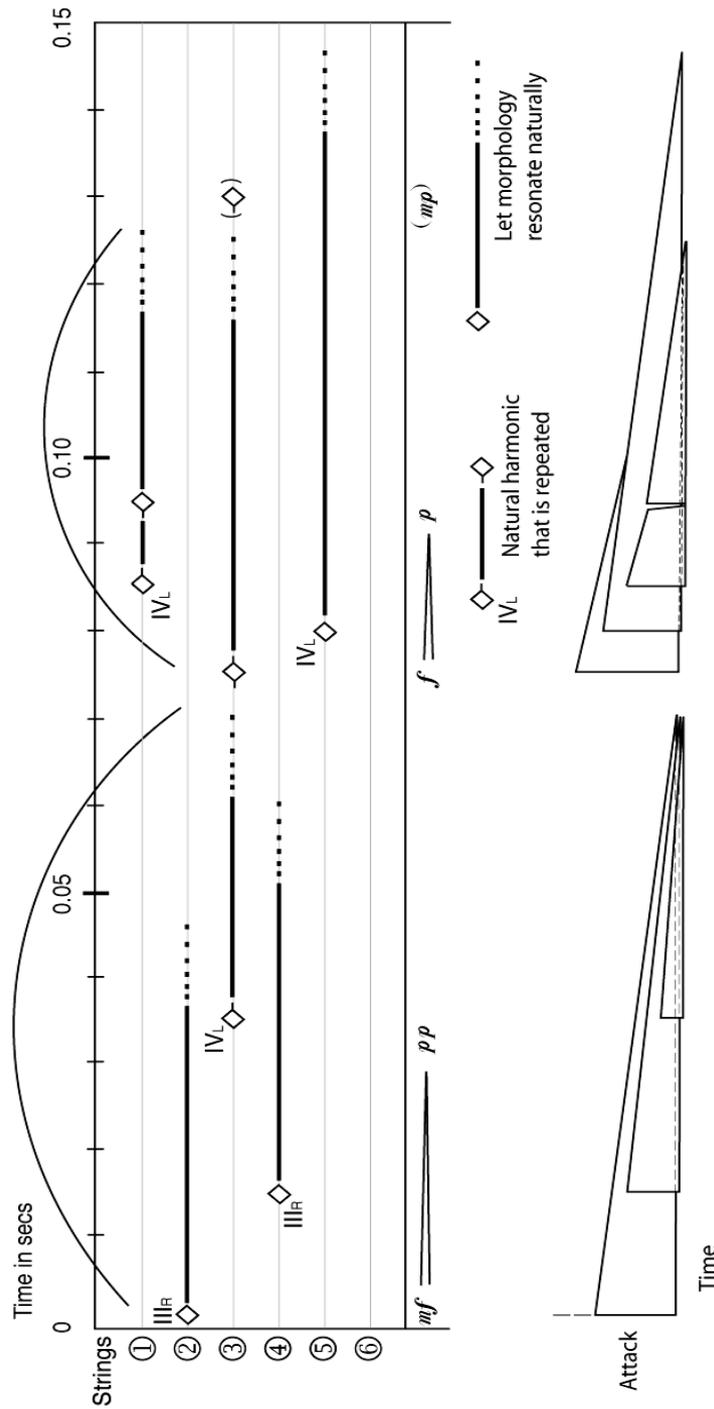


Figure 63: Natural harmonics study 1: Dynamics - page 1.

7.2.2 Natural harmonics study 2: Longer phrases

Natural harmonics study 2 is a logical continuation of the previous study. The emphasis for the performer is on developing phrase shapes and dynamic levels further, and the morphological effect of interrupting resonances by damping is introduced. Moreover, higher harmonics are featured in this study, just to the

left of the third fret on the lower three strings, for instance. Philippe Durville uses this type of harmonics playing in *Mouvement apparent* (1988), where he experiments with merged natural, higher, soundhole, and multiphonic harmonics. (See section 1.4.1.)

In this study the player concentrates on building five longer phrases, where given dynamics affect the merging of morphologies.¹⁷⁰ For example, Figure 64 illustrates the phrase between 11” and 22”. In terms of morphological contour, the composite morphologies will be reasonably balanced - a smooth decrescendo followed by a crescendo (shown as a red line). The phrase terminates using the right hand to interrupt the final composite morphology; a silence of just less than 2” ensues.

Passages that include natural harmonics played between frets I/II and III will always result in a predominance of high pitches. (See Figure 60: 2.) Therefore, constructions like Figure 64 will result in a close arrangement of composite morphologies. *Sound example, track 20* is a realisation of Figure 64.

¹⁷⁰ Note that the dynamic range of higher harmonics is moderately loud to very soft.

Natural harmonics study 2: Longer phrases
Page 1

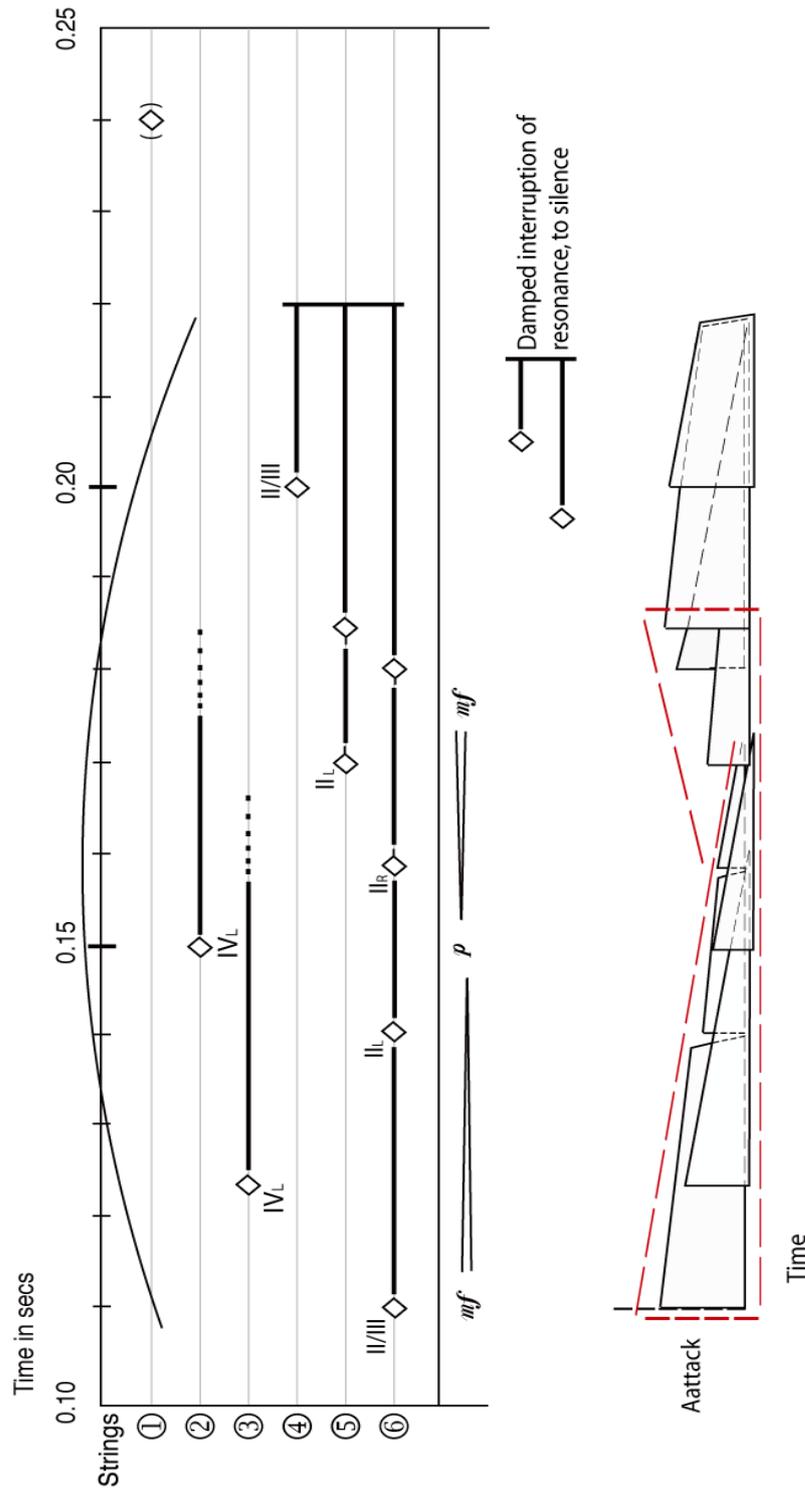


Figure 64: Natural harmonics study 2: Longer phrases - page 1.

In contrast, the phrase between 39.5” and 45” shows an imbalance, as two loud (relatively low) resonances are followed by four soft resonances. (See Figure 65.) The two quieter morphologies at 41” and 42” will be masked by the resonance from the opening two harmonics. The final two soft morphologies at

43'' and 44'' will merge with the latter part of the loud morphologies, until damping occurs just after 45''. *Sound example, track 21* is a realisation of Figure 65.

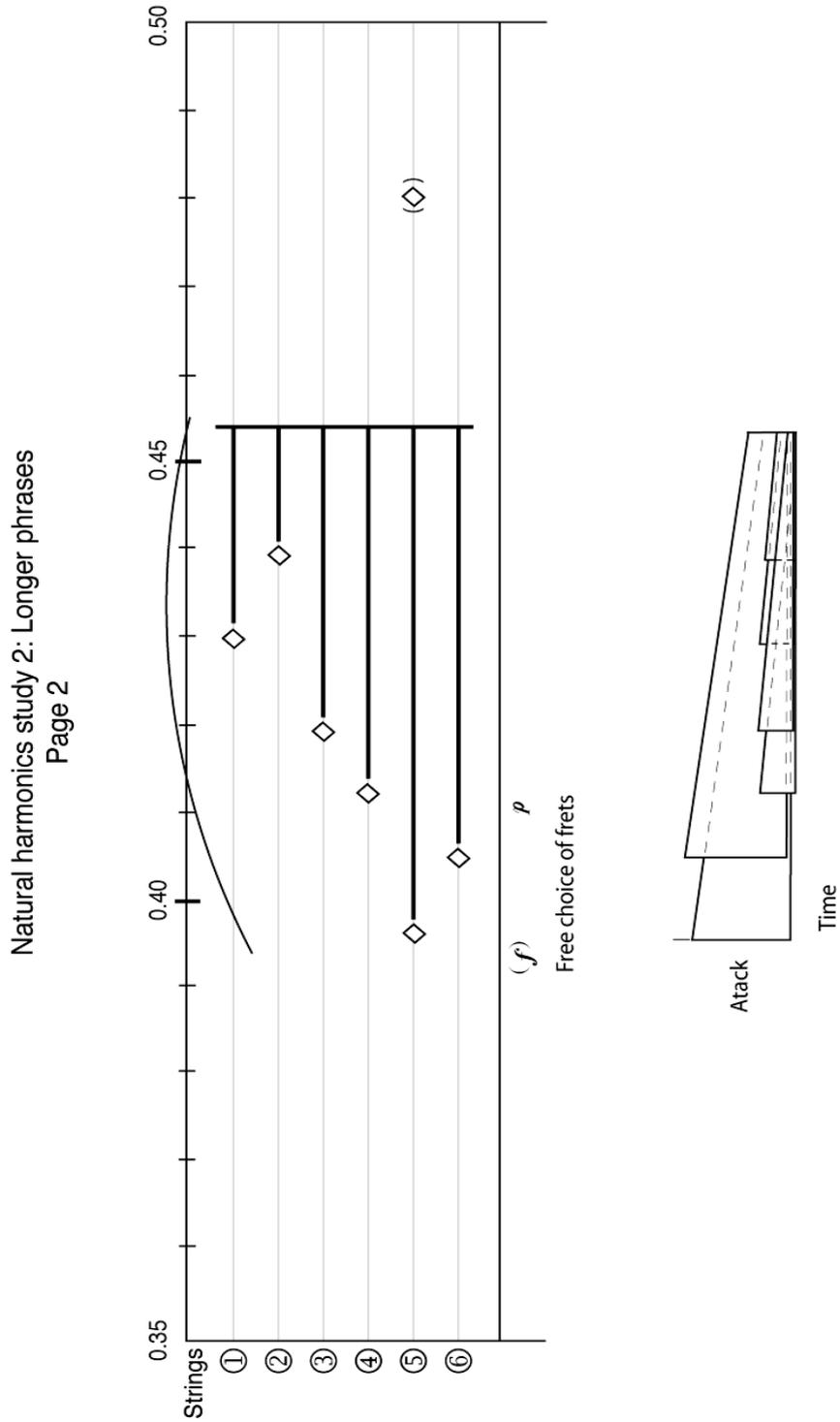


Figure 65: Natural harmonics study 2: Longer phrases - page 2.

7.2.3 Natural harmonics study 3: Arpeggios, interruption and echoes

The music in Natural harmonics study 3 consists of arpeggios and echoes that combine the range of fret positions used in Natural harmonics studies 1 and 2. The goal for the player is on creating composite resonances that happen within two particular situations, rapidly played configurations across the strings and decaying dynamic levels that incorporate interrupted morphologies. Interruptions occur by termination or intervention. This results in a mixture of phrase lengths - two long phrases based on echoes and five shorter arpeggio configurations.

Arpeggios that have consecutive morphologies as part of their structure are incorporated. In Figure 66 at 10" for instance, the phrase consists of an arpeggio of seven pitches, using all six strings, the fifth being a repetition of the second (an example of interruption by intervention). By right-hand damping, the performer interrupts the ensuing composite resonance at 13.5" (interruption by termination).

Natural harmonics study 3: Arpeggios, interruption and echoes
Page 1

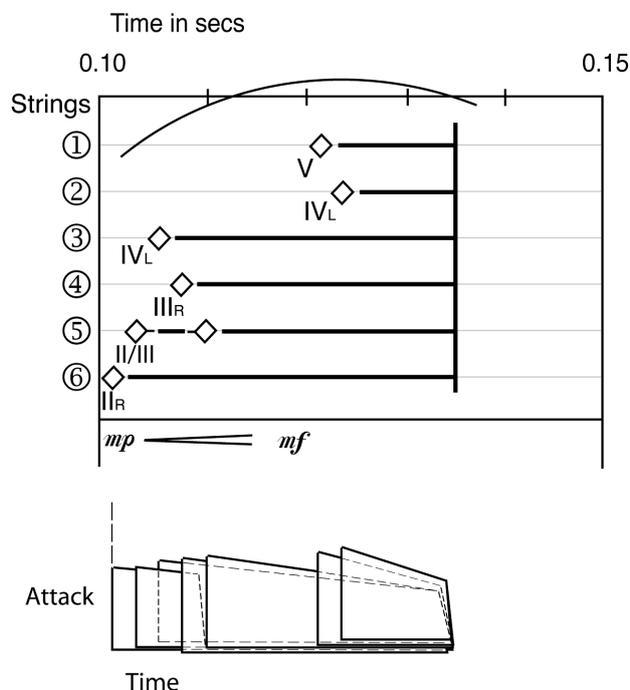


Figure 66: Natural harmonics study 3: Arpeggios, interruption and echoes - page 1.

Synchronous morphologies characterise the first echoes sections, starting at 15'' with a loud synchronous morphology, played on strings 6 and 5, which is left to decay through the whole phrase. The soft echo (at 23'' and 23.25'') of two loud synchronous morphologies (at 17'' and 17.5'') on strings 2 and 1 then strings 4 and 3, are followed at 26.5'' by a very soft synchronous morphology on strings 2 and 1; the performer should strive for durational accuracy. *Sound example, track 22* is a realisation of Figures 66 and 67.

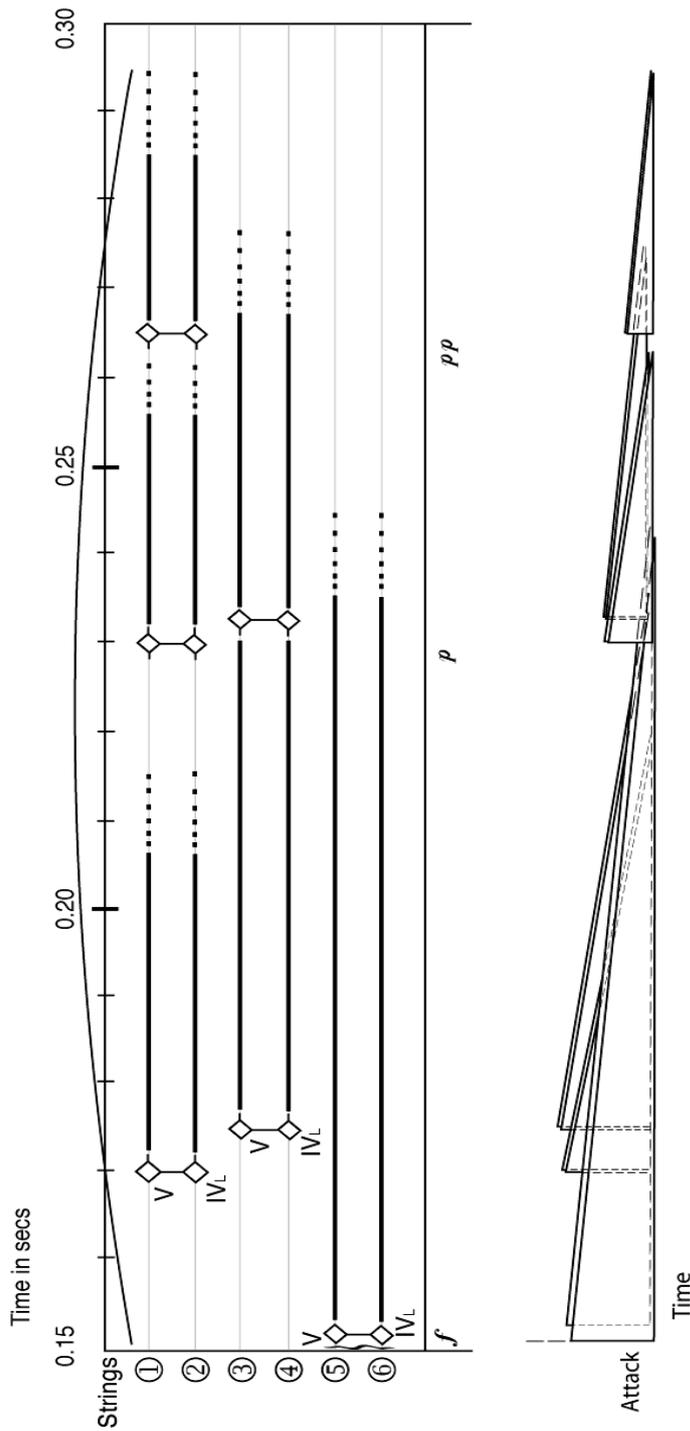


Figure 67: Natural harmonics study 3: Arpeggios, interruption and echoes - page 1.

Resonances that are in opposition to the archetypal decaying structure are explored in the opening three phrases (0-15''), where there is a tendency towards an increase in intensity (crescendo). For example, listen to the first

section of *sound example, track 22* and note how the last two morphologies mask the resonance from the initial arpeggio.

An element of freedom is introduced in this Natural harmonics study 3. The phrase starting at 30'' is marked *free choice of dynamic levels*, enabling the player to shape events. The performer is encouraged to make a choice, for example, the tendency towards silence following the archetypal shape. The opening five-note arpeggio across the top five strings may be played loudly; the following group of morphologies on string six could follow the dynamic contour from the resultant composite morphology of the original arpeggio.

In this study there is further development of left-hand position shifting. Taking one way of interpreting the phrase at 30' as an example, the first nine morphologies are played with thumb near fret II, then a swift change to III/IV for the next four harmonics, finishing with a quick change back to II for the last one.

7.2.4 Natural harmonics study 4: Improvisation

More freedom is found in *Natural harmonics study 4: Improvisation 1*. (See Volume 2, page 335.) This study comprises four sections that are made up of short phrases; each section finishes with an improvisatory passage.

The player will need to concentrate on bringing out composite resonances from the arpeggio-based phrases, whose varied dynamic levels will have an effect on the spectral content of composite resonances and durational values of morphologies. For example, as the opening morphology is loud, it will dominate and have a longer duration than the following soft ones. Although the attacks of the second and third natural harmonics are heard, masking may occur within the composite resonance. A high level of technical control over hand actions is essential for a successful result. This is followed at 6'' by a configuration of four natural harmonics, where the dynamic level contour follows the archetype.

The following improvised section, indicated by a broken horizontal line, may be informed by using ideas from the first ten seconds - an improvisatory narrative on the given material.¹⁷¹ For example, perform as an improvisation using the top three strings, create composite resonances from arpeggio-based natural harmonics with free choice of frets, vary dynamic contours, and do not

¹⁷¹ A short vertical line indicates the stop point.

repeat or interrupt resonances. Therefore, the improvised sections provide an environment for the student to become involved in decision-making. Listen to *Sound example, track 23*, which is a performance of the opening section.¹⁷²

7.2.5 Natural harmonics study 5: Velocity and improvisation

In this study, the performer's main objectives are to manipulate composite resonances and explore the whole range of available natural harmonics pitches. Three boxes are used, in which the effect of changes of speed in relation to dynamic contours as well as continuing the use of improvised passages are developed in a free-time environment, encouraging the performer to experiment with durations.

This type of structure enables the performer to engage in shaping the form of the study. The boxes may be played in any order and as many times as the performer wishes. When a box is played again, however many times, the performer should strive to improvise on the given musical ideas.¹⁷³ In Azio Corghi's *Consonancias y Redobles* (1974) similar freedom is given to the performer; he utilizes phrases within boxes. (See Figure 25, page 86.)

Differing characteristics are found within each of the boxes in Natural harmonics study 5. The first, for example, consists of three long phrases where the rhythm starts briskly and becomes gradually slower. However, each phrase possesses its own qualities. For instance, the first opens with nine single morphologies played on the lowest three strings only; this section is underlined by a gradual crescendo. The aim for the player is to increase the expansive nature of composite resonances as the phrase progresses, which will occur as the morphologies become louder and grow further apart. Listen to *sound example, track 24*.

Conversely, the focus in the second box is on steadily increasing speed and free choice of dynamic levels. Phrases of short durations are used in the third box, where two contrasting ideas that alternate between *languid* and *energetic* are developed.

¹⁷² Varying dynamic contours applies to all improvised passages.

¹⁷³ This procedure for performing boxes applies to all exercises of this kind.

7.3 Multiphonic harmonics

Multiphonic harmonics are morphologically similar to natural harmonics, since they both share a percussive attack and consistency of pitch. However, there are some differences in multiphonic harmonics; durations are shorter and dynamic range less extensive. Moreover, as individual morphologies consist of between two and four discernable partials, spectral activity is more complex.

Ideally, multiphonic harmonics should change the harmonic structure so that some partials become more dominant than the fundamental, producing inharmonics.¹⁷⁴ In *The Contemporary Guitar* John Schneider explains how they occur, especially in regard to left-hand fingers locating appropriate node points:

Higher harmonics on a vibrating string create many equally spaced nodes, and some will overlap if numerically related. For example, all the even harmonics share the node at the midpoint of a string, and all harmonics that are multiples of four share a node at the fifth fret. It is well known that the stronger lower harmonics will sound even if the node-producing finger is not touching exactly the right point on the string. The combination of these two phenomena enables the player to produce more than one harmonic on a string at a time (Schneider 1985: 136).

To back up Schneider's description of multiphonic harmonics, Rita Torres tells us that gently touching the excited string at particular harmonics node points unsystematically damps out some vibrational modes, more complex spectra are produced, 'with a spectrum that facilitates the perception of multiple pitches' (Torres and Ferreira-Lopes 2012: 61).¹⁷⁵ She then goes on to explain the importance of touch location and pressure, as well as the bell-like character of multiphonics.

¹⁷⁴ In music, *inharmonic* refers to the degree to which the frequencies of the overtones of a fundamental differ from whole number multiples of the fundamental's frequency.

¹⁷⁵ Vibrational modes relate to the overtone series. (See C. E. Gough. *The Theory of String Resonances on Musical Instruments*. Acta Acustica united with Acustica, Volume 49, Number 2: S. Hirzel Verlag, October 1981.)

The sonic result is best illustrated by describing the morphology produced on string 6, fret VI. Listen to *sound example, track 25*. This is one of the more dense multiphonic harmonics, consisting of four partials. The morphology is dominated by an attack noise that, in comparison to a similar natural harmonic, stands out in relation to the pitched resonance. The partials form a synchronous morphology; B₃, D₅, G[#]₅, and F₆; in traditional Western harmony this may be analysed as a diminished seventh. However, the highest partial (F₆, in red) is softer than the rest, showing an inherent imbalance. In performance, this leads to problems of discernment in regard to hearing all the partials. Moreover, because of difficulty of accurate production, the occasional inaccurately executed multiphonic harmonic will mix with mostly accurate sounds.

Of the four pieces cited in Figure 2 where multiphonic harmonics are employed, three composers notate them following a conventional notational manner. (See section 1.3.) However, there is no consensus on the symbols used to convey the information. In *Mouvement apparent* (1988) Philippe Durville employs a chord comprising two pitches for each multiphonic harmonic, the lower with a diamond shaped notehead and the upper, which highlights one of the partials, using a small round blackened notehead in parenthesis. Michael Edward Edgerton, in Variation 3 of *Tempo Mental Rap* (2005), uses a normal round notehead with two small zeros stacked above. Joseph Pereira charts the multiphonic harmonics pitches in *Bento Box* (2007) as a block chord on a five-line staff. In contrast however, William Bland employs a tilted double sharp sign to notate multiphonic harmonics in *Untitled Composition in Three Sections* (1975). The symbol of a cross, placed inside a diamond-shaped notehead, is used in the Volume 2 scores, where the emphasis is on a notation system that enables multiphonic harmonics and natural harmonics to be easily differentiated. (See Figure 51: 1, and Volume 2, page 344.)

Developing music that uses these morphologies enables exploitation of sonorities that extend the possibilities for harmonic complexity; multiphonic harmonics include pure tones and some quartertones. Pitch range is from B₄ to Eb₈, bearing in mind that precise pitches within each multiphonic are difficult to discern.

Preliminary experience in multiphonic harmonics playing may be gained by concentrating on spectra resulting from varying dynamic levels. For example,

play the multiphonic harmonic found on Fret VI string 6 (left-hand finger 2) moderately loudly. Let the resonance decay, listening to the composite nature of the spectral content and compare the outcome to *sound example, track 25*. Perform the same morphology with a contrasting dynamic level, softly for instance. Compare spectral content and durational value to the earlier moderately loud morphology. Explore differences in duration and spectra by repeating the process on other strings and fret positions. (See Figure 60.)

To summarise, locating the node points is more exacting than playing natural harmonics (except higher harmonics and those around the soundhole) as there is an even smaller margin for error. Consistent work on left-hand accuracy and right-hand positioning (near the bridge) is essential. It is very difficult to produce satisfactory multiphonic harmonics on the top three nylon strings, so it is best practice to use only the lower wound strings. The following group of multiphonic harmonics studies has a similar construction to the natural harmonics studies and may be seen as their extension.

7.3.1 Multiphonic harmonics study 1: Simple patterns

In *Multiphonic harmonics study 1*, the performer concentrates on ways of presenting composite resonances that comprise two or three multiphonic harmonics; which strings to use, dynamic levels, and fret positions are indicated. Seven short phrases that vary in spectral content precede three concluding spread chords that increase in intensity.

In most phrases, the dynamics follow the archetypal shape. For example, the opening phrase (shown in Figure 68) balances three multiphonic harmonics, with the first and second being played moderately loudly, half a second apart. As the resulting composite morphology decays, and in order to merge with the decaying resonance produced by the previous two, the third multiphonic harmonic is played at a moderately soft dynamic level. The blend of resultant pitches that occurs during the composite morphology can be determined by referring to Figure 60: 2 (page 221). *Sound example, track 26* is a realisation of Figure 68.

Multiphonic harmonics study 1: Simple patterns
Page 1

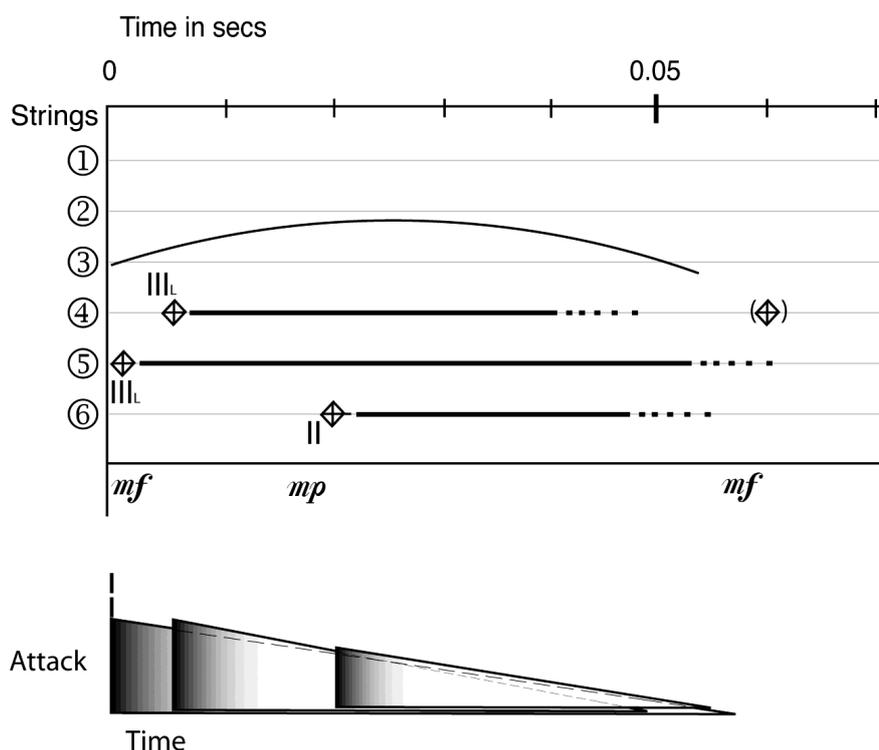


Figure 68: Multiphonic harmonics study 1: Simple patterns - page 1.

In contrast, the phrase that starts at 33” also consists of three multiphonic harmonics. However, contrasting dynamic levels of soft, moderately loud, and very soft are employed, changing the internal balance of the composite morphology; the second multiphonic harmonic will stand out, and the resonance tail from the first morphology will be masked by the third. (See Figure 69.)

Multiphonic harmonics study 1: Simple patterns
Page 2

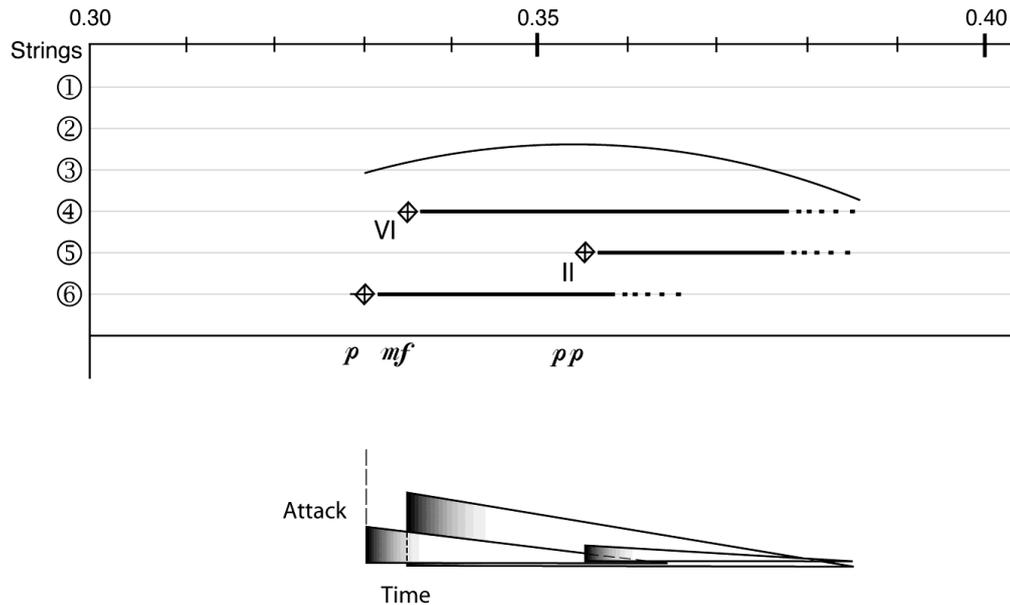


Figure 69: Multiphonic harmonics study 1: Simple patterns - page 2.

The range of multiphonic harmonics used is between frets II and VI. Although most phrases can be played using one left-hand position, sometimes a quick position shift is needed. For example, for the phrase at 12" consisting of three morphologies, the player may use left-hand finger 1 for the first (fret II) followed by 4 across IV_R; the thumb is near second position. However, the next phrase at 15.5" needs a change of position directly after the morphologies are played; the thumb moves from third to second position.

7.3.2 Multiphonic harmonics study 2: Iteration and periodicity

Multiphonic harmonics study 2 consists of a mixture of long and short phrases, encompassing a variety of iterative configurations that generate composite morphologies. In the longer phrases, the guitarist deals with a musical direction that has a tendency towards two factors - rhythmic impetus generated by the spacing of morphologies, and dynamic levels. *Sound example, track 27* is a realisation of the opening phrase, showing the iterative character of the music. (See page 342.) A group of three multiphonic harmonics is repeated a number of times; six on string 6 fret VIII_R, two on string 5 fret IX_R, and four on string 4 fret XL.

For the shorter phrases, the player works with structures based on periods or fast iterations. For instance, a configuration of three multiphonic harmonics appears at regular intervals - firstly 21", then again at 42" and 51" (a partial repeat, which finishes the study, is heard at 56.5"). The first of these evenly spaced iterative morphologies that are initiated by a broken chord occurs at 27".

In this study, where right-hand dexterity is more demanding than *Multiphonic harmonics study 1*, the phrases are played using one left-hand position. For example, in the opening phrase the thumb is located in eighth position, then finger 1 will play fret VIII_R, finger 2 fret IX_R, and finger 3 fret XL.

7.3.3 Multiphonic harmonics study 3: Improvisation

Multiphonic harmonics study 3 consists of six boxes. The performer encounters increased interpretive freedom, and opportunities to develop improvisational skills further. To help the player, within each box pitches are organised into left-hand position groups. For example, in the opening of Box 1, multiphonic harmonics are played using finger 1 on fret II, finger 2 on III_L, and finger 3 on III/IV.¹⁷⁶ The whole range of multiphonic harmonics is used in the study.

For each of the boxes, the guitarist is asked to deal with a different musical objective. In Box 1, for example, two sections that concentrate on the composite resonances from arpeggiated configurations are developed. After the opening three arpeggios, where varied rhythms and dynamic levels are given, the performer is free to experiment by choosing pitches from the allocated left-hand position group and to continue varying rhythm and dynamic levels. *Sound example, track 28* is a realisation of the opening section, up to the pause sign.

In Box 2 the performer is asked to slow the pace. Iteration and contrasting dynamic levels form the basis of the opening phrase. In the second phrase, natural harmonics, synchronous morphologies mixing the two types of harmonics, and termination by interruption are included. *Sound example, track 29* is a realisation of Box 2.

The focus in Box 3 is on sharing the texture between echoes and periodicity; precise durations are left to the performer's discretion. For example, the two opening morphologies, consisting of string 4 fret VI, and string 5 fret VIII_L, are

¹⁷⁶ Further details are found in the score, page 344.

reflected three times. The performer should aim to place the echoes equidistantly. Between the second and third reflection, a very soft gesture of three consecutive multiphonic harmonics played on string 6 occurs; this configuration is repeated at similar distances. A second echo gesture starts after the first ceases. *Sound example, track 30* is a realisation of Box 3.

Box 4 opens with three short gestures followed by a longer decelerando passage. For the first time, as part of the third gesture, a natural harmonic on an upper string is added to the texture. The decelerando is realised by increasing the distances between short gestures. *Sound example, track 31* is a realisation of Box 4.

There are two sections in Box 5. The first concentrates on accelerando, where adjacent strings are used to create composite morphologies. In contrast, playing irregular rhythms is the focus of the second section. For choice of frets, two left-hand positions are juxtaposed (finger 1 on fret IV_R, 2 on IV/V, and 3 on V/VI, and finger 1 on fret VI, 3 on VIII_R, and 4 on XI_R). The player is free to choose dynamic levels, which should be varied, and natural harmonics. *Sound example, track 32* is a realisation of the opening section.

Box 6 is concerned with interrupted morphologies. Phrases are built from successive multiphonic harmonics played on the same string, where the same pitch is never repeated. This causes the consecutive morphologies, except the last one, to interrupt the previous resonance. However, the left or right hand sometimes interrupts the decaying resonance from the last multiphonic harmonic deliberately. This includes isolating and interrupting morphologies within phrases. For example, the opening phrase consists of eight multiphonic harmonics; two consecutive morphologies on string 6, followed by one on string 5, then five on string 4. By using a convenient right-hand fingertip, the third of the five morphologies on string 4 may be interrupted. Then two composite morphologies follow, each consisting of two multiphonic harmonics, which are interrupted by using the right-hand palm to dampen the sound. *Sound example, track 33* illustrates the interrupted morphologies.

7.4 Bottleneck

Bottleneck guitar technique was first introduced into the United States by Hawaiian guitarists during the pre-blues era. In *Finding a Voice*, Kimberley

Perlak reminds us that: “Guitarists refer to this style as *slide playing* (Perlak 2008: 103)¹⁷⁷ Subsequently Southern black blues players adapted the technique and developed a particular method of playing. (See Snow, 1995: 1.)¹⁷⁸ The guitar is usually in an open tuning, typically E, D or G major. Thus sliding the bottleneck up and down the guitar neck, parallel to the frets, moves the entire chord up and down. For single pitch playing: “The string is plucked as the slide, placed a few frets too low, ‘slides’ up to the desired pitch” (Perlak 2008: 103).¹⁷⁹

Of the many early pioneers, Robert Johnson was a seminal exponent with a distinctive blues style.¹⁸⁰ Listen to *sound example, track 34*, which comprises the introduction and opening verse from *Crossroads Blues*.¹⁸¹ The use of glissandi between carefully selected pitches is apparent. Jimi Hendrix’s use of a bottleneck in *All Along the Watchtower* is a more recent example.¹⁸² In *sound example, track 35* Hendrix uses a bottleneck during the solo section to produce a particular glissando effect that covers a wide pitch range. This potential to generate refracted glissandi with a pitch bias is exploited in the studies. (See sections 7.4.4, and 8.1.7.) Moreover, seven composers who have used bottleneck morphologies on a classical guitar are cited in Figure 2: 1 and 2. (See pages 22 and 23.)

A slide (or bottleneck) is usually made from a tube of hard material between 4 to 7 centimetres long and 1.8 to 2.2 centimetres wide. (See Figure 70.)¹⁸³ The player inserts a left-hand finger (typically annular or little) into the tube. Instead of altering the pitch content in the normal manner, the performer obtains the morphology by pressing the bottleneck against the strings lightly so as not to touch the strings onto the fretboard. The whole string length may be used. Right-hand fingers or a plectrum attack the strings as usual, producing a

¹⁷⁷ “Finding a Voice” in *The American Classical Guitar Vernacular: The Work of Andrew York, Benjamin Verdery, Bryan Johanson, and David Leisner* by Kimberley Shelley Perlak.

¹⁷⁸ Taken from *www.bluesonline*, which is an explanation of the development of bottleneck guitar style.

¹⁷⁹ *Ibid*, footnote 115.

¹⁸⁰ Other notable early blues exponents were Blind Willie McTell (1898-1959) and Son House (1902-1988).

¹⁸¹ *Crossroads Blues* by Robert Johnson, original recorded performance by the composer in San Antonio, Texas, November 27 1936. Re-mastered 1992 on Delta Blues Legend, Charly Blues Masterworks Vol. 13, disc 1 - track 17.

¹⁸² *Electric Ladyland*, the third and final album by the Jimi Hendrix Experience, released in 1968 on Reprise Records.

¹⁸³ Steel, glass, brass, or plastic are used, each produces a different quality of sound.

sustained tone whose pitch can be continuously varied by moving the bottleneck across the neck. The free left-hand fingers are used to fret the strings and mix between bottleneck and normally produced sounds.



Figure 70: Bottleneck.

Bottleneck morphologies consist of a percussive attack, followed by a decaying spectral activity that is refracted and possesses an ample amount of pitch content. The action of using a bottleneck will restrict left-hand movement. As result of this restriction, the music is mostly made up of consecutive morphologies. In the following studies, two types of glissandi result from bottleneck production – *plucked* (using the upper three strings) and *unplucked* (the lower three strings). However, it is possible to produce merged morphologies using two bottlenecks. In addition to normal left-hand usage, a second tube is placed on the right-hand middle finger. The two morphological types may be superimposed to produce merged sounds; for instance, it is possible to execute an unplucked morphology with the second bottleneck during a plucked resonance.

Lachenmann employs bottleneck sounds in *Salut für Caudwell* (1977). He uses morphologies that change direction of upwards and downwards, as the device is always placed across the six strings the similarity to the studies ends there. (See section 2.3.2.) However, his musical style does connect to the expressive potential of the Folk/Blues tradition. In *Pro Musica Nova* Bruck reminds us that the composer wrote the following comments on his piece: ‘The guitar’s typical aura as a folk and art instrument embraces primitive elements as well as highly sensitive, intimate and collective ones’ (Bruck 1992: 9a).

For best results this technique is initiated in the general area of the soundhole (*norm* - normal), *ponticello* (*ponti* - near the bridge), or *tastiera* (*tasti*

– over the fretboard). These general location points means the performer is given an element of freedom. Although there are similarities with sound outcome, Lachenmann employs more precise location indications in *Salut für Caudwell* (1977) that actually limit the inherent performative freedoms of this technique. (Again, see section 2.3.2.)

7.4.1 Plucked

To execute the bottleneck (plucked) version, the player places the top rim of the bottleneck lightly on two strings - 1 and 2, or 2 and 3 (strings 4, 5, and 6 are not used).¹⁸⁴ The two strings are plucked simultaneously by the right hand¹⁸⁵ (*i* and *m*, *m* and *a* or *p* and *i*) producing a composite morphology consisting of two-pitches; *sound example, track 36* is an upwards glissando morphology. Due to the angle of attack, the interval is slightly wider than a perfect fourth. (See Figure 71.) By sliding the bottleneck along the strings (like a train on its tracks), the player may make an upward or downward glissando. Dynamic range is from moderately loud to very soft. (See Figure 51: 1, page 193.)

The symbol used is a graphic representation of a bottleneck. Two horizontal lines are placed before and after the symbol, representing the strings that are to be plucked. The lines after the symbol bend downwards or upwards, indicating direction of glissando. (See Figure 51: 1.) The initial morphology may sound for up to approximately 1" before the glissando is initiated; this is reflected in the first part of the symbol. Pitch range is proportional to the speed of execution and string length covered. For example, an upward glissando could be played fairly quickly, lasting about one second, starting at fret XIX (F#6 and quarter tone higher than B6, approximately) and finishing just past the soundhole, approximately an octave higher.

¹⁸⁴ Playing in this manner on the lower wound strings produces an unsatisfactory scraping sound.

¹⁸⁵ In guitar editing convention *p* = thumb (Spanish *Pulgar*), *i* = index, *m* = middle, and *a* = annular.



Figure 71: Angle of attack for plucked bottleneck morphology.

7.4.2 Unplucked

The bottleneck (unplucked) technique is used for its unusual resonance. A smooth sliding pitched morphology that includes a small amount of metallic sounding frictional noise, bottleneck against string windings; unplucked morphologies are produced by using the left or right hand on string 6, strings 6 and 5, or strings 6, 5 and 4. Figure 51: 1 shows that the symbol used for unplucked morphologies is similar to plucked, in this case a downwards glissando on string 6. (See 7.4.1 above.) Listen to *sound example, track 37*.

An appropriate amount of force is used to produce the morphology. The player allows the bottleneck to attack the string (or strings) over the soundhole, near the bridge, or over the fretboard before sliding along the string towards or away from the headstock, producing a glissando. Dynamic range is the same as plucked. The duration of the glissando, which is variable, is indicated by tail length of the symbol. (See *Bottleneck study*, page 348.) Pitch range, on string 6 for example, is two octaves above where the bottleneck happens to be during the glissando; from *ponti* to *tasti* would represent a pitch range of approximately C₆ to A₅, depending on the length of glissando.

7.4.3 Interrupted and extended morphologies

Plucked and unplucked morphologies may be interrupted during their resonant phase; the right-hand palm is used to damp the appropriate strings. This is designated in the score by a horizontal line that breaks the glissando line. (See Bottleneck study, 12.5" or 22".)

Unplucked morphologies may be extended when the morphology is not interrupted. The action of lifting a bottleneck off the string, or strings, towards the end of a glissando phase produces a further resonance; pitch content relates to open strings. (See Bottleneck Study, 4.5".)

7.4.4 Bottleneck study

As an introduction to playing and thinking of bottleneck morphologies as sound objects - an archetypal morphology with the potential to include refracted pitches - the player could start by listening to the spectral and durational content of single morphologies. Use *sound example, tracks 36 and 37* to evaluate outcomes. For example, starting from the normal position, play a *plucked* bottleneck morphology on two adjacent strings using right-hand fingers *i* and *m* simultaneously; glissando upwards using the top two strings (towards the bridge) at a moderately loud dynamic level. Make the morphology last for approximately 1.5". Now execute a downwards glissando for 1" (towards the headstock) with a contrasting soft dynamic level. Listen to the decaying composite resonances.

Play a moderately soft *unplucked* bottleneck morphology on string 6 (the left-hand alone forms the morphology). Start *ponticello* and produce a long downwards glissando for approximately 5". Terminate the morphology with a right-hand interruption. Repeat varying start positions, dynamic levels, and durational values. For example, execute an upwards morphology for a duration of 4"; start *tastiera* and use a moderately soft dynamic level. Take note of the consistent dynamic level.

With the emphasis on consecutive and merged bottleneck morphologies, the *Bottleneck study* is fashioned using a mixture of plucked and unplucked morphologies. Lachenmann uses merged bottleneck during *Salut für Caudwell* (1977). However, due to his method of usage, merging only takes place when both guitarists play. (See section 2.3.1.)

In this study three phrases of variable duration are to be interpreted by the performer; glissando starting points, dynamic levels and length of glissandi are given. For example, the opening unplucked morphology, played by the left hand (LH), is indicated as starting *ponticello*; the glissando lasts for 4.5'' with a moderately soft dynamic level, its extension being a further 4.5'' produces a pitch of E₂. Note that the pitch of the natural harmonic at 5'', an E₄, forms a related composite morphology with the extension of the first glissando. The ensuing soft plucked morphology on strings 1 and 2 starting at 6'', also played with the left hand, merges with the composite resonance. The first phrase ends with two short consecutive unplucked morphologies, played directly after the plucked morphology and interrupting the extended resonance from the previous morphology.¹⁸⁶ Note that the second of the two final morphologies is damped and played by the right hand (RH).

The opening two morphologies of the last phrase, which starts at 23.5'', are an example of merging using two bottlenecks. Then the two natural harmonics at 29'' and 29.75'' (pitches of B₄ and D₄[#]) occur during the resonance from the lower of the first two morphologies (pitches of E₂ and A₂). The resonance from the harmonics relates to the unplucked morphology, starting at 31.5'', which is indicated as starting at the node point XIX on string 6, producing a B₃. *Sound example, track 38* is a realisation of the closing phrase.

7.5 Snap pizzicati

Bela Bartok introduced this particularly strong type of percussive pizzicato in his string works, most notably in the fourth movement *Scherzo* of *String Quartet no. 4*, marked pizzicato, composed in 1928.¹⁸⁷ From the second half of the last century the same technique can be found in guitar music. In *You Asked for It* (1969), David Bedford asks the performer to alternate between very loud snap pizzicati and moderately soft, staccato and damped immediately, conventionally plucked notes. Listen to *sound example, track 39*.¹⁸⁸ Moreover, Nikita Koshkin uses Bartok pizzicati alongside conventionally strummed chords in the climax

¹⁸⁶ The broken vertical line is designed to help the performer. It indicates the continuity link between ending and initiating morphologies.

¹⁸⁷ In his *The Cambridge Companion to the Violin*, Robin Stowell claims that the invention of 'snap pizzicato', often attributed to Bartok, actually dates back to Biber (1644-1704), who used the effect to represent a gunshot in *Battalia* (1673).

¹⁸⁸ This occurs as part of the section that starts near the end of page 1 in the printed score.

section in his Edgar Allen Poe-inspired *Usher Waltz* (1984). Listen to *Sound example, track 3* again. However, the music in this work seeks to exploit snap pizzicati and their dynamic range as a sustainable self-contained texture, or in combination with other extended techniques. [See *Snap pizzicato study*, and *Snap pizzicato (long) study*, pages 350 and 351.]

A snap pizzicato morphology is produced in two stages; lift the string away from the soundboard at a ninety-degree angle, then initiate a release allowing the string to bounce against the fretboard. The action of the string hitting the metal frets produces a strong percussive attack, and the ensuing resonance possesses a fundamental pitch. A combination of right-hand thumb and index finger is usually used in execution. However, it is possible to use the left hand when necessary. A combination of strings may be used to produce synchronous morphologies. Two images are shown in Figure 72, index and middle fingers attached, under strings 6 and 5, in the elevated and then release positions.





Figure 72: Snap pizzicato using two strings.

Snap pizzicati are used on all strings, but are most sonorous when played on the lower strings. Due to the type of execution mentioned above, dynamic range is weighted towards the loud end. (See Figure 51: 2.) Technically, the pitch range covers the complete fretboard, with the inclusion of stopped notes, from E₂ to B₅ (some classical guitars have a C₆). However, only the open string possibilities are made use of here.

Two types of snap pizzicati are used, the archetypal snap pizzicato (long) and variant snap pizzicato. The symbols are based on the traditional notation. However, a horizontal line is attached for snap pizzicato (long) depiction. (See Figure 51: 2.)

7.5.1 Snap pizzicato (long)

To produce a snap pizzicato (long), the pitched resonance is left to decay after the attack phase. However, the duration of resonance will vary as it is affected by dynamic level and thickness of string. For instance, *sound example, track 40* is a very loud morphology executed on string 6, the thickest, lasting about 15". Moreover, in a musical context, the player may intervene at some stage during the decay time.

7.5.2 Snap pizzicato

A sharp percussive attack is followed by a pitched resonance that lasts a short amount of time. *Sound example, track 41* is a loud snap pizzicato on string 6.

Execution is initially the same as for snap pizzicato (long), except the player intervenes to stop the resonance almost immediately. Therefore, a snap pizzicato morphology may be seen as a prematurely interrupted snap pizzicato (long); a staccato sound is produced.

7.5.3 Snap pizzicati studies

Consecutive morphologies, consisting of single and composite sounds, are explored in the *Snap pizzicato study*. As snap pizzicato morphologies are always detached, inevitable pauses in the texture carry a special significance; energetic sound objects are interspersed with relative silences. When snap pizzicato and snap pizzicato (long) are combined, as in the *Snap pizzicato (long) study*, a mix of consecutive and merged morphologies occurs.

The symbols / or \ are used to indicate an unconventional angle of attack. This produces a subtle variation in sound quality - a slightly less positive attack and a broader tone. The bounce against the fretboard is usually from the perpendicular but here the performer offsets the angle by up to 45 degrees. To execute this a modified second stage is added; during the lift away from the fretboard, pull the string either upwards (/) or downwards (\) before releasing. Using string 6, *sound example, track 42* consists of two morphologies, a normal snap pizzicato followed by an unconventional angle of attack.¹⁸⁹

As well as the *normal* position, further variations of tone colours are possible. (See Figure 72.) Morphologies may be played *ponticello* and *tastiera*; dynamic levels are from very loud to moderately loud. (See Figure 51: 2.)

7.5.4 Snap pizzicato study

In this study, the player is encouraged to incorporate snap pizzicato morphologies into a musical context by focusing on awareness of dynamic levels and building phrases. This study comprises four short phrases, where dynamic levels, tone colours, angle of attack, and string numbers are given. The

¹⁸⁹ Dimpker mentions this technique in his book *Extended Notation: The Depiction of the Unconventional* (2013). He notes that during execution the string may hit an adjacent string when bouncing back.

opening phrase consists of three loud morphologies, played low to high, on adjacent lower strings. A diminution of this configuration, interspersed with two moderately soft morphologies on string 6, makes up the second phrase. *Sound example, track 43* is a realisation of the opening two phrases.

For the phrase starting at 16", which is a crescendo that exploits the dynamic range, the player concentrates on the dramatic effect that dynamic levels have on the percussive nature of snap pizzicato morphologies.

The boxed section at 21", which is part of the final phrase, is played as fast as possible and with changing orders; the performer is free to choose tone colour and angle of attack.

Two synchronous morphologies are used, just before 20" and at 29"; both are played very loudly. The first uses strings 6 and 4, and is the climactic point of the third phrase; which gathers speed and intensity. The second consists of three morphologies played on the lower strings, producing a powerful ending.

7.5.5 Snap pizzicato (long) study

This study is a development of the *Snap pizzicato study*, where the music encompasses both techniques - snap pizzicato (long) and snap pizzicato. The emphasis for the player is on using snap pizzicato (long) to form extended resonance-based phrases. Specific performance detail is similar to the Snap pizzicato study. However, for the final 11.5" the performer takes responsibility for generating tone colours, and angle of attack. Composite resonances formed by open string morphologies, sometimes loudly plucked, are explored in *Ko-Tha - "A Dance of Shiva"* (1967) by Giacinto Scelsi. (See section 1.5.4.)

The music in Snap pizzicato study is developed through integrating consecutive and merged morphologies, where the guitarist will need to pay particular attention to spectral content and durations of snap pizzicato (long) morphologies. For example, this study starts with two snap pizzicato (long) morphologies; the second, initiated after 1.25", merges with the first. During their resonance, two snap pizzicato morphologies are played at 3.5" and 4.25". The phrase ends at 6", when a synchronous morphology of two snap pizzicati interrupts the resonance of the first two snap pizzicato (long) morphologies. In contrast, the second phrase starts with four consecutive snap pizzicato morphologies before merged snap pizzicato (long) and snap pizzicati occur.

Pitch relations with natural harmonics are used. At 22” for instance, a very loud synchronous sound from three snap pizzicato (long) morphologies, played on the lower three strings - producing E₂, A₂, and D₃, is followed half a second later by another synchronous morphology of three natural harmonics played on the same strings - producing E₄, A₄, and D₅. The performer places a left-hand finger across the strings, at the appropriate node point, to produce the natural harmonics; they are not plucked. Slur marks indicate a smooth transition from the snap pizzicato (longs) to natural harmonics. *Sound example, track 44* is a realisation of the first 25”.

7.6 Cross stroke and Cross stroke (active scordatura)

Cross stroke and *cross stroke (active scordatura)* are produced by using combinations of the three lower, wound strings. The morphologies are realised by utilizing the right-hand index fingernail to scrape along the string length, resulting in iterative metallic-sounding morphologies that possess a rich spectral content. Lachenmann’s occasional usage of cross stroke morphologies in *Salut für Caudwell* is mentioned in chapter section 1.3, and Figure 35. (See pages 12 and 106.)

To execute, stroke string 6 (or 5, or 4) lengthways in a quasi-plucking motion, that is, at approximately ninety degrees left to the normal plucking position; then let the string resonate. The morphological result is two distinct but connected sections - *multiple attacks* and *resonance*. Multiple attacks are the result of the backwards and forwards action of the nail scraping lightly on the string, which may vary in speed and therefore in duration. The decaying resonance is the ensuing morphology generated by the attacks.

Cross stroke and *cross stroke (active scordatura)* morphologies are differentiated by their resonance; a fixed pitch for *cross stroke* and a refracted resonance for *cross stroke (active scordatura)*.¹⁹⁰ The symbols used are a graphic representation of a nail attacking a string - multiple attack iterations - with a further line for the resonance. (See Figure 51: 2.) The attack phases durations are variable, depending on the number of iterations and speed of multiple attacks, but the resonance is left to decay naturally, or may be

¹⁹⁰ Scordatura means re-tuning the open strings.

interrupted. Most cross stroke morphologies are played at the loudest dynamic level – string 6 *moderately loud*, string 5 *moderately soft*, and string 4 *moderately soft*. However, there are occasional exceptions; the decrease in intensity of the final morphology in the Cross stroke study, for example (See page 353).

7.6.1 Cross stroke

This technique is not difficult to perform at first as only the right-hand index fingernail is used. *Sound example, track 45* consists of a cross stroke morphology with multiple attacks. Figure 73 shows three stages of one stroke towards the bridge – approach, mid-way, and rest. *Video example 2* shows a cross stroke morphology, on string 6 with five multiple attacks, being performed slowly then quickly. However, it takes some study to produce a clean and convincing sound, especially in rapid configurations across the strings. Resultant pitches, depending on tuning, always correspond to the open strings.





Figure 73: Three stages of cross stroke morphology production.

The two studies that involve cross stroke morphologies are in scordatura, requiring the guitarist to re-tune the instrument - the fifth string A down to E, and the fourth string D up to E, resulting in an open E minor chord.

7.6.2 Cross stroke (active scordatura)

Changing pitch trajectory during the resonance phase produces active scordatura glissandi; both hands are now employed to form the morphology. This is achieved by turning the tuning keys either way using the left hand. Three types of cross stroke (active scordatura) are possible, *ascending* – tightening the key, *descending* – loosening the key and *curvilinear* – around the same pitch in a tightening and loosening motion during a single resonance. Examples of each type are on *sound example, track 46* and *video example 3*. Curvilinear morphologies are divided into oscillating - denoted by a regularly contoured horizontal sine-wave shape, and undulating - an irregularly contoured symbol. (See page 355.)

Active scordatura technique occurs in the repertoire. (See section 1.8.1.) However, it is developed here as an important element of the compositional fabric, merging cross stroke morphologies or combining with other extended techniques, bottleneck and multiphonic harmonics for instance. Moreover, where tuning adjustments are specifically diatonic, detuned pitches are open to interpretation (an element of performer choice exists), microtonal glissandi inevitably occur.

7.6.3 Cross stroke study

Before tackling the studies, it is advisable for the guitarist to spend some time listening to spectral content of the two phases that emanate from cross stroke morphologies - multiple attacks and resonance; taking note of pitch content within the two phases, the player concentrates on resonant phase durations. Listen to *Video example 2* and compare the results. Always play morphologies at their loudest dynamic levels - string 6 results in *mf*, and strings 5 and 4 *mp*.

The *Cross stroke study* consists of two boxes, where the compositional focus is on the interaction of the resonance phases. The player is asked to engage with the notion of using merged cross stroke morphologies to build pitch relationships, developed further by including pitches from either natural harmonics or snap pizzicati. For example, Box 1 opens with a natural harmonic played on string 6, fret V (E₄), followed by two cross stroke morphologies (E₂ and E₃). The final morphology is another natural harmonic on string 1, fret V

(E₆). The resonances from all morphologies merge before decaying to silence. Listen to *sound example, track 47*, which is a realisation of Box 1.

Variations in multiple attack speed are indicated. For example, the opening cross stroke morphology in Box 2 starts slowly before increasing in pace. *Sound example, track 48* is a realisation of the opening phrase of Box 2.

7.6.4 Cross stroke (active scordatura) study

The *Cross stroke (active scordatura) study* consists of two boxes. Although both forms of the technique are included - cross stroke and cross stroke (active scordatura) - the compositional emphasis is on the latter. The goal for the performer is twofold: executing different types of glissandi contours as well as interpreting interactions between cross stroke and cross stroke (active scordatura) morphologies with other techniques. The music in Box 1, for example, comprises one long phrase; multiphonic harmonic, plucked and unplucked bottleneck morphologies combine with the complete array of cross stroke morphologies. *Sound example, track 49* is a realisation of Box 1.

To produce an oscillating morphology, turn the tuning key up then down in a smooth and even motion. Note that an oscillating morphology may be performed *visa versa*, down then up. Speed of oscillation is left to the performer. However, there is a general indication in the score; see the variable length of oscillatory symbols. For undulating morphologies, turn the tuning key in an uneven motion; the last morphology in Box 1 is an example. Ascending morphologies occur when the tuning key is tightened at a speed that is left to the performer. To produce an uninterrupted ascent, the player is limited to how far the key will turn with a single wrist movement. Conversely, a descending morphology is achieved by loosening the key. Generally, the furthest amount of glissandi pitch distances in one turn is approximately a tone.

In Box 2, the performer concentrates on interrelating multiphonic harmonics, snap pizzicato and snap pizzicato (long) with cross stroke and cross stroke (active scordatura) morphologies. For example, the first phrase opens with three multiphonic harmonics; their resonances produce pitches of - E₅ and G₅ (twice), and - E₆ and G₆. (See Figure 60: 4.) The following cross stroke (active scordatura) morphologies, played on strings 5 and 4, producing an E₃ and E₄, interrupt part of the multiphonic harmonics' resonance; string 6

continues. After the ascending then descending (active scordatura) that ensues, the resultant pitches from the multiphonic harmonic on string 6, fret IV/V will be E₄ and G[#]₄. (See Figure 60: 3.) The resonance from the subsequent cross stroke (active scordatura) morphologies will return the pitches on strings 5 and 4 to somewhere near their starting pitch. At this point the resonance will closely relate to the decay phase of the multiphonic harmonic. *Sound example, track 50* is a realisation of the opening phrase of Box 2.

Part of the final phrase contains a descending cross stroke (active scordatura) morphology, played on strings 6 with an L shape, the symbol located on the multiple attack phase. This denotes that the active scordatura should be executed with the left hand during the multiple attacks played by the right hand. The last morphology is an ascending active scordatura also played during the multiple attacks. Note that the speed of multiple attacks is slow. *Video example 4* is a live recording of the whole study.¹⁹¹

7.7 ‘Snare drum’ (normal), ‘Snare drum’ lateral glissando, and ‘Snare drum’ slide glissando

This section comprises three techniques – *normal*, *lateral glissando*, and *slide glissando*. The sound of ‘snare drum’ morphologies is similar to a conventional snare drum sound with loose snares that rattle after the initial attack.¹⁹² The morphology has three phases that are common to all three techniques – *preparation*, *resonance*, and *release*.¹⁹³ They are differentiated by the direction of spectral contour during the resonant phase; ‘snare drum’ follows the archetypal attack/decay, while *lateral glissando* and *slide glissando* are refracted. *Lateral glissando* is more restricted in pitch change but has a longer potential duration than *slide glissando*. (See Figure 51: 3.)

As time is needed to cross two adjoining strings, a preparation period is required. For example, a left-hand finger lifts string 5 over string 6, and then pulls it back towards its normal position; Figure 74 shows the two phases. The crossed strings are secured with an adjacent fingertip; any left-hand finger may

¹⁹¹ 3rd February 2012, Performance Space, City University, London.

¹⁹² This technique was used first by Francisco Tàrraga in *Gran Jota* (1872), and by a few composers between the 1960s and into the new millennium; for example, Cristóbal Halffter in *Codex I* (1963) and Benjamin Verdery in *11 Etudes* (2005), see Figure 35: 3 and 7.

¹⁹³ Note that the duration of a resonance phase left to decay naturally is dependent on the quality of the instrument.

be employed. This can be applied anywhere between frets V to XIX. The preparation time is variable. When executed, a mixture of soft noise and pitch content occurs; this is always a subtle sound.



Figure 74: 'Snare drum' preparation stages.

The preparation, which results in a slight scuffle of sound, acts as an upbeat to the second phase. The richest spectrum is produced when using the lower wound strings - string 5 and 6 (or string 4 and 5). However, by including the

upper nylon strings, which add spectral interest, opportunities for merging arise. Very little use of the upper strings has been found to date in existing guitar literature. Of the eight composers listed in Figure 2, it is only Benjamin Verdery in *Etude 11* that includes string 3; strings 4 and 3 are used in *Home is Here*. (See Figure 2: 5, page 26.) Moreover, Verdery employs consecutive morphologies. Furthermore, most of the other composers use strings 6 and 5 exclusively. It is only Paavo Heinenen who also includes strings 5 and 4 in *Touching Op. 40*. Note that no composers cited in Figure 2 use merged morphologies.

In executing a ‘snare drum’ (normal) resonance phase, the attack - striking the two strings in a conventional manner - enables them to vibrate sympathetically against each other. *Sound example, track 51* comprises a ‘snare drum’ (normal) morphology using strings 5 and 6 at fret VII. The two pitches result in an interval of a perfect fourth. Note that to produce the desired equality of noise and pitch content, left-hand fingers need to be just behind frets.

To play a *lateral glissando*, two strings are crossed using the method described above. However, the string that is being crossed over is pushed a little further before being anchored by a left-hand finger. Then using the gap that is now between the crossed strings, the string that has been pushed a little further is drawn back slowly and deliberately after the right-hand attack. This creates a subtle, but effective, microtonal glissando. *Sound example, track 52* is a lateral glissando morphology played on strings 6 and 5, Fret 7. (See Figure 75.)

Each player will manipulate the microtonal refractions differently. Therefore, the sonic result will vary; the amount of glissando pitch distance is left to the performer. This leads to a certain amount of interpretative freedom.¹⁹⁴

¹⁹⁴ For further experience of the subtle variation in sonic outcome of *lateral glissandi*, listen to *sound example, track 93*, which is a studio realisation of ‘Snare drum’ and *snap pizzicato combined study - Box 1*, and the opening section of *Video example 1*, a live performance of the same study. Also, see chapter section 1.10 for discussion on sculpting guitar morphologies.



Figure 75: Crossed strings with gap for ‘snare drum’ lateral glissando.

For *slide glissando* morphologies the pitch contour of the resonance phase begins by following the archetype, but is subsequently refracted. This holds true for all morphologies of this type. (See Figure 51: 2.) *Sound example, track 53* is an ascending *slide glissando* morphology using strings 6 and 5, starting on fret 7. Moreover, the nature of the release, letting go of the strings to terminate the glissando, results in an interruption. *Slide glissando* morphologies may include a *lateral glissando* as part of the resonance before the glissando occurs. This gesture is left to the discretion of the performer.

The second-phase duration of ‘snare drum’ (normal) and *lateral glissando* morphologies is tied to dynamic level - 6” for very loud and 2” for soft; and for *slide glissando* it is 4” for very loud and 1” for soft.

‘Snare drum’ morphologies may be left to decay without interference (*non vibrato*), or by applying two types of vibrato during the resonance phases - *horizontal*, and *vertical*. They both produce pitch oscillation. A horizontal vibrato is used for small degrees of pitch variation, vertical for wider amounts. To produce a horizontal vibrato a left-hand finger moves from side to side, from its fixed position, along the line of the string.¹⁹⁵ For a vertical vibrato, the stopped strings are pulled in a down and up motion across the fretboard. The

¹⁹⁵ As used in conventional string vibrato playing.

speed of pitch change is left to the performer. *Video example 5* consists of three 'snare drum' morphologies - non vibrato, horizontal vibrato, and vertical vibrato - using strings 5 and 6 at fret 7.

Rasgueado techniques may be included to produce multiple attacks at the beginning of the resonant phase. The player strums the relevant strings, using a varied combination of right-hand fingers to produce rhythmic gestures. (See 7.7.2, and page 357.)

Releasing the crossed strings produces a quiet percussive sound that is an integral part of the morphology. Two release types are used. A *soft* dynamic level occurs when the left hand alone releases the crossed strings. To obtain a *very soft* dynamic level, the right hand dampens the relevant crossed strings during left-hand release.

The symbols reflect the three main phases. (See Figure 51: 3.) A vertical line, variable in length, with an embedded small semi-circle denotes the preparation. This is attached to a graphic representation of the decaying resonance phase, a decreasing set of connected diagonal lines. The length of the resonance indicates the duration of decay. A separate symbol is used to represent three release possibilities - free choice, soft, or very soft. A vertical line with a circle placed at its mid point indicates that the player may choose. A short horizontal line added at the top means a soft release, while a similar one added at the bottom specifies very soft. The release does not always occur immediately at the end of a resonance. Between the second and third phase, a broken horizontal line signifies variable amounts of relative silence. This is seen as part of the third phase - anticipation of the termination.

When multiple attacks are included, the symbol used is similar to cross stroke. The difference is that the nail contour is turned ninety degrees, representing the attack angle of conventional strumming.

7.7.1 'Snare drum' studies

The studies focus on music consisting of consecutive and merged morphologies. Resonances may be interrupted by prematurely releasing the crossed strings. A vertical line, similar to the release symbol without a circle, denotes an interruption using the right hand. Roman numbers indicate which fret to use.

For example, *Fr V* means cross the strings in a position that will enable the securing fingertip location to be just behind fret five.

It is advisable for the guitarist to start engaging with the three phases of ‘snare drum’ morphologies before attempting the studies, in particular, listening carefully to delicate nuances that occur in the preparation and release phases as well as the mix of noise and pitch of the decaying resonance phase.

Play a ‘snare drum’ morphology that includes all three phases using strings 6 and 5 at fret VII – preparation, resonance, and release. Take approximately 1” for the preparation. Use a loud dynamic level with no vibrato for the resonance phase, allowing the sound to decay to relative silence before a left-hand alone release. Compare the result to *sound example, track 51*. Then execute similar ‘snare drum’ morphologies on other adjacent strings and note the resonance duration. Sometimes utilize the right-hand damping technique for the release phase.

7.7.2 ‘Snare drum’ (normal) study

There are two main objectives for the performer in this study - constructing consecutive and merged ‘snare drum’ morphologies, and interpreting the three long phrases that make up the music. The player learns to shape phrases by concentrating on left- and right-hand actions and dynamic level contours.

The opening phrase comprises four consecutive morphologies, where the emphasis is on ‘snare drum’ (normal). For additional colour, the second and third ‘snare drum’ morphologies share pitch relationships with natural harmonics. For example, the ‘snare drum’ morphology that starts at 8” produces F#₄ and B₅, and the natural harmonic at 9.5” is an F#₅.

In order to make the phrase flow, the player moves swiftly and accurately between morphologies. The information given is comprehensive - durations of the three phases (in accord with Figure 51: 3),¹⁹⁶ type of vibrato, strings, frets, release type, and dynamic levels.

The first appearance of merged ‘snare drum’ morphologies occurs at 27.5”, opening the second phrase. Note that the preparation of the higher morphology, played on strings 3 and 4, starts before the lower one. However, the second

¹⁹⁶ Approximately 6” for *very loud*, 5” for *loud*, 4” for *moderately loud*, 3” for *moderately soft*, and 2” for *soft*.

phase of the lower morphology is initiated before the higher one. The two merged spectra produce a dissonant composite morphology – B₂, E₃, Bb₃, and Eb₃. Both morphologies are released simultaneously using the *soft* option.

Multiple attacks appear once, during the final phrase. They are found between an interrupted soft morphology that utilizes a lateral vibrato, and a loud resonant phase. Note that the preparation phase has already occurred just after 1.07". A dramatic change of dynamic level, a crescendo from soft to very loud, is used between the two resonant phases. *Sound example, track 54* is a realisation of the whole study.

7.7.3 “Snare drum” (normal), slide glissando and lateral glissando study

The guitarist engages in a more intricate soundworld in the ‘*Snare drum*’ (*normal*), *slide glissando* and *lateral glissando* study. Left- and right-hand dexterity is developed further by integrating the three types of ‘snare drum’ morphologies within seven phrases of variable durations. For example, the *lateral glissando* and *slide glissando* techniques are introduced in the opening phrase, which starts with two ‘snare drum’ morphologies played on string 6, fret VI. The first morphology, a loud *lateral glissando*, is followed by a soft ‘snare drum’ (normal) that has 1" of multiple attacks and interrupts the opening morphology at 3". At 5" the pitch of the natural harmonic on string 4, fret II/III produces a C₇, which interacts with the C₄ and F₄ of the second morphology. The phrase closes with a sequence of interrupted ‘snare drum’ (normal) morphologies at 8", which increase in intensity, before a final upwards *slide glissando* at 13". *Sound example, track 55* is a realisation of the opening phrase.

Full performance instruction is given up to 1' 10" and then in the final phrase, from 1' 10" to 1' 43", the performer is free to choose dynamic levels, frets, and vibrato.

7.8 Soundhole resonances

A soundhole resonance is the generic term for two techniques called *palm*, *fist*, or *thumb* and *buzz*. Their morphologies are archetypal; an attack followed by a decaying noise-oriented spectrum. Both techniques are usually played by the right hand, and result in a dynamic level that is relatively quiet - ranging from moderately soft to very soft. (See Figure 51: 4.) However, in certain

combinatorial contexts, soundhole resonances may be performed using the left hand. (See sections 7.8.1 and 7.8.2.)

Palm, fist, or thumb has its origins in *Latin* playing, where hitting the strings with the hands produces the desired, noise-biased, rhythmic effect.¹⁹⁷ *Sound example, track 56* is a typical Latin rhythm; played slowly to illustrate the effect clearly, then at a typical performance speed. Buzz is a new technique, used here with palm, fist, and thumb as morphologies that are integrated into a textural-based musical context.

7.8.1 Palm, fist, or thumb

A *soundhole resonance (palm, fist, or thumb)* morphology is usually executed by using the appropriate part of the right hand to press against the strings, an action that starts just above the strings, and moves down towards the soundhole quickly. Figure 76 and *video example 6* highlight hand positions for the two stages of palm morphologies. This creates a synchronous noise-biased morphology with some pitch content. Note that to execute fist and thumb morphologies, a similar procedure is applied when depressing the strings – form a fist shape utilizing the flesh under the little finger, and use an extended thumb in a taut position. Morphologies either resonate naturally, or by oscillating the hand in a motion at right angles to the strings, a vigorously executed vibrato may be employed. Listen to *sound example, track 57* for both versions.¹⁹⁸

¹⁹⁷ Notable practitioners are The Gipsy Kings and Paco de Lucia.

¹⁹⁸ Pitches vary in accuracy; they are dependant on the design of the guitar, especially where the fretboard joins the soundhole.



Figure 76: Two execution stages of soundhole resonance (palm).

Execution of this technique is equivalent to adding a further fret. If all six strings are utilized simultaneously the resultant morphology consists of the following pitches (C₅, F₅, B_{b5}, E_{b6}, G₆, and C₇). Furthermore, when performing a *palm*, *fist*, or *thumb* using combinations of the six strings, consecutive morphologies are the only option. However, merging may occur by using both hands to select adjacent numbers of strings, for example, right hand on strings 6,

5, and 4, and left hand on strings 3, 2, and 1. The player will need to re-adjust the right hand to execute; this is where the fist or thumb is used, as appropriate.

Duration is variable, as it is directly related to the amount of force involved in the attack. For example, the highest dynamic level, moderately soft, will produce an uninterrupted morphology lasting 6"; in contrast, the lowest level, very soft, will be 3". Note that morphologies using upper strings are soft at full force. The symbol represents the initial attack - a round notehead on a stem with an X at the bottom (similar to standard percussion notation) - followed by the decaying resonance, comparable to the 'snare drum' resonance representation. (See Figure 51: 4.)

Interruption of morphologies occurs in the usual two ways - by termination or intervention. There is an example of intervention by interruption in the repertoire. Helmut Oehring uses soundhole resonance (palm) morphologies that are implemented with short durations in *Foxfire Eins* (1993), resulting in variant morphologies. (See section 1.7.1, and Figure 35: 5.) In this study Palm, fist, and thumb morphologies may be interrupted by releasing the depressed strings to terminate the resonance, or by intervening in a sounding resonance with a new morphology.

7.8.2 Buzz

Soundhole resonance (buzz) is a single-string version of *palm*, played using the three wound (lower) strings.¹⁹⁹ *Sound example, track 59* consists of two buzz morphologies using string 6 - non-vibrato then with vibrato. Any left- or right-hand finger may be used to produce *buzz* morphologies. However, in most situations, the right-hand index (*i*), middle (*m*), and annular (*a*) fingers are employed to push the string towards the soundhole. To produce convincing morphologies, a strong attack is needed. Therefore, dynamic levels are always at their loudest during performance – moderately soft for string 6, soft for string 5, and very soft for string 4. Moreover, as it is easy to inadvertently touch an adjoining string and interrupt other resonances, more time is needed to develop accurate performance than *palm, fist, or thumb*. Vibrato may be employed by using a finger to oscillate the string in a similar fashion to *palm, fist, or thumb*.

¹⁹⁹ The upper strings are not utilised because they lack textural interest.

Pitches and types of interruption are the same as *palm, fist, or thumb*. The notation for a buzz morphology is a stem with an X at the bottom, which is similar to *palm, fist, or thumb*. (See Figure 51: 4.)

Prior to starting work on the studies, it would be prudent for the guitarist to listen to the noise-biased nature of *palm, fist, or thumb* and *buzz* morphologies. For example, execute a single *palm* morphology across all strings as loudly as possible. Let the resonance decay to relative silence. Although the action is vigorous, a moderately soft dynamic level will result. Repeat adding a vibrato to the decaying resonance. Note that to achieve the intended sound, another energetic action is needed (*sound example, track 57* comprises examples of both). To follow on, play a soundhole resonance *fist* morphology on the upper strings at a very soft dynamic level; less vigorously. Let the resonance decay naturally to relative silence. Then perform a soundhole resonance *thumb* morphology on the lower strings with a soft dynamic level without vibrato. However, after approximately 1" terminate the resonance by releasing the depressed thumb. Finally, execute a *buzz* morphology on string 6 at the top dynamic level, taking note of the decaying resonance.

7.8.3 Palm, fist, or thumb study

The musical aim for the performer in the *Palm, fist, or thumb study* is to become aware of the symmetrical nature of phrase durations and the inherent compositional subtleties that arise when developing palm, fist, and thumb morphologies. Most of the morphologies possess a mixture pitch and noise, during the phrases starting at 3", 13", and 23" for example. Helmut Oehring uses soundhole resonance (palm) morphologies in *Foxfire Eins* (1993). However, these morphologies are constantly interrupted, and he does not develop the potential of their spectral content further. (See section 1.7.1 for more details.)

This study consists of five phrases that use consecutive and merged morphologies. Each phrase is 10" in duration. Natural harmonics are employed at the opening and at periods of 10", forming synchronous morphologies whose resonances are interrupted after 2.75". The natural harmonics are played on strings 5 and 4 at fret II/III, producing pitches of G₆ and C₇, which constitute

octave relationships with three soundhole resonance pitches - strings 6, 2, and 1. (See section 7.8.1.)

The opening phrase has a melodic contour based on a variant of the archetypal model, where the shape of the archetype is extended; three consecutive morphologies, whose resonances are interrupted, act as an anacrusis to a fourth morphology, which is left to decay. To elucidate, the phrase between 3'' and 10'' comprises four consecutive morphologies that use a varied number of strings to form the resonance. Two short interrupted morphologies are followed by a longer interrupted morphology. The phrase ends with a morphology, using all strings, that is left to decay. The player is free to select palm, fist, or thumb usage. For example, choose fist for the two opening morphologies, followed by thumb then palm. Listen to *sound example, track 58*, which is a realisation of the opening phrase to 10''.²⁰⁰

Merged morphologies occur in the phrase starting at 30'' (after the natural harmonics). The player uses the right-hand *fist* and left-hand *palm* in a motion that starts parallel to the strings. (See Figure 77.)



Figure 77: Position for merging soundhole resonance (palm and fist) morphologies.

²⁰⁰ 3rd February 2012, Performance Space, City University, London.

7.8.4 Buzz study

The player engages with phrases of varied durations in the *Buzz study*, where the emphasis is on producing merged morphologies and composite resonances; delicate operations that involve both hands are needed. Snap pizzicato and snap pizzicato (long) are added to the texture for variety. For example, a single interrupted morphology, on string 6, initiates the opening phrase. This is followed at 2'' by the first of three merged configurations that dovetail; string 6 using the right-hand finger *i*, followed by *a* on string 4, then *m* on string 5. To perform the snap pizzicato at 9.6'', the player may use the left-hand thumb and index finger. *Sound example, track 60* is a realisation of the opening phrase.

A synchronous morphology is used for the first time during the second phrase, at 25'', on strings 5 and 4. In the third phrase, interrupted figures that form rhythmic units using single string morphologies occur at 42''; however, by 54'' they become synchronous morphologies.

7.9 Tapping

Tapping is the general terminology used for *bi-tone tapping* and *mute tapping*, and may be described as a form of pizzicato. Bi-tone tapping is a development of an electric rock music technique, also called *tapping*. In a rock setting, *Midnight* from the album *Surfing with the Aliens*, by Joe Satriani illustrates the possibilities for bitonality on electric guitar. Listen to *sound example, track 61*.²⁰¹ Mute tapping is an elaboration of a technique used in the experimental art music tradition. In his album *Guitar Solos 1974* Fred Frith, a notable practitioner, uses bi-tones and mute taps.²⁰² For example, *Hello Music* features bitonality (*sound example, track 62*), while mute taps form part of the texture in *Out of Their Heads* (*sound example, track 63*).

Bi-tone and mute tapping are used here as textures built from archetypal and variant morphologies. Moreover, both can be performed in two ways - as archetypal morphologies (left to resonate), called *bi-tone tap (long)* and *mute tap (long)*; or as variants with short durations (interrupted *long* morphologies) *mute tap* and *bi-tone tap*.

²⁰¹ Jo Satriani *Surfing with the Aliens* (original release 1987, re-mastered 2007) Epic records USA. Other notable exponents are Steve Vai and Stanley Jordan.

²⁰² Fred Frith *Guitar Solos*. 1974. Re-mastered released 1/1/2002 RER Megacorp.

7.9.1 Bi-tone tapping

Bi-tone morphologies occur when a string is made to vibrate in an unorthodox manner. Using a suitable amount of force to push the string(s), starting approximately one centimetre above, against an appropriate fret position with a left- or right-hand fingertip. Figure 78 shows the two stages; right-hand index finger on string 6, fret XI is used to produce the noise-based percussive attack. Ricardo Boullosa reminds us that: “the energy input from the string towards the guitar body comes not only from the bridge in the soundboard, at some low-medium to high frequencies the energy comes also from the fretted end of the string” (Boullosa, 2001). Two pitches emerge as a result of the forces used. (Precise pitches are shown in Figure 79):

- the length of string between fingered fret and nut (*upper pitch*),
- and the length of string between fingered fret and bridge (*lower pitch*).





Figure 78: Two stages of bi-tone production.

“The relationship between the upper bi-tone [itches] is not a chromatic scale from fret to fret, as it is for the normal portion of the string. [However, from fret XII towards the headstock, the shorter upper bi-tone string length becomes], the further apart the frets become, and this produces a rather uneven scale with microtones at one end and large intervals at the other” (Schneider 1985: 126).²⁰³ Figure 79 is a chart that represents bi-tone pitches.²⁰⁴

²⁰³ Schneider continues with a technical explanation of how a luthier calculates fret positions (Schneider 1985: 126, and 127).

²⁰⁴ Ibid. I have extended the pitch range to between frets III and XVIII; Schneider’s is from fret III to fret VII. Although we both use symbols for fingered pitches and bi-tones, I have included clarification of quarter tones, sharp and flat, missing in the Schneider chart.

Figure 79: Bi-tone chart

String 1

String 2

String 3

String 4

String 5

String 6

Fret VII

Fret XII

8va

8va x 2

○ = Fingered pitch

□ = Bi-tone

♯ = Quarter tone sharp

♭ = Quarter tone flat

Figure 79: Bi-tone chart.

For lower bi-tones, the resultant pitches cover the normal stopped pitch range of the instrument, G₂ to A₅, and E₃ to F_{#8} for upper bi-tones. Note that between the nut and frets one and two there is insufficient string length to produce an upper bi-tone. *Sound example, track 64* consists of two morphologies – string 6, fret III and string 1, fret III – illustrating the extremes of bi-tone pitch range.

To accomplish this technique using the above method, the left and right hands are employed separately and in conjunction; fingertips dance on the fretboard, making rhythmic patterns.

Since the 1960s bi-tones have been notated using a variety of notehead shapes. For example, Mauricio Kagel in *Sonant* (1964) and Rolf Riehm in *Notturmo für die trauerlos Sterbenden* (1977) utilized wedge-shapes attached to stems. Chris Dench employed a blackened rectangular-shape in *Severence* (1992-4) and Azio Corghi a diagonal line through an oval-shape in *Consonancias y Redobles* (1974). There are also instances of using text alongside standard notation: Bruno Giner has a capital letter F to denote finger in *Trans-errance 1* (1984). However, for the Volume 2 scores the author has drawn on existing notation. In Figure 51: 4 the bi-tone symbol consists of a rectangular head, stem, and arrow-shaped tail. In order to make score reading easier, the rectangular head lines up with the strings. The stem is at the bottom for right hand, and top for left hand. Dynamic range is loud to soft.

Before commencing work on the studies, listen to the dual nature of bi-tone (long) morphologies; decaying resonances are a composite of lower and upper pitches. Perform a single loud morphology using the left-hand index finger (1) on fret VIII of string 6 at a loud dynamic level. Allow the resonance to decay to relative silence. Note that lower pitches are inherently louder than their upper counterparts. However, this imbalance can be partly compensated by judicious use of microphones within an amplification system. (See section 9.4.)

7.9.2 Bi-tone tapping study 1: Merged and consecutive morphologies

Bi-tone tapping study 1 is designed to help the guitarist to become familiar with bi-tone playing in a musical setting. The emphasis is on performing phrases of varied durations that encompass a mixture of merged and consecutive morphologies. Although the soundworld of this study is similar to *The Squirrel*

And The Ricketty-Racketty Bridge (1971), Gavin Bryars uses composite bi-tone resonances whose rhythmic activity is markedly different. He employs an emphatic pulse, which is in contrast to the dissimilar units employed for this study.

In this study the player will need to learn the fingering terminology associated with each of the morphologies. Left- and right-hand bi-tones are expressed in the conventional manner, for the former - 1 equals *index*, 2 *middle*, 3 *annular*, and 4 *little*; for the latter - i equals *index*, m *middle*, a *annular*, and e *little*.²⁰⁵ Which fret to deploy is denoted by lower case Roman numerals. To illustrate this system, the opening three loud morphologies are left-hand bi-tones; note that stems are positioned below the notehead. Appropriate fingering is written above each. For example, 1 and *viii* for the opening morphology means hammer-on just behind fret eight using the index finger of the left hand. The right-hand bi-tone starting at 15th, the first of three bi-tones, is a contrasting example with stems above the notehead; i and *xiii* means hammer-on just behind fret thirteen with the index finger. This method of aligning fret and string numbers within the tablature system provides an alternative option to Rolf Riehm's system in *Toccata Orpheus* (1990), which is more like conventional guitar notation. (See section 2.3 for more details.)

The focus of this study is on forming appropriate left- and right-hand configurations that produce merged and consecutive morphologies. An example of left-hand usage is the second configuration starting at 3.5th. All six strings are used in succession (from low to high); a group of three fingers on the lower strings - 1 on fret VIII, 2 on IX, and 3 on X, is followed by a similar arrangement on the upper strings. Detailed interpretive instructions, connected to symbols and morphologies, are given throughout.

Left-hand morphologies are used for the first 15th, and right hand from 15th to 26.75th. From then on combinations of left- and right-hand bi-tones are employed. For example, *sound example, track 65* is a realisation of the section 29th to 39th. Note that the proximity of left- to right-hand usage, that is, the number of frets distance between both hands, avoids unison playing (in this case, five frets apart on all adjoining strings).

²⁰⁵ e – is used in Flamenco, not standard technique.

The phrase between 39' to 45' is reminiscent of Riehm's usage in *Toccatà Orpheus*, where the left hand sometimes strikes the strings nearer the soundhole than the right hand. In his explanations to the score Riehm tells us: 'Only the precise execution of the fingering can guarantee that the composed sound will actually be produced'. He also notes that his fingering indications: 'May not conform to normal guitar-playing practice' (Riehm 1990: 13). The player strives to deal with this unusual physical action to produce clearly articulated pitched material. (Again, see section 2.3.)

Two types of interruptions are notated for bi-tone (long) morphologies here: by left- or right-hand termination - a vertical line, or an intervening morphology - another bi-tone for instance. (See *Bi-tone tapping study 1: Merged and consecutive morphologies*, Volume 2, page 368.)

Merging occurs when consecutive bi-tone (long) morphologies, that may or may not be interrupted, are played on adjacent strings. For example, the composite pitches produced by the opening three bi-tone (long) morphologies, before left-hand interruption by termination at 3'', are - C₃, F#₃, and C₄ lower bi-tones and their corresponding upper bi-tones of - quarter tone below B₃, quarter tone below D₄, and quarter tone below F₄. In contrast, a series of three loud consecutive morphologies occurs just after 45''; each comprises a synchronous morphology of six bi-tones.

Pitch relations with natural and multiphonic harmonics provide further textural interest. For example, the fundamental pitch of the multiphonic harmonic at 11'' is a B₃. (See Figure 60: 3.) It is preceded by an interrupted bi-tone played on string 6 fret *vii*, whose lower pitch is a B₂. Moreover, the resonance of the bi-tone (long) at 10'', whose lower pitch is F₃ merges with the (above-mentioned) multiphonic harmonic at 11''; where the uppermost pitch is F₆. Listen to *sound example, track 66*, which illustrates this phrase.

Similar to *Foxfire Eins* (1993) by Helmut Oehring, configurations that incorporate bi-tone glissandi are utilized here in page 2. (See section 1.7.1.) Glissandi are used as part of the texture. The phrase starting at 49'' has two synchronous, interrupted bi-tone (long) morphologies. Using left-hand fingers 1, 2, and 3 on the appropriate frets, the player executes a hammer-on, then slides along the fretboard towards the bridge, keeping the strings depressed, before coming to rest at the destination position; a continuous morphology, which

changes pitch smoothly, occurs. Listen to *sound example, track 67*, which is a realisation of the closing section from 49”.

7.9.3 Bi-tone tapping study 2: Improvisation

Inclusion of elements of freedom is the main focal point for the performer in this second bi-tone tapping study, which consists of six boxes. However, the notated material also presents further challenges. The goal for the guitarist is to produce convincing phrases that are based on the given information, shifting imperceptibly between notated and improvised music.

The first three boxes contain improvisational ideas, while the others have fixed material and are shorter. Box 1, for example, starts with a phrase consisting of a lengthy and interrupted synchronous bi-tone (long) morphology, which is played *sforzando* (forced) using all strings. Approximately four second’s duration is appropriate. This is followed by a shorter synchronous bi-tone (long) morphology performed loudly on strings 6 and 5 that is then interrupted by a snap pizzicato. The improvisation material is shown within a second box (housed inside the main box). This consists of ideas for two short phrases that use the pitches from the opening morphologies. Rhythmic units that use conventional symbols are given above the inner box; dynamic levels are free. The broken line placed after the box instructs the player to *construct short phrases based on the given material and ideas*. The music in Box 1 finishes with a gesture consisting of a bi-tone (long), on string 1, interrupted by a synchronous staccato bi-tone morphology using the other strings, followed by a snap pizzicato on string 6. *Sound example, track 68* is a realisation of Box 1.

The three shorter boxes with fixed material provide a contrast. They are to be placed between, or flank, the improvisational boxes; ordering is left to the performer.

7.9.4 Mute tapping

Mute tapping is a damped version of bi-tone tapping. Similarly to bi-tone tapping, both hands are employed to form combinations of morphologies. To create the morphology, the fleshy area of the right-hand palm is used to dampen all six strings in an action that shortens the string length. The whole hand is adjusted from an arched shape, used in standard classical technique, to a

flattened horizontal position where it pushes the strings onto a chosen fret. (See Figure 80.) The palm is placed in an appropriate and comfortable position, just behind a fret; in the vicinity of fret 15 is good for these studies. As a consequence of the damping strategy, lower bi-tones are filtered out; therefore, the pitch content consists of upper bi-tones only. Pitches will only occur when fingers stop the strings behind the frets (corresponding to upper bi-tone pitches in Figure 79). (See page 276.) Inevitably many *taps* will land on the fret wire producing a noise only.

By adopting the above method, all right-hand fingers can move freely and are in a good position to *tap* (or hammer-on) the strings against the fretboard; left-hand fingers tap the fretboard in a similar fashion to the right hand. This produces a percussive attack followed by a noise-biased resonance; pitch content is muted due to fret rattle. Similar to bi-tones, *mute tap (long)* morphologies follow the archetypal behaviour, while *mute taps* are interrupted variants. *Sound example, track 69* consists of three mute tap morphologies, played on string 6 fret IX; a mute tap, non-vibrato, followed by two mute tap (longs) - non-vibrato then with vibrato. Dynamic level is from *moderately soft* to *soft*, and various permutations of fingers and rhythms are utilized in the studies.

For mute tap (long), the two types of interruptions are similar to bi-tone (long) usage, and notated in the same way. Interruption by intervention occurs when the performer changes from one fret to another or another morphology is played on the same string. Interruption by termination happens when the performer temporarily lifts the right-hand palm from its damping position and the stopping finger together, causing a pause. On continuation, the right-hand palm may resume the same damping position, or move to another fret; this will not alter resultant pitches.



Figure 80: Right-hand adjustment for mute tapping production.

7.9.5 Mute tapping study 1: Consecutive and merged morphologies

Comparable to *Bi-tone tapping study 1*, in *Mute tapping study 1* the performer is primarily concerned with forming merged and consecutive morphologies, as well as introducing mute taps into a phrase-based musical situation. Moreover, the guitarist will need to engage with the relatively narrow dynamic level range. As mute tap pitches are the same as upper bi-tones, they correspond to the dynamic levels of upper bi-tone morphologies - moderately soft to very soft.

Furthermore, the types of interruption are similar. For the first 27'' of music the player concentrates on left-hand usage, and the gesture between 29'' and 34'' on the right hand. From 34'' to the end, both hands are juxtaposed.

Merged and consecutive morphologies are expressed in the same way as bi-tones, and pitch relations with both forms of harmonics are explored. For example, the opening phrase starts with an archetypal mute tap (long) morphology that is interrupted at 2.5'' by three successive merged morphologies whose composite resonances are damped at 5'', an interrupted extended archetype; all played at the loudest dynamic level. Four consecutive morphologies that deviate from the archetype follow immediately (three mute taps and a mute tap (long) at 6'' that produces an A₄ pitch); the first three are staccato, acting as an anacrusis to the fourth, which is left to decay. As the four morphologies increase in dynamic level, the build up in intensity is in retrograde to the dynamic level of the archetypal shape. This merges with the A₄ fundamental pitch of the multiphonic harmonic that follows, just before 7''. The pitch of the natural harmonic at 12'', which ends the phrase, is also an A₄. Its resonance merges with the E flat₃ (lower) and A₄ (upper) pitches of the bi-tone at 9''; played on the same fret and string as the previous mute tap (long). *Sound example, track 70* is a realisation of opening phrase.

To help the performer with interpretation, rhythmic configuration indicators are used. For example, under the three successive mute tap (long) morphologies, starting at 3.5'', three evenly spaced vertical lines are joined at the bottom by a single beam; indicating three quavers. As time is in seconds, a crotchet will equal 60 beats per minute. For a more complex example, the configuration at 16'' shows a semi-quaver triplet, followed by a quaver triplet, and finally an accelerando section. Note that these figures show where to place events in the time continuum; they do not necessarily indicate precise duration of morphologies.

7.9.6 Mute tapping study 2: Iterative patterns

In this study the performer concentrates on subtly changing iterative patterns, where the emphasis is on developing right- and left-hand dexterity and co-ordination.

Mute tapping study 2 comprises a series of boxes that contain right- and left-hand fingering information and arpeggio configurations, which result in the production of merged composite resonances. Broken horizontal lines separate the boxes, indicating that the performer may change morphological ordering. Rhythmic cells with performing instructions are shown below each box. For example, the opening cell indicates quaver movement, at quaver equals 180 beats per minute; a continuous succession of even mute taps occurs. The cell attached to the second box shows movement of two quavers followed by four semi-quavers. The performer is free to mix both rhythmic figures and should aim to articulate morphologies in a legato fashion; staccato may be used to accent the start of a new rhythmic groupings.

The practice of incorporating boxes for sets of sound events is sometimes used in the repertoire. Examples given in Volume 1 comprise Biberian in *Prisms no. II* (1970), Brouwer in *La Espiral Eterna* (1971), and Goss in *The Oxen of the Sun* (2003-4); they employ boxes to express iterative constructions. (See section 1.6.)

The music in *Mute tapping study 2* comprises two long sections. Both start very softly, build in intensity and have climactic points. In the first section, which consists of seven boxes, the climax occurs in the final box with three successive loud bi-tone quintuplets. The second section peaks during the fourth box, very fast iterative septuplets. The function of the fifth and final box is to release tension by bringing the music back to the pace of the opening and gradually diminuendo to silence. *Sound example, track 71* is a realisation of the opening section, and *Video example 7* a live recording of the whole study.²⁰⁶

7.10 Nut-side

Nut-side morphologies are formed on a guitar by plucking the string-length between a stopped left-hand finger and the head-nut. Composers have been exploring nut-side playing since the 1960s; five works from the latter part of the twentieth century are cited in Figure 2. (See pages 22-29.) Mauricio Kagel

²⁰⁶ 3rd February 2012, Performance Space, City University, London.

started creating *Sonant* in 1960.²⁰⁷ However, *Faites votre jeu II*, the movement from *Sonant* that includes nut-side morphologies, was written for the electric guitar. (See Figure 35: 7.) Angelo Gilardino's *Abreuana*, which was written in 1971, was the first work to include nut-side playing for classical guitar, followed by Brian Ferneyhough's *Kurze Schatten II*, composed between 1983 and 1989. Then two works were written in 1990, *Sette Studi* by Maurizio Pisati and Rolf Riehm's *Toccata Orpheus*.

The new millennium has seen the emergence of a number of works that incorporate nut-side morphologies; five are referenced in Figure 2. Although *Axes(s)* by Sam Hayden was written originally in 1997, the composer revised the work in 2008-9. Michael Edward Edgerton composed *Tempo Mental Rap* in 2005, *Bingo Variations* by Michael Frengel was written in 2006, Dai Fujikura's *ICE* in 2009-10 and *Suite in Raag Marva* by Vineet Shende in 2010. (See Chapter 1 for further details on all the works mentioned above.)

Composers have given a modest amount of advice on how to perform nut-side morphologies. However, sometimes the information is less than satisfactory. For example, in his notes on *Variation 1* of *Tempo Mental Rap*, Michael Edward Edgerton instructs: "...the right hand pluck should be above (or to the left) of the left hand fingers" (Edgerton 2005, note 8). In *Bingo Variations, movement IX* Michael Frengel simply says: "...plucked behind the left hand" (Frengel 2006, *Bingo 'The Hard Way'*). However, in *ICE* Dai Fujikura's statement on page one of the score, "the note to be held by L.H. and played (by R.H.) between the L.H. and scroll" (Fujikura 2009: 1), is an improvement.

To play a nut-side morphology is not difficult. For example, place left-hand finger 3 on fret XII of string 6, in the normal playing position. Cross the right hand over the left and pluck string 6 with the right-hand thumb in the area of fret VIII; the resultant pitch will be an F4. (See Figure 81.) Note that nut-side pitches are equivalent to upper bi-tone pitches. (See Figure 79.)

²⁰⁷ It would appear that *Sonant* was written over a number of years. Kagel established the concept of 'instrumental theatre' in this work, an idea that became central to many of his later works. The dating is usually referenced as *Sonant* (1960/...). For example, see Wilhelm Bruck *'Pro Musica Nova' studies for playing contemporary music for guitar* (1992).



Figure 81: Nut-side playing.

The technique becomes more exacting when fast left-hand position shifts and composite resonances from simultaneously played morphologies or arpeggio configurations need to be articulated; both are compositional features in the studies that exploit nut-side playing.

Two factors contribute to nut-side morphologies possessing a compressed nature, and relatively short duration for an archetypal morphology. Spectral content is muted by the mode of attack. The guitarist is playing over the soundboard, therefore away from the normal soundhole area, and on the unconventional side of the stopping finger. Added to this is an amount of noise that occurs due to the inclusion of fret rattle. Listen to *Sound example, track 72*, which is a single nut-side morphology played on string 6, fret XII.

There is no consensus on the notation used in the repertory. The composers cited in Figure 2 employ a variety of symbols. For example, Corghi uses a diagonal line intersecting a standard notation minim, Gilardino a blackened rectangular notehead, and Ferneyhough a small pear shape. However, triangular-shaped noteheads are used to indicate nut-side playing in the Volume 2 studies. Figure 82 shows a single nut-side morphology as well as an upwards spread chord. This is in accord with Shende's notation. From a performer's

point of view, the score of *Suite in Raag Marva* is clear and unambiguous. [See Figure 32 (bar 3), page 100.]



Figure 82: Single nut-side morphology and a spread chord - upwards.

In preparation for the study, and to help the player become accustomed to the unusual intervals that occur, play the following octave scale as an exercise. Use the conventional method for alternating right-hand fingers, either thumb and index finger - *p* and *i*, or index and middle fingers - *i* and *m*. The player is free to choose rest or free strokes. Play the morphologies using the loudest dynamic level - *mf*. The right-hand plucking position should be in the area of fret IV. Refer to Figure 79 *Bi-tone chart* (page 276) for precise intervals between successive frets.

On string 6 in tenth position, play the following four nut-side pitches in succession - frets XIII (left-hand finger 4), XII (left-hand finger 3), XI (left-hand finger 2), and X (left-hand finger 1). This scale encompasses an interval of a major third. On the same string and in a similar manner, in sixth position use frets IX, VII, VII, and VI. This set of pitches covers the interval of a perfect fifth. Employ a slow tempo, crotchet equals 50 bpm for instance, allowing time to listen to the decaying resonance from each of the morphologies; note the relatively short durations. Moreover, this tempo will enable a smooth position shifting between tenth and sixth position.

Repeat on all other strings, varying tempi and dynamic levels. This could be accomplished by increasing the speed for each successive string. Start with crotchet equals 60 bpm for string 5 and add 10 bpm for each successive string, finishing on 100 bpm for string 1. Experiment with dynamic level contours. For example, follow an arched pattern of a crescendo between very soft to moderately soft then back down to soft.

7.10.1 Nut-side study

This *Nut-side study* consists of ten phrases, where the performer concentrates on bringing out an inherent arched structure. The phrases comprise variable

durations and dynamic level contours. Moreover, they always finish with composite resonances; the goal for the performer is to interpret merged nut-side, or combined nut-side and natural harmonics morphologies.

In this study, the composite resonances are designed to build in tension; spectral content increases in complexity to the two central phrases before tailing away to a calm conclusion. Left- and right-hand fingerings, as well as fret numbers are given. The player is sometimes asked to spread chords, indicated by a wavy line placed just before the morphologies. Note that the variable width of the wavy line is proportional to the speed of arpeggio execution - quickly to slowly spread.

To elucidate further, phrases five and six (starting at 23'') consist of chords across six strings that are an amalgam of pitches from the preceding four phrases. The opening two phrases, consisting of chords using one fret position, are played on strings 1, 2, and 3.²⁰⁸ However, strings 4, 5, and 6 are employed for phrases three and four, where pitches within the chord voicing are more complex. Moreover, pitch relations with natural harmonics are utilized. For example, the lowest pitch from the slowly spread nut-side chord just before 20'' is the same as the B₅ natural harmonic that joins the resonance just after 20''.

A plectrum is used as an alternative mode of attack; the added noise from the attack acts as a contrast to the usual strike of the right-hand nail. In the opening six phrases, the player is asked to alternate between using plectrum then right-hand fingers. Listen to *Sound example, track 73*, which is a performance of the whole study, for the subtle morphological differences that occur.

7.11 Introduction to rapid mute

Rapid mute is a further development, by the author, of a form of left-hand pizzicato that produces pitched unfretted sounds. Various composers in the latter part of the twentieth century used this technique. For example, John Schneider cites Mauricio Kagel's *Tremens* (1963/65) and Gilbert Biberian's *Prisms no. II* (1970) in *The Contemporary Guitar* (Schneider 1985: 124). However, twenty-two composers are listed in Figure 2: 7 and 8. (See pages 28

²⁰⁸ The well-known barré technique is employed. Typically, a left-hand finger is used to press down multiple strings across the guitar fingerboard (like a bar pressing down on the strings).

and 29.) To illustrate further, *sound example, track 74* is a recording of Leo Brouwer performing this technique in his *La Espiral Eterna* (1971);²⁰⁹ an extract from page 7 of the published score, Schott (1973), is shown in Figure 83 below. Unusual use of the left hand helps to produce a short muted morphology, which is biased towards noise. It is an unfretted sound, executed by resting the left-hand fingers lightly on the string(s) without pressing them to the fretboard. The right hand, changing orders of - *p a m i*, *p m i*, *p i* (where p = thumb, i = index, m = middle, a = annular), forms different combinations of tremolando and arpeggiated configurations.²¹⁰ Strummed techniques (*rasgueados*) are also encouraged, especially to build tension. Rapid mute may be played with speed variation from medium to very quick.

Three types of this technique are developed: rapid mute (normal), undulated and linear contours, and sixth string; their differing usages are reflected in the studies. The symbol used to represent rapid mute is an X placed centrally on the top or bottom of a stem, an extension of existing guitar scoring. (See Figure 2: 4.) Leo Brouwer (1971) employs an X placed under a regular note head to indicate this technique. (See Figure 83.) However, Gilbert Biberian uses triangular noteheads in *Prisms no. II* (1970).

Figure 83: From *La Espiral Eterna* by Leo Brouwer.

²⁰⁹ Leo Brouwer *La Obra Guitarrística Volume V*, 2002.

²¹⁰ Taken from standard classical technique.

Rhythm is indicated by the positioning of stems within configurations (see Figure 84 for example) and reference to bpm (beats per minute) markings, crotchet = 180 for example.

7.11.1 Rapid mute (normal)

Rapid mute (normal) is a straightforward technique and not too difficult to execute. The top five strings, with a bias towards the higher three, are used in performance. However, time is needed to build right-hand dexterity and the left hand should be in such a position to be able to glide easily along the strings.

Figure 84 is an example of a configuration of six rapid mute (normal) morphologies played as equal quavers. The following left-hand position, which is variable, is advocated; place left-hand finger 4 on string 1, finger 3 on string 2, finger 2 on string 3, finger 1 across strings 4 and 5. (See Figure 85.) In this configuration, morphologies may be played in succession by using the following right-hand fingers - p, m, i, a, m, p. Listen to *sound example, track 75*.

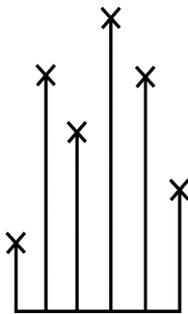


Figure 84: Configuration of six rapid mute (normal) morphologies.



Figure 85: Rapid mute, left-hand position.

By experimenting with tonal variation, a wide range of pitches with subtle contours may be explored. For instance, from very *tastiera* to very *ponticello* for right-hand positions, or slow to rapid left-hand glissandi over short distances of string length. The whole string length may be used, allowing the performer to choose an appropriate position for producing gestures. This method of indicating rapid mute morphologies is in contrast to Lachenmann's usage in *Salut für Caudwell* (1977), however, there are similarities to Corghi's scheme in *Consonancias y Redobles* (1974). (See sections 2.3.1, 2.3.2, and 1.7.1.)

Pitch range is from Bb₂ to approximately F₆, as the upper pitches are played beyond the fretboard and past the soundhole. The pitch content of any given *rapid mute* morphology corresponds to the fret where it is being played. However, an interesting textural side effect is the production of harmonics when the left hand passes a node point. To illustrate, *sound example, track 76* is a series of rapid mute morphologies that pass the node point on fret XII, from *tasti* towards *ponti*.

7.11.2 Linear and undulated glissandi

Execution of *linear* and *undulated* rapid mute glissandi is similar to *rapid mute (normal)*. Note that, to bring out tone colour, both hands work in conjunction. However, linear glissandi are defined by their refracted pitch contour and

rhythmic direction. The contour is performed through glissandi movement upwards or downwards in a direct line between start and stop points. Undulated glissandi are characterised in the same way as linear glissandi. The difference is in the left-hand back-and-forth movement in a broad oscillatory motion along the string lengths, with a tendency towards getting higher or lower in pitch.

The notation for both glissandi is a development of rapid mute (normal). For instance, *linear glissando* may start low in pitch and proceed, at various speeds, in a direct contour to higher pitches. Figure 86 shows *norm* towards *ponti*, whereas Figure 87 is in an opposite direction, *norm* then towards *tasti*. Moreover, Figure 87 shows *undulated glissando*, where pitch movement alters direction within a given contour.

All six strings are used for linear and undulated glissandi; pitch range is from F₂ to approximately F₆, thus extending the range a perfect fourth lower than rapid mute (normal). *Sound example, track 77* consists of a realisation of Figure 86 – linear glissando, and *sound example, track 78* of Figure 87 – contoured glissando.

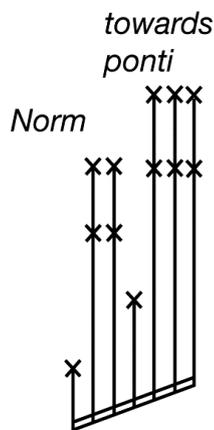


Figure 86: Rapid mute, linear glissando.

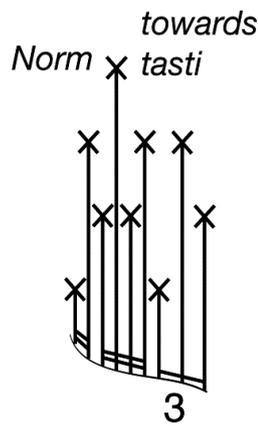


Figure 87: Rapid mute, contoured glissando.

7.11.3 Sixth string

Sixth string is a variation of *linear and undulated glissandi*. The lowest and most sonorous of the six strings are explored, as well as the relationship with inherent natural harmonics when passing node points. To perform sixth string, a left-hand finger is placed on string 6, in a similar fashion to the other *rapid mute* techniques. The right-hand thumbnail, flesh of the thumb, or a mixture of the two plucks the string to make different pitches; achieved by moving the left-hand up or down the string, thus varying the string length.

Initially this is an easy technique to execute. However, the player is encouraged to engage in more complex rhythms by developing right-hand thumb dexterity, variations of dynamic levels, and tone colour. Left-hand positioning, which should be natural and comfortable, is left to the performer.

Figure 88 is an example of a linear glissando (*sound example, track 79*), and Figure 89 a contoured undulating glissando (*sound example, track 80*).

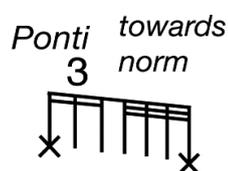


Figure 88: Rapid mute (sixth string), linear glissando.

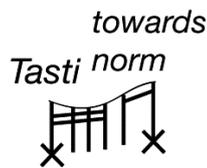


Figure 89: Rapid mute (sixth string), contoured glissando.

The pitch range is from F_2 to approximately F_4 . As a consequence of using the sonority of the 6th string, and the inclusion of harmonics that occur when passing the many node points, a rich texture is created.

7.11.4 Rapid mute studies

Five studies are used, building the three types (rapid mute (normal), undulated and linear contours, and sixth string) from simple gestures to complex phrases. The studies are divided into appropriate sub-sets, 1 and 2 - rapid mute (normal), 3 and 4 - undulated and linear, and 5 - sixth string. Fragmentary and iterative styles are developed.

7.11.5 Rapid mute (normal) study 1

This study is designed to help the performer in the initial stages of rapid mute playing, in particular, becoming familiar with the noise-biased sound quality, forming groups of consecutive morphologies, and experimenting with dynamic levels.

Rapid mute (normal) study 1 contains four boxes of approximately 10" duration. The music in each box is based on a different idea - regular and irregular repeated patterns for boxes 1 and 2, regular and irregular arpeggios for boxes 3 and 4. Right-hand fingering and dynamic levels are given. A speed of *quaver* = 360 is suggested. However, the player should start at approximately *quaver* = 180 then subsequently increase the tempo incrementally. *Sound example, track 81* consists of Box 1 played at both tempi. Note that in performance, there is scope for shaping phrases.

7.11.6 Rapid mute study 2: Synchronous morphologies

With the addition of synchronous morphologies, the emphasis for the player in *Rapid mute study 2* is on interpreting various right-hand patterns that consist of iterative, arpeggiated, and strummed configurations. This is comparable to

Murai's *Tellur* (1977) in the area of using rasgueados for maintenance of sound. However, in this study the strummed phrases are fairly short in duration, which is in contrast to Murai. (See chapter section 1.5.4, and listen to *sound example, track 91*.)

For this study, the music comprises phrases of consecutive morphologies that are more complex and varied in duration than the previous study. Precise rhythm (note that *crotchet* = 60), right-hand finger usage, and dynamic levels are given; arrows are used to indicate direction of rasgueado strums. For example, the opening iterative configuration is played rasgueado; a sextuplet followed by a staccato semi-quaver. This crescendo pattern is executed with the right-hand index finger (*i*). An arpeggiated example is found at 5.5", where the phrase starts with a loud semi-quaver pattern; right-hand fingering - *p* on string 5, *i* and *m* on strings 3 and 2, *p* on string 4, *i* and *m* on strings 3 and 2. *Sound example, track 82* is a realisation of the opening section.

7.11.7 Rapid mute (short undulated glissandi) study 3: Improvisation

Rapid mute (short undulated glissandi) study 3 consists of three boxes. The purpose behind this study is to further develop rapid mute playing. In particular, the performer concentrates on creating contrasting short phrases comprising consecutive morphologies. Furthermore, improvisatory passages and introducing the player to the challenge of producing *short undulated glissandi* are included.

The use of successive rapid mute sounds is akin to Pisati in Movement 4 of his *Sette Studi* (1990), where he employs quickly- played consecutive sounds. (See section 1.4.1.) There is further information on rapid mute playing in the horizontal aspect, see chapter section 1.5.1. Moreover, elements of freedom in this study have similarities with Corghi's method in *Consonancias y Redobles* (1974), especially as rapid mute undulated glissandi are sometimes employed. Corghi uses short fragmented gestures for the right hand that include arpeggios, rasgueado, and repeated morphologies that are played in sympathy with the left hand movements. However, Corghi is more restrictive in the number of strings he utilises. (See sections 1.7.2, and 2.3.1.)

The music here in Boxes 1 and 2 is based on the repeated patterns and arpeggiated ideas from Study 1. A more fragmented texture is presented in Box

3, where repeated morphologies, arpeggios, and rasgueados are mixed together in a series of short phrases that feature contrasting dynamic levels.

For the improvisatory sections, the player is instructed to construct appropriate phrases based on the given material and ideas, giving an impression of where to base improvisational thinking. Precise performing instruction for fingering and dynamic levels is given. Although the guitarist follows the spacing between stems for rhythmic indication, the underlying duration of a crotchet should be 180 bpm.

To play undulated glissandi over short distances of string length, the left-hand glides - with an upwards or downwards tendency, or around a fixed point - along the string length during right-hand execution; it is denoted by a curved beam shape. (See Figures 87 and 89.) *Sound example, track 83* is a realisation of the opening section of Box 3, featuring short undulated glissandi. The left-hand moves within positional parameters of:

- *tasti* - between frets I and XI,
- *norm* - fret XII to half way over the soundhole, and
- *ponti* - half way over the soundhole to near the bridge.

7.11.8 Rapid mute study 4: Linear and undulated glissandi

In *Rapid mute study 4* the *linear glissando* version of rapid mute is added to *undulated glissando*. The music is intended to test the hand coordination and dexterity of the player, who forms phrases of varied durations that are made up mostly of consecutive rapid mute morphologies. To execute linear glissando technique, string 6 is added to the other five: place left-hand finger 4 on string 1, finger 3 on string 2, finger 2 on string 3, finger 1 on string 4 and thumb across strings 5 and 6. (See Figure 90.)

The dramatic opening linear glissando phrase comprises a succession of gestures, made up from arpeggio, iterative rasgueado, and tremolando configurations. Start and stop points correspond to those of undulated glissandi. (See previous study 7.11.7.) This study starts *tasti* (perhaps at the low end of the fretboard, near fret I) and moderately softly, then proceeds slowly towards *ponti* becoming gradually louder. The final staccato rasgueado, at 9.5", is followed at 10" by a very loud snap pizzicato. Straight beam shapes, with a tendency

towards upwards or downwards, are used to represent linear glissando pitch orientation. *Sound example, track 84* is a realisation of the opening section.

After the fragmentary texture between 12.5" and 25", a long undulated downwards phrase, played from *ponti* to *tasti*, which balances the opening linear glissando phrase occurs. The player is instructed to improvise using the given configurations as a basis. Study 4 finishes with a return to the fragmented texture.



Figure 90: Linear glissando, left-hand position.

7.11.9 Rapid mute study 5: Sixth string (linear and undulated glissandi)

The technique *sixth string* is introduced in Study 5, where linear glissandi and undulated glissandi are featured. The main goal for the guitarist is to explore the morphological properties of these two techniques on the lowest string.

To execute this technique, only one left-hand finger is needed to touch and slide along the string. However, the player is free to explore using different fingers and hand positions. One possibility is to use finger 2 exclusively. (See Figure 91.) As well as the characteristic mixture of pitch and noise, performing this technique will engender natural harmonics when a node point is passed; this is an important timbral feature for the performer.

Taking the opening upwards linear glissando phrase for example, the player starts *tasti* reaching fret XII on the eighth semi-quaver; producing a natural harmonic - E₂. After half a second, the resonance from this natural harmonic is interrupted by four morphologies; dynamic level contours are given. In contrast, the phrase at 4'' consists of a downwards undulated glissando phrase that ends with a natural harmonic played SH - E₃. (See Figure 60: 5.) This time the resonance lasts 3'' before being interrupted. *Sound example, track 85* is a realisation of the opening section.



Figure 91: Rapid mute (sixth string), left-hand finger 2.

7.12 Pinch mute

Pinch mute is a damped technique.²¹¹ Its roots are in electric guitar *pinch harmonic* playing. For example, in *For the Love of God*, from the album *Passion and Warfare*, Steve Vai uses pinch mutes between 59'' and 1.15''. Listen to *sound example, track 86*.²¹²

For the guitarist, *pinch mute* is not a difficult technique to accomplish in its basic form. However, time is needed to get used to the right-hand action and

²¹¹ Developed by the author.

²¹² Steve Vai *Passion and Warfare*. Sony. 1990. Pinch harmonics occur when the plectrum and edge of the right-hand thumb strike a node point in very close succession. Another example may be found on *Echo*, just after 2 minutes, from *Surfing with the Aliens* by Joe Satriani (2007).

location of pinch mute harmonics. To execute a normal pinch mute morphology, the right-hand thumb and index finger are positioned about an inch apart. With a pinching motion, pluck the string simultaneously using the two specified fingers; a short clicking, noise-oriented sound results. To illustrate timbral range, *sound example, track 87* consists of four pinch mute morphologies - *tasti* and *ponti* on string 6, then *tasti* and *ponti* on string 1.

Figure 92 shows an attack and release position. This technique is performed by moving along the string length, with an upwards or downwards trajectory, between *tasti* and *ponti*. *Tasti* is located over the fretboard, normal (*norm*) in the area of the soundhole, and *ponti* - close to the bridge.

The resultant music consists of consecutive morphologies that are a mixture of staccato sounds, between node points, with natural harmonics resonances added to the texture when passing, or at node points. To illustrate, *sound example, track 88* consists of two pinch mute phrases - passing a node point then stopping at a node point. All six strings are used and played without left-hand intervention.

The notation used to depict pinch mutes and pinch mute natural harmonics are similar to rapid mute, start and stop points with iterations between. A single pinch mute morphology has an X placed centrally on the top or bottom of a stem. However, an extra X, which is less pronounced, is placed on the stem beneath or above. By replacing the more pronounced X with a diamond shape, pinch mutes with natural harmonic resonances are denoted. (See Figure 51: 5.) Roman numbers are used to specify particular node points. Dynamic range is between moderately loud to very soft.



Figure 92: Pinch mute.

To help the performer in the initial stages of playing pinch mute morphologies, in particular, learning to construct phrases of consecutive morphologies that exploit timbral range, the following exercises will be useful. Play three pinch mute morphologies at the loudest dynamic level on string 1; this will be moderately loud. Using a slow and even tempo, perhaps 100bpm, execute the first morphology ponticello, the second normal (over the

soundhole), and the third tastiera. Repeat the exercise on all other strings, increasing the tempo a little on each occasion.

7.12.1 Pinch mute study: Nodes

In this study, the player uses pinch mute morphologies to experiment with dynamic levels and form phrases of varying durations. Most of the music in *Pinch mute study: Nodes* consists of consecutive morphologies, where the guitarist engages with improvisational aspects that are used within the phrases. However, merging occurs by using pinch mutes that generate natural harmonics and their relationships with regular natural and multiphonic harmonics. This use of pinch mute natural harmonics, which are invariably played in the soundhole area, may be seen as an extension to the soundhole harmonics technique. (See section 7.1.2.)

As an introduction to playing pinch mute harmonics, locate SH and SHR on string 6, then execute a pinch mute harmonic on each. (See Figure 60: 5.) Play them consecutively at a slow tempo, allowing the resonance to decay naturally. The player may choose dynamic levels.

All performance parameters are given in this study. For example, four short gestures comprising rapid consecutive morphologies are used for the opening 4.5". The first gesture is made up of seven moderately soft morphologies played *ponti*; three on string 2 with an upwards tendency, four on string 1 with a downwards trajectory. The second is similar, played very softly in the *norm* position. Gestures three and four are performed on string 6, with contrasting dynamic levels and tone colour; the horizontal beams denote, use the right hand in a fixed position. This type of material occurs two more times, at 15" and 36".

At 5.5" there is a longer phrase that includes merged morphologies. The opening gesture, which starts *ponti* and moves towards SH consists of decelerating rapidly played pinch mute morphologies on string 1 that crescendo from moderately soft to moderately loud; ending with a pinch mute natural harmonic. (See Figure 60: 5.) The natural harmonic pitch produced at SH on string 1 is E₆. Its resonance merges with the multiphonic harmonic at 9.5" (G₆ and E₇) and the natural harmonic at 10.5" (E₄). The phrase is then balanced by an *accelerando* gesture on string 2, shorter in duration than the first. An improvisational element is included. When there is a gap between stems within

a beamed configuration, the player is free to choose the number of morphologies; starting and ending stems are intimated in the notation. *Sound example, track 89* is a realisation of the first 15”.

In contrast, the longest phrase, starting just after 19”, uses merged morphologies that feature pinch mute harmonics. The opening gesture starts with a pinch mute harmonic (SH_{RRR} played on string 6), which produces an E₅. (See Figure 60: 4.) It ends with a pinch mute harmonic morphology at 20.5”, played at SH on string 6. This produces an E₄ pitch, which merges with the following morphologies’ resonance that starts the next gesture, a D₅ just after 21” played on string 4; the interval of a minor 7th is a feature of the phrase.

8 Combining techniques

This section comprises eight studies that combine two extended techniques, and four studies that comprise three extended techniques. The intention is to start providing a repertoire for guitarists that centres on integrating extended guitar techniques. The compositional focus is on forming relationships through combining consecutive, merged, and combined morphologies. We have seen that composers have combined two extended techniques, *Consonancias y Redobles* (1974) by Azio Corghi and *Tocatta Orpheus* (1990) by Rolf Riehm for example. (See section 1.7.2.) However, there are no examples in the repertoire of combining three techniques. The result can be a overlaying of three extended techniques; listen to the significant amount of pitch content in *sound example, track 96*.

For these 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 superimposition of similar and different morphological types, 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 and mental skill necessary to deal with melodic contours that occur concurrently. One of the many examples can be found in the *Soundhole harmonics, bi-tones, and nut-side combined study*, which is explained further in chapter section 8.2.3.

In Figure 23, pages 80-81, we have seen that three composers have combined two extended techniques in ways that link closely with the Volume 2 music, Azio Corghi in *Consonancias y Redobles* (1974), Rolf Riehm in *Tocatta Orpheus* (1996), and Helmut Lachenmann in *Salut für Caudwell* (1977). (See sections 1.7.2, 1.10, and 2.3.1.) However, it would appear that the studies in this section that combine three extended techniques are unique to the repertoire.

Four studies combine two techniques. The first two studies consist of closely related morphologies, while more differences are found in the second two. For example, natural and multiphonic harmonics morphologies are analogous and will tend to blend, producing similarity. In contrast, the combination of bottleneck and soundhole resonances will produce disparity, resulting in a more polyphonic texture. Moreover, three techniques are

integrated in two more studies. In the first, three contrasting techniques, harmonics, ‘snare drum’ and pinch mute, are combined. For the second however, the three techniques - soundhole harmonics, bi-tones, and nut-side - have many similar properties. Relevant information from Figure 51 (pages 193-198) is used to explain the similarities and differences between techniques.

8.1 Two techniques

8.1.1 Natural and multiphonic harmonics

Close connections between natural and multiphonic harmonics are evident in Figure 51: 1 - archetypal morphology, similar notation, and percussive attack. Differences occur in the more complex decaying spectral activity, shorter durations and lower dynamic levels of multiphonic harmonics.

8.1.2 Natural and multiphonic harmonics combined study

In this study, the focus for the performer is on integrating dissonant sonorities and resonances in an improvisatory setting.

For the opening section, which is played on the lower three strings, frets and dynamic levels are initially given; the performer is then free to choose pitches and dynamic levels based on the initial material. For example, the composite morphology from the first three multiphonic harmonics - string 5 fret II, string 4 fret IV_R, and string 6 fret VI - produces a complex mix of ten different merged pitches. (See Figure 93.)²¹³ Listen to the opening of *sound example, track 90*.

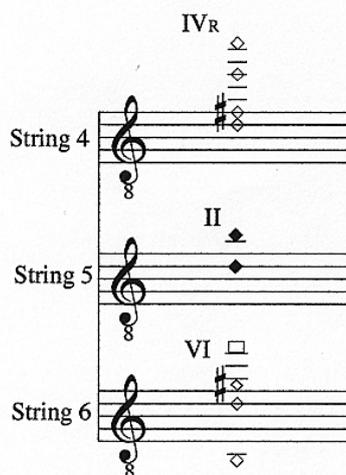


Figure 93: Ten pitches.

²¹³ The pitches are taken from Figure 60: 2 and 3 (pages 221 and 222).

138 harmonics (total number in Figure 60) occur throughout the string lengths. Their usage will have a performance impact on left-hand technique. To illustrate, Figure 94 shows the opening section of *Natural and multiphonic harmonics combined study*. The gesture starting just after 4" covers a relatively narrow fret area - from XL to XI. This can be played within one position.²¹⁴ A contrasting and more demanding example is the third gesture, just before 8", where a wider scope is used - between XR and SHL. The player will have to change position. *Sound example, track 90*, which is a realisation of the whole of Figure 94, illustrates the result. Also, *Video example 8* is a live recording of the whole study.²¹⁵

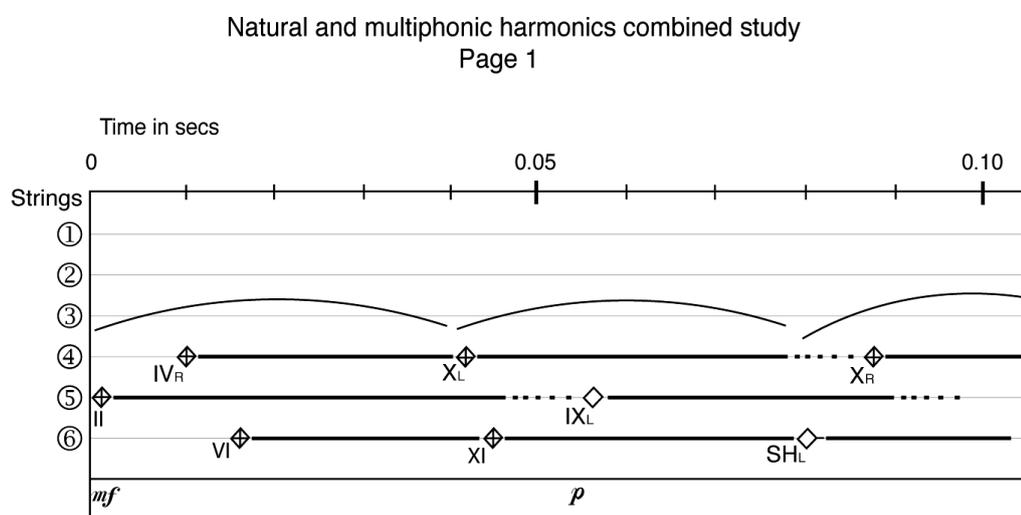


Figure 94.

The improvisation section, between 10" and 19", should be based on ideas from the opening arpeggios.

8.1.3 Rapid mute and pinch mute

Three noise-oriented, variant techniques are used; rapid mute, rapid mute (sixth string), and pinch mute. (See Figure 51: 5.) They all possess a short spectral activity and playing rapid mute produces consecutive morphologies only. However, as rapid mute (sixth string) and pinch mute share the possibility of generating resonances from harmonics node points, merging is possible.

²¹⁴ Meaning the left hand does not move.

²¹⁵ 3rd February 2012, Performance Space, City University, London.

Due to the modes of attack there is a difference of dynamic range at the high end. (See section 7.11.) From Figure 51: 5 we note that rapid mute and rapid mute (sixth string) may be performed slightly louder than pinch mute.

8.1.4 Rapid mute and pinch mute combined study

This study consists of two boxes, where each has a different compositional feature - transformation, and energetic fragments. For the player this means engaging with the technical challenge of accomplishing a transition between two related techniques in the first box, then learning to realise the necessary speed and hand movements for a successful outcome in the second box. In both boxes, all performance parameters are given until *free dynamic levels* are indicated.

At particular points in Box 1, the performer concentrates on delivering an imperceptible transition from rapid mute to pinch mute, and pinch mute to rapid mute morphologies. For example, a succession of rapidly played pinch mute morphologies opens the study, followed without a pause by a decelerating group of pinch mutes. As the spectra are similar and all that changes is the mode of attack, the guitarist can engender an outcome that evokes a seamless change.

There is a relationship between this *Rapid mute and pinch mute combined study* and *Consonancias y Redobles* (1974) by Azio Corghi in the area of affecting a transformation. For example, Corghi asks the performer to transform bi-tones into mute taps. (See section 1.7.1.)

In this study, most of the morphological movement is consecutive. However, merging occurs when pinch mute harmonics and rapid mute (sixth string) harmonics are juxtaposed. For instance, the second phrase begins with a group of rapid mute (sixth string) morphologies, played with a regular pulse. The final morphology of this group is a rapid mute (sixth string) harmonic at SH_L – D₄. Its resonance continues during the following pinch mute morphology at SH on string 2 – B₅; an interval of a major sixth occurs. *Sound example, track 91* is a realisation of the first two phrases. Three more harmonics are specified - rapid mute (sixth string) SH_L on string 6, pinch mute SH and XIX on string 2 - D₅, B₅, and F#₅ (in order of succession). To add morphological variety to the third phrase, a cross stroke morphology with a single attack between the D₅ and B₅ harmonics, sets a D₄ resonance in motion.

Box 2 is made up of a series of phrases, which are akin to the fragmented structures employed by Leo Brouwer in *La Espiral Eterna* and Corghi in *Consonancias y Redobles*. (See section 1.4.3.) In box 2 consecutive morphologies are played as fast as possible; the performer moves suddenly and quickly between techniques. For example, the short opening phrase is a rapid mute arpeggio consisting of nine morphologies, played *normal* with a *short undulated glissando* using all six strings, followed immediately by a group of three *ponti* pinch mute morphologies on string 1.

During the third phrase, merging occurs after the opening undulated rapid mute arpeggio followed by a group of linear rapid mute morphologies. A series of three rapid mute (sixth string) morphologies, the last being a harmonic at SHr, merges with a short bi-tone gesture, producing a dissonant composite morphology. A second group of bi-tones, whose pitches produce a more consonant composite morphology, occurs just before the improvised section. (See Figure 79 for precise pitches.) *Sound example, track 92* is a realisation of the opening section. Plus, *Video example 9* is a live recording of the whole study.²¹⁶

8.1.5 ‘Snare drum’ and snap pizzicati

When comparing the ‘snare drum’ group and snap pizzicati morphologies, there are areas of disparity:

- ‘Snare drum’ (normal), lateral glissando, and slide glissando are variant morphologies performed in three phases. Although snap pizzicato is a variant and snap pizzicato (long) archetypal, both have a single phase.
- As ‘snare drum’ (normal) resonant phases and snap pizzicato (long) morphologies have a decaying spectral activity, both are archetypal; they also share a percussive noise attack. However, after the initial noise element, pitch content is stronger in snap pizzicato (long) morphologies compared to the relatively equal pitch-to-noise ratios of ‘snare drum’ resonant phases.
- There are also differences in dynamic level and durations; snap pizzicati are from very loud to moderately soft, ‘snare drum’ resonant phases are loud to soft. Moreover, at the same dynamic level, snap pizzicato (long) morphologies have a longer duration than ‘snare drum’ resonant phases.

²¹⁶ Ibid.

8.1.6 'Snare drum' and snap pizzicato combined study

Although consecutive and merged morphologies are employed, the main focus for the guitarist is on exploring the possibilities for combining the contrasting 'snare drum' and snap pizzicato morphologies.

The '*Snare drum' and snap pizzicato combined study* comprises five short boxes of varying durations. Boxes 1, 2, and 3 contain music that combines snap pizzicati with a particular 'snare drum' technique. For example, 'snare drum' (normal) and snap pizzicati are used in Box 1. In Boxes 4 and 5, all three types of 'snare drum' and both kinds of snap pizzicati morphologies are combined. Full performing instruction is given in Boxes 1 and 3. However, dynamic levels and vibrato are free in Box 2, and tone colour and angle of attack are free in Boxes 4 and 5.

To illustrate further, Box 1 starts with merged 'snare drum' (normal) and snap pizzicati morphologies. A very loud snap pizzicato (long), played on string 6, is set in motion during the preparation phase of a loud 'snare drum' (normal) morphology that uses strings 5 and 4. The resonant phase of the 'snare drum' (normal), played with lateral vibrato, is interrupted by a moderately soft 'snare drum' (normal) on the same fret, played without vibrato; a moderately loud snap pizzicato occurs on string 3 during its decay. Listen to *sound example, track 93*, which consists of the whole of Box 1.

Box 2 opens with consecutive 'snare drum' morphologies, consisting of a lateral glissando then a series of three 'snare drum' (normal) sounds; the first two are interrupted. During the resonance of the third 'snare drum' (normal), merging with a snap pizzicato morphology occurs. Listen to *sound example, track 94*, which consists of the whole of Box 2.

In Box 3, consecutive snap pizzicati occur before merging with slide glissando morphologies. Natural harmonics are included in Box 3, and cross stroke (active scordatura) in Box 4.

Technical and physiognomic capabilities need to be considered. In Box 1 for example, although both hands are in close proximity, the left-hand action during execution of the opening 'snare drum' preparation phase will need to avoid

touching string 6 when the right hand initiates the snap pizzicato (long). *Video example 1* is a live recording of the whole study.²¹⁷

8.1.7 Bottleneck (plucked and unplucked) and soundhole resonances (palm, fist, or thumb and buzz)

Although they share a percussive noise attack and decaying spectral activity, when combined, bottleneck and soundhole resonances techniques form a texture of contrasting morphologies. Their differences are threefold:

- Performing bottleneck technique produces variant morphologies, whereas soundhole resonances are archetypal.
- Regarding pitch orientation, soundhole resonances are endowed with a higher proportion of noise.
- Palm, buzz, and bottleneck (glissando) morphologies share the same durational possibilities of 3" to 6". However, bottleneck (slide) morphologies may last from 3" to 8".

8.1.8 Bottleneck and soundhole resonances combined study

In this *Bottleneck and soundhole resonances combined study*, the goal for the player is to interpret the recurring structures that are featured, as well as textures comprising combined, merged, and consecutive morphologies.

One example is the opening configuration - an upwards bottleneck (plucked) morphology, played on strings 1 and 2, merges with a soundhole resonance *palm* morphology on the lower strings 0.5" later - which has two reflections at distances of 7"; each reflection diminishes in dynamic level.

A second example is the phrase starting at 10", consisting of two consecutive bottleneck (glissando) morphologies. An upwards morphology on string 6 followed by a downwards three-string morphology. The resonance of the second glissando morphology is interrupted by two pinch mute morphologies on string 6, the first of which adds a dissonant pitch to the composite resonance. *Sound example, track 95* is a realisation of the whole study.

²¹⁷ Ibid.

8.2 Three techniques

8.2.1 Combining natural and multiphonic harmonics, ‘snare drum’ and pinch mute

These three contrasting groups are used for the study. The only commonality between all three techniques lies in the attack action, right-hand activity occurs between tastiera and ponticello, although this may sometimes be exaggerated. However, there are similarities between some pairings:

- The morphologies of both harmonics and ‘snare drum’ resonant phases have a percussive attack and decaying spectral activity.
- Some pinch mute morphologies include natural harmonics.
- Harmonics and pinch mutes have a single phase.
- The dynamic range of multiphonic harmonics and pinch mutes are moderately loud to very soft.

The extensive morphological differences among pairings are best shown as a table. Analysis of Figure 95 shows that the most significant contrast is in spectral activity - pitch bias of the harmonics group compared with the noise based pinch mute for example. There are inherent structural differences. For example, ‘snare drum’ morphologies comprise three interconnected stages. (See section 7.7.) All the other techniques have one phase (archetypal or variant). However, although the harmonics group and pinch mute have a single phase, their durations are very different. Note that because pinch mute harmonics are damped variants, the duration is much shorter than the harmonics group - typically up to 6” on string 6, or 3” on string 1.

Subtle differences in dynamic range among pairings are important when morphologies merge. For instance, the harmonics group is slightly broader in scope than the ‘snare drum’ group. (See Figure 51: 1 and 3.)

Morphologies differences table

Techniques	Phases	Spectral activity	Duration	Dynamic range
Harmonics - natural and multiphonic	1	Pitch bias	4" to 15".	Loud to very soft.
'Snare drum' - normal, gliss and slide	3	Equal pitch and noise	1" to 6"	Loud to soft.
Harmonics - natural and multiphonic	1	Pitch bias	4" to 15".	Loud to very soft.
Pinch mute	1	Noise bias	Short spectral activity, plus harmonics resonances.	Moderately loud to very soft.
'Snare drum' - normal, gliss and slide	3	Equal pitch and noise	1" to 6"	Loud to soft.
Pinch mute	1	Noise bias	Short spectral activity, plus harmonics resonances.	Moderately loud to very soft.

Figure 95: Morphological differences table.

8.2.2 Harmonics, 'snare drum' and pinch mute combined study

The *Harmonics, 'snare drum' and pinch mute combined study* consists of three boxes of contrasting textures. The main musical focus for the player is on manipulating the pitch content of morphologies comprising varied combinations of the above techniques.

In Box 1 for example, a texture with dissonant pitches is developed. The first section is made up of a 'snare drum' normal (that includes multiple attacks) on fret VII strings 5 and 4 - F₃ and B flat₃, which merges with a multiphonic harmonic on fret VI string 6 - B₃, D₄, G#₄, and F₅ just before 2", then a pinch mute harmonic just after 3" - F#₄. *Sound example, track 96* is a realisation of the whole box.

A more transparent texture is employed in Box 2, where the focus is on moving between two predominant pitches - E and then B. To illustrate, three pitches - two in unison, one an octave higher - occur during the opening gesture. Using strings 4 and 5, the resonant phase of a lateral glissando morphology on fret VI (producing pitches of A₃ and a quartertone above E₃) is played with a natural harmonic on string 6 fret V - E₃. As the glissando is executed, the lower pitch blends with the E₃ pitch of the natural harmonic. A pinch mute gesture on string 1, executed during the lateral glissando resonant phase, finishes on a pinch mute harmonic at SH that produces an E₄. Listen to *sound example, track 97*, which is a realisation of the opening section. A chromatic 'snare drum' configuration with an upwards direction follows, moving the pitches an interval of minor third; from G₃ and a quartertone above D₃ to B flat₃ and a quartertone above F₃.

Regarding the improvisation section, the performer is asked to construct a phrase, similar to the opening, using material with a contrasting pitch focus of A to E. One method could be to compile a list of morphologies to provide improvisational material from which to choose.

Box 3 consists of three sections. In sections one and three, composite and synchronous morphologies form euphonic pitch arrangements. For example, the opening multiple attacks and resonant phases of two 'snare drum' morphologies, on the lower strings, form a synchronous morphology of perfect fourths - E₃, A₃, D₄, G₄. A pinch mute gesture, which sounds during the decay

of the two lower pitches, interrupts the two higher pitches and finishes with a pinch mute harmonic of D₃. Listen to *sound example, track 98*.

The pitches that make up the final section, another example similar to Western harmony, form a IV⁹ (D⁹) – I⁹ (A⁹) cadence:

- D⁹ - starting with a pinch mute harmonic on string 4 at SH - D₃, natural harmonic on string 2 fret XIX - F₃[#], and slide glissando on strings 6 and 5 fret X - E₃ and A₃.
- A⁹ - an slide glissando on strings 5 and 4 fret XIII - B₃ and E₄, pinch mute harmonics on strings 2 and 1 at SH - B₃ and E₄, and synchronous natural harmonics on strings 5 and 4 frets IV_L and VII - C₂[#] and A₂. *Sound example, track 99* is a realisation of the closing section.

The middle section is a palindrome configuration, made up of natural and multiphonic harmonics, whose pitches form a dissonant composite morphology. (See Figure 60: 4.) *Video example 10* is a live recording of the whole study.²¹⁸

8.2.3 Combining soundhole harmonics, bi-tones and nut-side

From Figure 51: 1, 4 and 5 (pages 193, 196 and 197) we can see that the techniques soundhole harmonics, bi-tones, and nut-side share various similarities. For example, soundhole harmonics, bi-tone (long), and nut-side are archetypal morphologies; all have a percussive attack and decaying spectral activity. Moreover, they have a similar dynamic range between loud and very soft, although playing bi-tones very softly is difficult and nut-side have a slightly narrower band (*mf* to *pp*).

However, there are differences in durational range and mode of right-hand attack. When left to resonate unimpeded, soundhole harmonics have the longest durations, nut-side the shortest. Soundhole harmonics are played in the conventional right-hand position, nut-side over the fretboard, and bi-tones with the fingertips of both hands.

8.2.4 Soundhole harmonics, bi-tones, and nut-side combined study

This study consists of phrases with variable durations, constructed through merging and combining the three techniques - nut-side, soundhole harmonics, and bi-tones. The player concentrates on bringing out strategically placed

²¹⁸ Ibid.

composite resonances comprising contrasted groupings of morphologies made up from various combinations of the techniques.

For example, the study opens with a phrase that integrates all three techniques. The composite resonance from a soundhole harmonic (SH on string 4) and three spread nut-side morphologies, played on strings 3 to 1, combine at 2'' with two simultaneously played bi-tones on strings 6 and 5. The second phrase ends with the resonance from six merged nut-side morphologies, which occur at 11''. However, at 4'' the same phrase starts with a soundhole harmonic (SHR on string 6), whose resonance is combined 3.5'' later by a spread nut-side chord using the remaining five strings.

A compositional feature of this study is the development of dissonant pitch relations. For example, interactions occur through seeking quartertone and octave relationships. Staying with the second phrase for instance, the pitch from SHR on string 6 is G#₄, whereas the pitch from string 1 of the spread nut-side chord is a G quartertone-sharp₇. Moreover, the pitch from the ensuing nut-side morphology at 11'', on string 6, is G quartertone-sharp₄.

In contrast, for relations that centre on octaves, we will look at part of the composite resonance from the phrase starting at 33''. The pitch of SHRR on string 6, which initiates the phrase, is a B₄ that combines with the bi-tone morphology at 37'', played on string 2 fret XII, consisting of pitches B₅ (lower) and C₅ (upper). (See Figure 79.) Listen to *Sound example, track 100*, which is a performance of the whole study.

There is a similarity here to *Toccata Orpheus* (1990) by Rolf Riehm, especially as he explores pitch relationships between bi-tones and nut-side morphologies. For example, Riehm combines lower pitches bi-tone morphologies with the nut-side morphologies. (See section 1.7.2 for more details.)

Layering contrasting melodic contours is a feature of this study. For example, the soundhole harmonics and bi-tones phrase that starts at 48'', which lasts 13'', starts with an ascending arpeggio comprising merged soundhole harmonics, whose resonance is interrupted by a descending arpeggio. Then a short phrase of merged bi-tones, with a shape based on the extended archetype model, is superimposed over the composite resonance of the descending arpeggio as it decays naturally. The next phrase, which starts immediately,

comprises bi-tone and nut-side morphologies lasting 5.5.” The composite resonance from two bi-tone morphologies that have an altered trajectory, glissando downwards, are layered over the composite resonance from a short nut-side phrase that is initiated at 1.01”. By increasing in intensity, the nut-side phrase structure is a deviation on the extended archetype model.

Full performance detail is specified for most of this study. However, elements of freedom occur in the section starting at 1’. Concentrating on combined composite resonances, the performer is asked to construct similar phrases based on given information - choice of parameters in the box and the textual instruction alongside.

9 Coda

9.1 Reflections on relationships

In order to cover the research scope, volumes 1 and 2 comprise a complex web of interrelations, an inevitable consequence of transforming the examination of guitar morphologies into an instructive and informative work. Therefore, in this section I will be selective, giving an overview that considers the main relationship issues.

A close observation of this research will show that it has a dual theoretical and practical purpose. It instructs whilst being self-reflexive and is intended as a source of information and learning for guitarists, composers, and scholars in the area of contemporary performance practice; however, it should also prove to be invaluable for guitar teachers. The *Instrucción de Música* by Gaspar Sanz, which was written well over three hundred years ago, 1674/5, is the only work that attempts to reach a similar range of musicians - composers, performers, and teachers.

The foundation for the compositional strategies used in the Volume 2 studies were formed by creating morphological structures, whose principles were expounded in Chapter 5, based on consecutive, merged, and combined morphologies; shaping the spectral content emanating from the chosen set of extended guitar techniques, resulting in a scheme comprising interrelated parts that function sympathetically, falling along the axis of simple to complex. (See pages 192-207.) Consecutive morphologies equate to single line structures, merged to superimposition of similar morphologies that manifest as composite or contrapuntal structures; however, combining contrasting morphologies brings about further expression to the contrapuntal dimension. (See section 2.3.3.)

The music in Volume 2 was composed methodically, using a set of principles that had a pedagogical rationale. Rules that included the restriction of direct hand contact with strings on the fretboard between the head-nut and bridge were adopted; personal directives that took consecutive, merged, and combined morphologies, as well as pitch and noise elements, plus the dichotomy between instrumental technique and controlling tension through manipulating consonances and dissonances into account. Therefore, the extended techniques used were chosen for their adaptive capability when

dealing with left- and right-hand actions, always keeping performance considerations in mind during the composition stage.

Chapters 7 and 8, which relate directly to the *Studies*, provides the basis of a method for guitarists to learn about interpreting music based exclusively on extended techniques. Moreover, the explanations for each study also contain important intrinsic compositional information. (See pages 213 to 314.) Furthermore, knowledge from these two chapters will help the guitarist to gain a deeper understanding of the repertoire examined in Chapter 1 *Historical links* (pages 13 to 120), and the tablature-based systems discussed in Chapter 2 *Notation in the repertoire* (pages 121 to 155).

When relating to sounds that include inherent noise content as part of their spectral makeup, there are three key areas between the music in Volume 2 and existing repertoire (Chapter 1) to consider; seeking to learn about the varied noise to pitch ratio that occurs in most extended techniques, maintenance of sound in relation to spectra and resonance, and the use of tablature to convey noise-biased musical information.²¹⁹

The many cross-references used in this dissertation serve an important pedagogical purpose. For example, when reading the studies explanations in Chapter 7, the guitarist is encouraged to also examine the relevant sections in the historical links Chapter 1, thus connecting performance skills with gaining insights into repertoire outside Volume 2. Moreover, the *connection* column in Figure 2 (pages 22 to 29) forms the foundation for relationships with the morphological structuring principles posited in Chapter 5 *Morphology and morphological structures* (pages 192 to 207); the Volume 2 Studies are based on these ideas. Taking harmonics as one example, when working on natural harmonics studies, the guitarist can also relate to the text in Chapter 1 in various ways. This may be the commentary on Schneider's description of harmonics in *The Contemporary Guitar* (Schneider 1985: 122-136), the action notation as explained by Lehner-Wieternik in *Neue Notationsformen* (Lehner-Wieternik 1991: 35), or the observations about extended technique usage deduced from the information in Figure 2 (Historical links, pages 15, 17, and 22.)

²¹⁹ A full rationale for this notation was closely argued in Volume 1, Chapter 2 and Volume 2, Chapter 6. The purpose of Chapter 2 is to outline how the tablature-based notation used in Volume 2 relates to appropriate repertoire. Whereas explaining the reasoning behind the search for a divergence from the orthodox approach becomes the focus in Chapter 6.

To illustrate the point further, the commonalities within the compositional features of the studies are evident in terms of consecutive, merged, and combined morphologies, and key repertoire. If we take merging morphologies as an example, from Figure 2 it is apparent that Pisati uses merged, campanelas style and natural harmonics in *Sette Studi*, movements II and IV. (See pages 31 and 57.) Merged harmonics that bear a close sonic relationship to Pisati's usage occur in many of the Volume 2 studies, *Natural harmonics study 4: Improvisation 1* for instance. Consequently, learning to play this particular study in Volume 2 will help the player gain further insight into tackling Pisati's guitar music.

In order to engage in the studies in Volume 2, guitarists from all musical backgrounds are encouraged to gain the necessary technical and theoretic knowledge. This is achieved through the all-encompassing approach employed in this research; a guided exploration that connects existing repertoire to the principles mooted in Chapter 5, understanding the notational approach in Chapter 6 and engaging with the performance instructions in Chapters 7 and 8, where emphasis is on listening, and awareness.

One final thought on the theme of relationships. From reading this research it is easy to deduce that extending morphologies is not a new subject. We have seen that compositions including extended techniques are not restricted to the guitar, they also occur on other instruments, and may at times have surprisingly deep historical roots. For example, in the late seventeenth century Biber used snap pizzicati in *Battalia* (1673), which is scored for string orchestra. (See footnote 188.) Bartok also employed the same technique in his *Scherzo of String Quartet no. 4* (1928). (See section 7.5.) In *The Contemporary Guitar* John Schneider explains about how Bartolozzi, as part of an exploration into new playing techniques, discovered woodwind multiphonics in the early 1960s (Schneider 1985: 136). (See section 1.2.)

The chapters on historical links and notation help to contextualize this research to some extent, and they serve the purpose of general background to the other sections that focus on pedagogical issues. Although I have touched on the rich topic of relationships between this dissertation and research into extended techniques usage on other instruments, a more extensive perspective would merit a separate study. (See section 4.1.)

9.2 Expansion of repertoire

There are possibilities for further expansion of morphological combinations. Here are a few suggestions.

Figure 96 shows ideas for producing bi-tones, multiphonic harmonics and snap pizzicati morphologies. This extract opens with a phrase that comprises single morphologies played consecutively. In the second phrase, starting just after 11", resonances from all three techniques are combined. Listen to *sound example, track 101*.

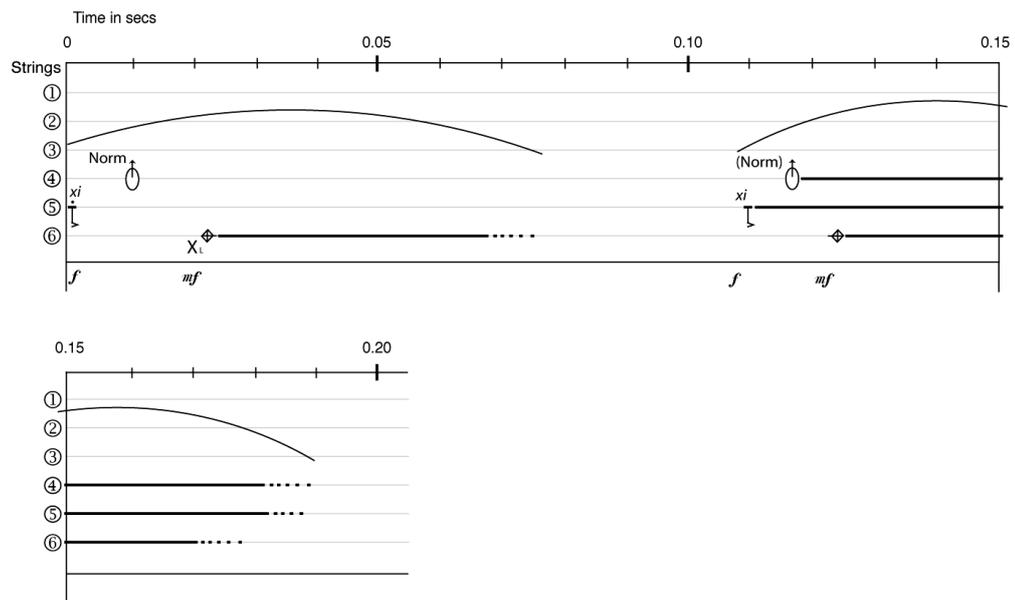


Figure 96: Combining bi-tones, multiphonic harmonics and snap pizzicati morphologies.

It is also possible to combine four techniques. For example, in Figure 97 harmonics, snap pizzicati, soundhole resonances, and pinch mute morphologies are combined. Listen to *sound example, track 102*.

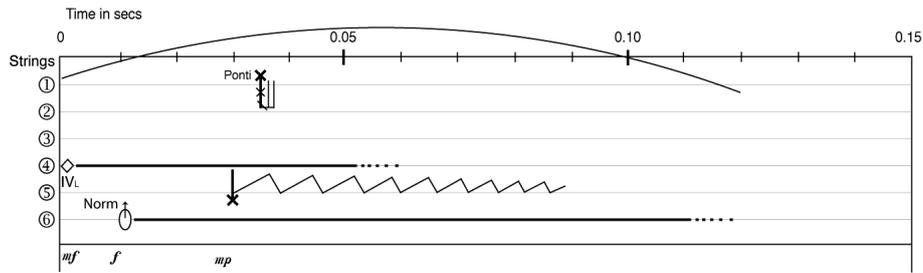


Figure 97: Combining harmonics, snap pizzicati, soundhole resonances and pinch mute morphologies.

Other external devices, besides a bottleneck, may be used to produce morphologies, for example, scraping a double-bass or cello bow across a multiphonic harmonic node point. In Figure 98, bowed morphologies, which consist of two phases - bow being drawn across the string and ensuing resonance - are used to create relations with multiphonic and natural harmonics. The bowed multiphonics produce composite morphologies of E4 and G#5 then B2, D3, G#3, and F4, and harmonics form octave and unison pitch associations during the resonances of the bowed multiphonics - E4 and G#5 from the natural harmonics, then B4, D4 from the plucked multiphonic harmonic, F4 and G#5 from the natural harmonics. Listen to *sound example, track 103*.

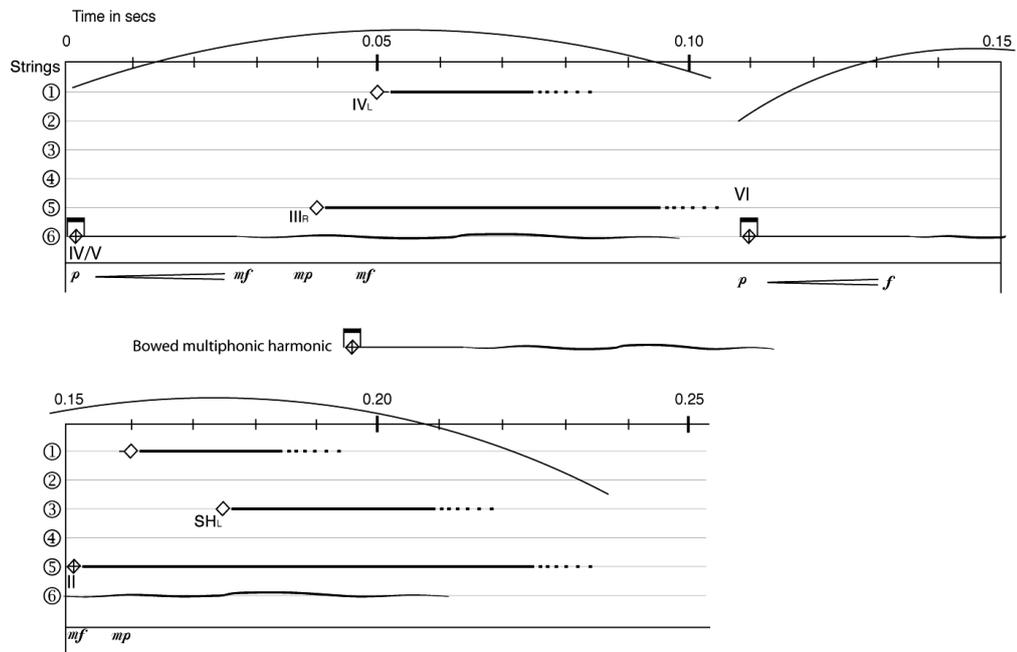


Figure 98: Combining bowed multiphonic harmonics resonances with multiphonic harmonics and natural harmonics morphologies.

More non-standard tunings may be used to explore different pitch relations. For example, *sound example, track 104* consists of multiphonic and natural harmonics across the same fret on the lower three strings, using the cross stroke scordatura from *Cross stroke study*, which form unison and octave arpeggio configurations.²²⁰

A guitarist may wish to improvise freely. Taking a composed section as a starting point is one possible example. *Sound example, track 105* is a free improvisation based on the opening material of *Harmonics, 'snare drum' and pinch mute combined study*. (See section 8.2.2.)

The techniques could be used to add sonic variety in other genres. One example is utilizing natural and multiphonic harmonics as an introduction to a jazz ballad, as in *sound example, track 106*.²²¹ Another example could be to play specific techniques during the spaces in a funk rhythm. In *sound example, track 107* 'snare drum', rapid mute and mute taps are used.

9.3 Combining with other media

The principles used to expound guitar morphology may be used as a basis for considering relationships with other instruments and media. For instance, the pitch-biased attack/decay archetype is common to all plucked and hammered acoustic instruments. Therefore, textures based on similar and contrasting archetypal morphologies may be explored. Taking natural harmonics as an example, harp and guitar morphologies will possess commonality because their string lengths are set in motion by being plucked. However, forming connections between plucked guitar harmonics and a tuned percussion instrument like a marimba, where the morphology is set in motion by a beater on wood, would inevitably produce a more contrasting texture.

With the further expansion of guitar morphologies in mind, there are possibilities of combining with electroacoustic sounds or live electronics. During the early stages of research, three studies for guitar and electroacoustic sounds were composed. Guitar samples from relevant techniques were manipulated and processed, forming relationships with the acoustic

²²⁰ E2, E2, E3, G3, B3, and E4.

²²¹ Derek Bailey often used higher and multiphonic harmonics in his improvisations. *Body and Soul* from the album *Ballads* (2002) is an example.

morphologies.²²² *Sound example, track 108* is a recorded performance of a study by the author, based on rapid mute morphologies.²²³ (The score may be found in Volume 2, from page 329). The results and experience gained from this activity helped to form the basis for this research, in particular the processes involved when combining morphologies, notational concepts, and perception of dynamic range possibilities. Moreover, by constructing modules using MaxMSP patches, it was possible to begin experimenting with real-time processing of live guitar morphologies.²²⁴ *Sound example, track 109* is a recorded extract from one of the initial sessions; performed harmonics and ‘snare drum’ morphologies trigger delays and filters. This proved to be influential in the development of improvisational principles, for example constructing phrases based on initial ideas and finding consonant and dissonant pitch relations within the texture.

A number of the guitar morphologies used in Volume 2 reflect qualities found in electroacoustic music. For example, multiphonic harmonics may be employed to explore relationships with transformations of bell morphologies; both possess inharmonic spectra. Moreover, some archetypal variants sound as if they have been passed through filters; pinch mute morphologies can sound as if a band-pass filter has been applied, and mute tap (long) can give a bandwidth filter impression. Viewing extended guitar techniques in this morphological manner allows us to consider the sounds themselves as points of departure in composition; sound event becomes the foundation for a compositional structure.

9.4 Amplification

As the transmission of spectral content in a performance environment is essential, a practical solution for delivering morphological detail is to use amplification. Note that to enable the performer to hear clearly, a close proximity monitor mix that corresponds to the main speaker mix should be used.

As well as broadening dynamic range, amplification will help assist both performer and audience to apprehend softer morphologies. For example, it is essential to hear the soft and subtle preparation phase of ‘snare drum’

²²² Performed by the author.

²²³ *Rapid mute study for guitar and electroacoustic sounds* (2003) by Martin Vishnick.

²²⁴ *Max MSP* is a graphical development environment for music and multimedia, developed and maintained by San Francisco-based software company Cycling '74.

morphologies or the decaying spectral activity of palm resonances. (See Figure 51: 3 and 4.)

When rehearsing and performing, the guitarist is encouraged to experiment with an array of strategically placed microphones and to include local control. Figure 99 is the result of studio experimentation for recording and live performance, showing a set-up using six microphones and a six-channel mixer.²²⁵ Although at first an alien environment, most performers will soon be at ease with this system.

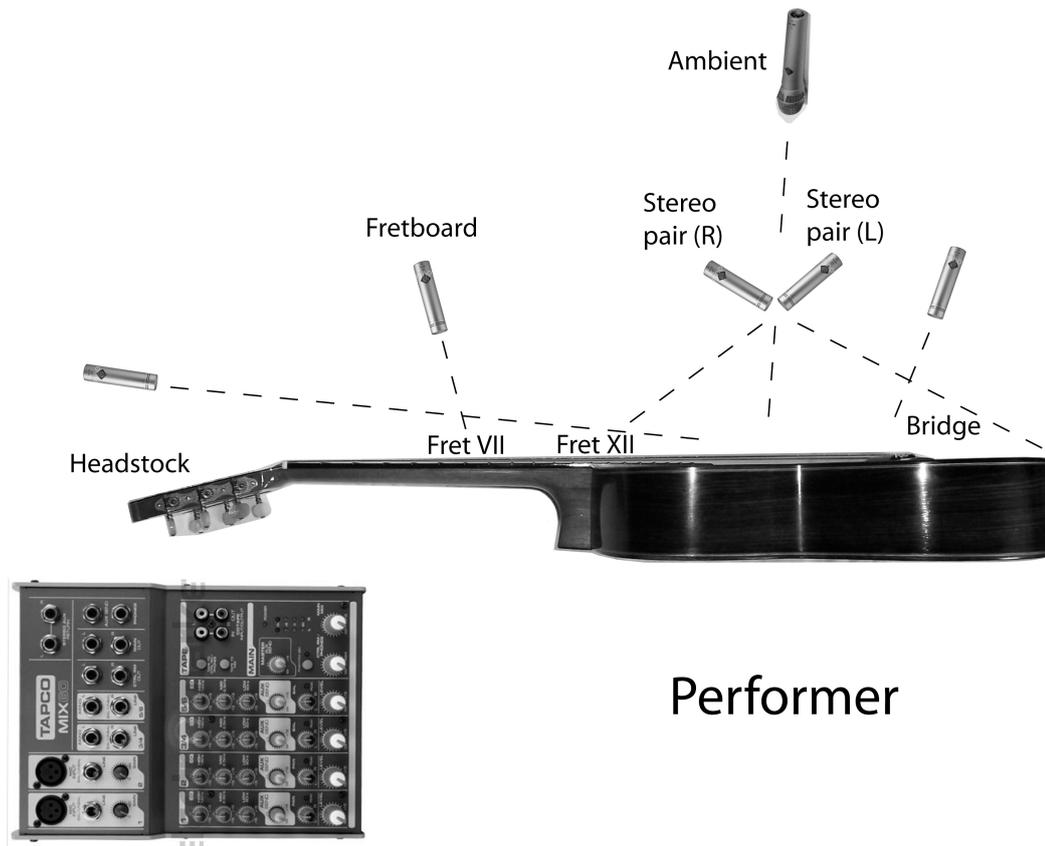


Figure 99: Performance set-up.

9.4.1 Microphones

The stereo pair, fretboard and bridge microphones are placed 40 cms from the instrument, a microphone near the headstock at 20 cms and ambient microphone 120 cms at a height of approximately 72 cms.²²⁶ Each microphone should be aimed at a particular area. For example, the end of the guitar, or just past, for stereo pair (R) – fret XII for stereo pair (L) – fret VII for fretboard – bridge – and fret XII for headstock.

²²⁵ For my experiments, Neumann MK184s were used.

²²⁶ All microphone settings are approximate.

9.4.2 Mixer

The mixer is positioned near the performer's left hand. To enable the dynamic level of each microphone to be controlled, each microphone is allocated to a mixer fader. Fader positions may be set before each piece and, if necessary, finely tuned during performance at appropriate places; a pause for example. Before each performance the sound is tested for morphological clarity. For example, the detail of very soft morphologies should be audible throughout the performance space and the impact from very loud morphologies not too overpowering.

In regard to setting microphone panning on the console, the following should be a useful guideline; stereo pair (R) panned hard right, stereo pair (L) hard left, fretboard half-left, bridge half-right, and ambient centre. The headstock microphone, which will help to emphasise the upper partials in *tapping* morphologies, is panned half-left. This arrangement will convey a broad and balanced image and can trace any left or right-hand movement; for example, *ponti* to *tasti* rapid mute configurations.

Figure 100, which is divided into three columns, offers guidelines as to which faders should predominate. For example, to bring out harmonics morphologies, the fretboard and bridge microphone faders should dominate. Although the others may be used, care should be taken regarding right-hand attack noise. Note that the ambient microphone fader level remains constant for all techniques.

Techniques	Microphones	Notes
Natural and multiphonic harmonics	Fretboard and bridge	Regarding intensity of right-hand attack noise, take care with the stereo pair fader levels.
Bottleneck	Stereo pair, fretboard, bridge and headstock	Enabling an even response of glissando movement. Consider attack noise level from plucked morphologies when using the stereo pair.
Snap pizzicati	Stereo pair microphone 1 and fretboard	Regarding attack noise from string bounce on fretboard, pay attention to stereo pair microphone 2 fader levels.
Cross stroke and cross stroke (scordatura)	Stereo pair	To bring out cross stroke multiple attacks. For cross stroke (scordatura), take care with extraneous noise from turning the tuning keys.
'Snare drum'	Stereo pair and fretboard	Stereo pair is used for the attack and resonance phase, fretboard to enhance the preparation and release phases.
Soundhole	Stereo pair and bridge	To bring out attack mode and vibrati.
Tapping, bi-tone	Stereo pair, fretboard and headstock	To enhance bitonality.
Tapping, mute	Stereo pair microphone 2, fretboard and headstock	Revealing the pitch content of upper bi-tones.
Nut-side	Stereo pair microphone 2, fretboard and headstock	
Rapid mute	Stereo pair, fretboard, bridge and headstock	Enabling an even response from left- and right-hand movement.
Pinch mute	Stereo pair, fretboard and bridge	

Figure 100: Guidelines for setting mixer faders.

When combining techniques, microphone usage will result in a compromise. For example, when ‘snare drum’ (stereo pair and fretboard) and snap pizzicato (fretboard and stereo pair microphone 1) are combined, noise from the snap pizzicato attack needs attention. To compensate, the fader for stereo pair microphone 2 is attenuated.

9.5 Final comments on present and future

Guitar morphologies that emanate from the extended techniques used in Volume 2 exist as archetypes or variants that unfold in time; pitch material occurs as either linear or refracted. In the studies, morphologies are treated as sound objects that engender a spectral continuum. The music is based on the idea of strategically placing and integrating morphologies in a temporal setting.

Until now there has been no contemporary guitar literature that seeks comprehensively to 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.²²⁷ 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, it’s contents are aimed at broadening current thinking. The intention has been to provide a thorough understanding of the morphology of guitar sounds. This is achieved by a detailed explanation of relevant historical links and the soundworld that exists in the studies.

The historical links section covers appropriate guitar repertoire and significant research, presenting a framework for understanding the existence of and reasoning behind the studies. The discussion ranges from early music influences to usage of extended techniques in recent works and writings. Moreover, exploration of existing notations leads to comprehending the system used in Volume 2, which challenges conventional usage.

The soundworld of the studies includes these archetype and variants models, methods for evaluating guitar sounds, and how integrating morphologies may form the basis for composing pieces. Of the eleven groups of techniques used, four techniques within the groupings are new ones – ‘snare drum’ lateral glissando, ‘snare drum’ slide glissando, soundhole resonance (buzz), and pinch

²²⁷To the best of the author’s knowledge.

mute. However, although natural and multiphonic harmonics, bottleneck, snap pizzicato (long) and snap pizzicato, nut-side, cross stroke, ‘snare drum’, soundhole resonance (palm, fist, or thumb), tapping (bi-tone) and tapping (mute), and rapid mute have been extensively developed, their origins lie in previous times.

The two sets of studies at the core of Volume 2, which consist of consecutive, merged, and combined morphologies, form a repertoire of pieces designed to help the guitarist develop the necessary skills based on the principles expounded in the morphology section. (See Chapter 5, and Chapter 7 to chapter section 8.2.4.) For the first set, where the focus is on individual techniques that are organised as consecutive or merged, the explanation always related to the underlying principles established in this research. Where relevant, details of the following were covered - historical links, performance advice, and improvisatory suggestions. Techniques are combined in the second set. Here the guitarist concentrates on the connections between pitch and noise orientation and the use of consonant and dissonant pitch relations.

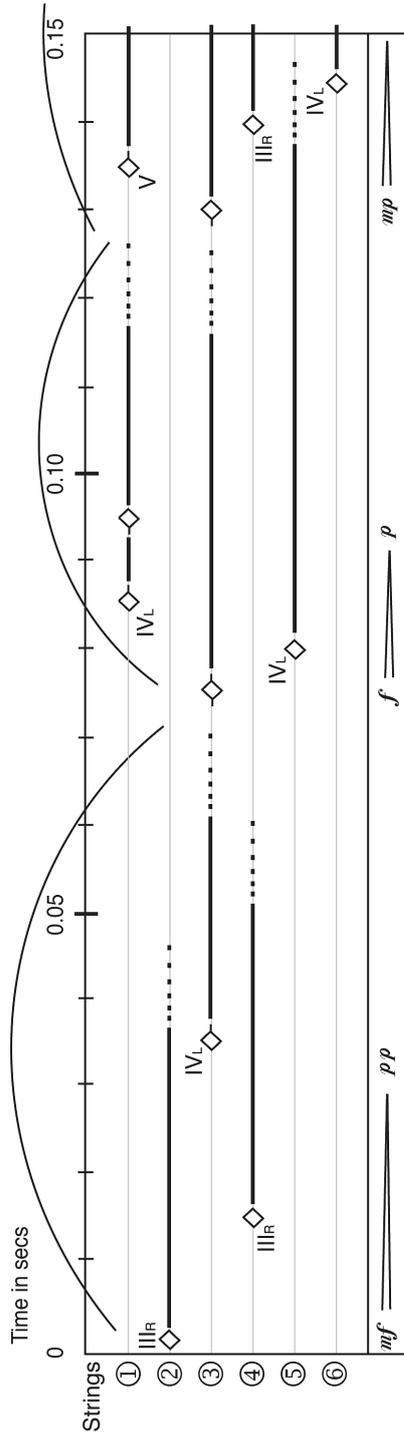
As well as reflecting on musical relationships found during the research process, possibilities for further research and use of amplification as an aid to expressing morphological detail are discussed in the concluding section. (See Chapter 9.) This includes expansion of repertoire by using further combinations of techniques, employing other external devices, and combining with other media (electroacoustic sounds or live electronics for example). One immediate development in the near future is to try these ideas on other instruments (electric guitar for example), and identify other soundworlds into which these extended morphologies could be integrated.

In order to establish the validity of this research, it remains to test the music. Initial feedback from professional guitarists has been encouraging. (See footnote number 95.) Moreover, when talking about the notation system and compositional quality in Volume 2, Alan Thomas observed: “If you and other composers using your system create compelling works that guitarists want to play and audiences want to hear, by definition that proves the validity of the system”.²²⁸ The operative word is ‘if’, and it remains the challenge, although

²²⁸ Taken from correspondence on 6/2/12. Alan Thomas is a well-known exponent of contemporary guitar music.

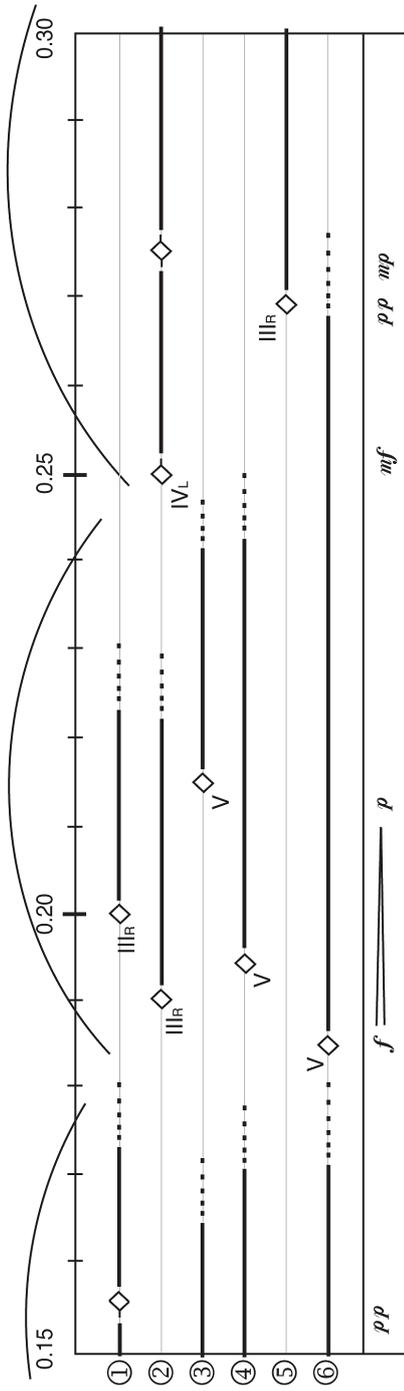
preliminary feedback is encouraging. My purpose is to use this work to seek out guitarists and composers and encourage them to explore this sound repertory whether in pieces for solo guitar or in an ensemble context. I have done this already to some extent, and will continue to do so as this project develops beyond the PhD stage.

Natural harmonics study 1: Dynamics
Page 1



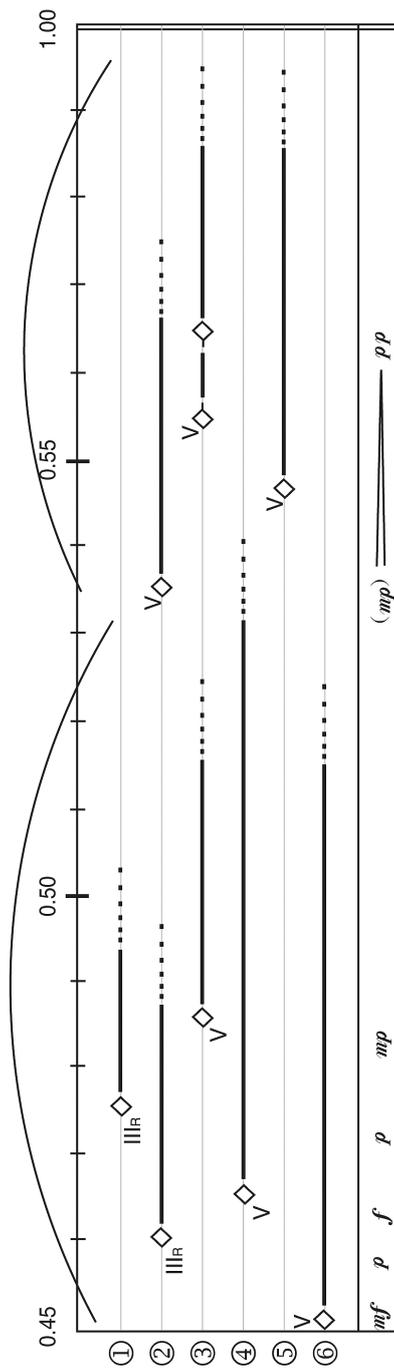
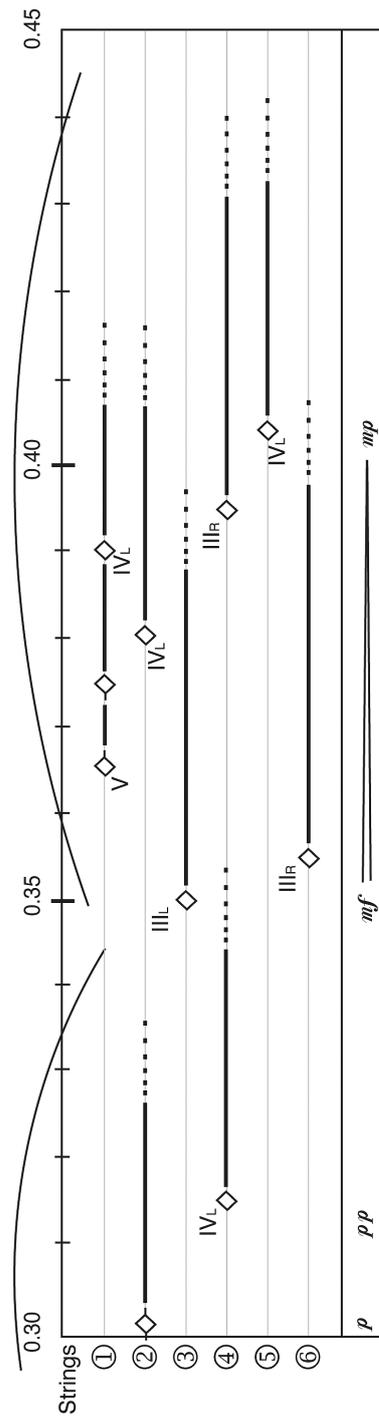
Strings, frets, and pitches key
 ① III_r B₆ IV_l G_{#6} V E₆ ④ III_r A₅ IV_l F_{#5} V D₅
 ② III_r F_{#6} IV_l D_{#6} V B₆ ⑤ III_r E₅ IV_l C_{#5} V A₄
 ③ III_r D₆ IV_l B₅ V G₅ ⑥ III_r B₄ IV_l G_{#4} V E₄

◆ Natural harmonic that is repeated
 ◆ Let morphology resonate naturally



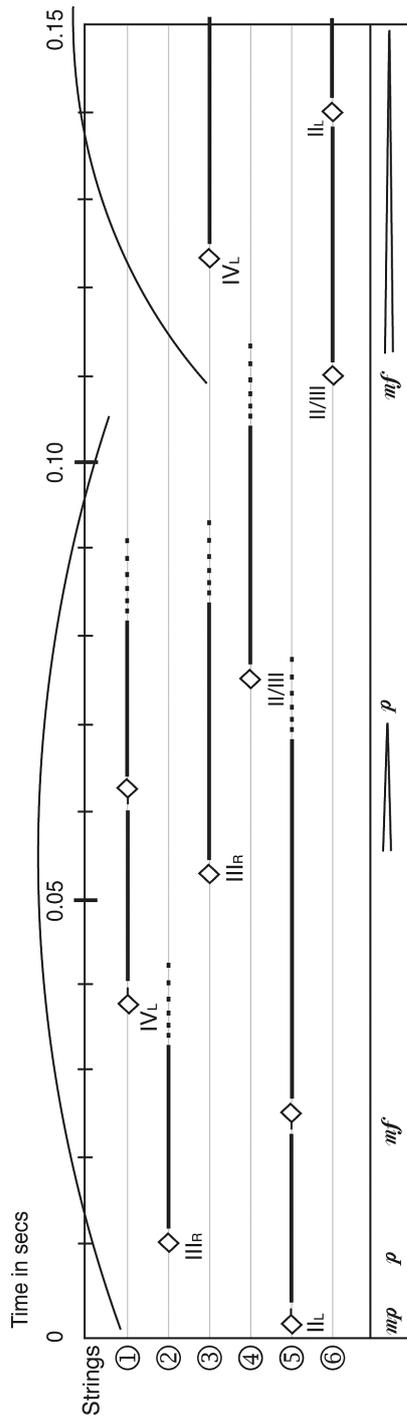
Sound example, track 18: Realisation of the opening 13"

Natural harmonics study 1: Dynamics
Page 2



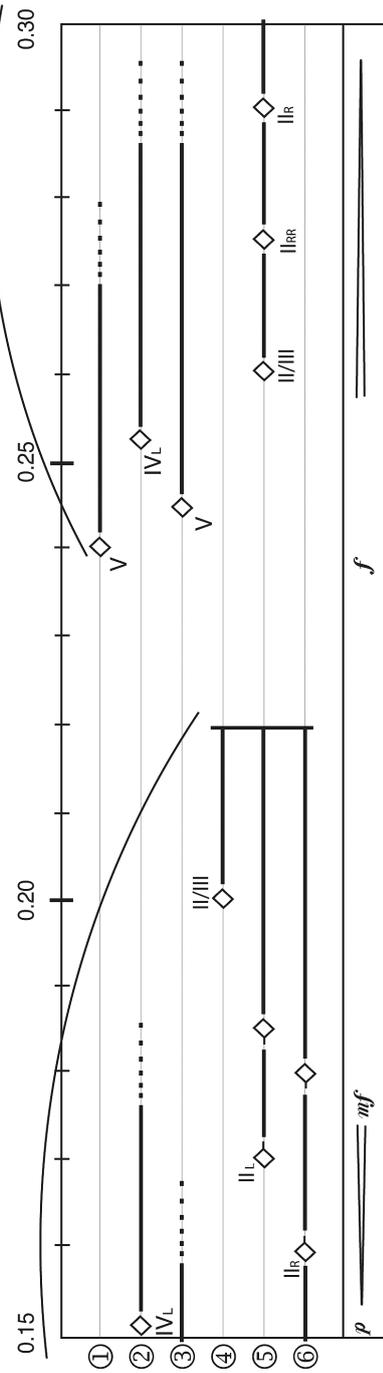
Sound example, track 19: Realisation of phrase starting at 45"

Natural harmonics study 2: Longer phrases
Page 1



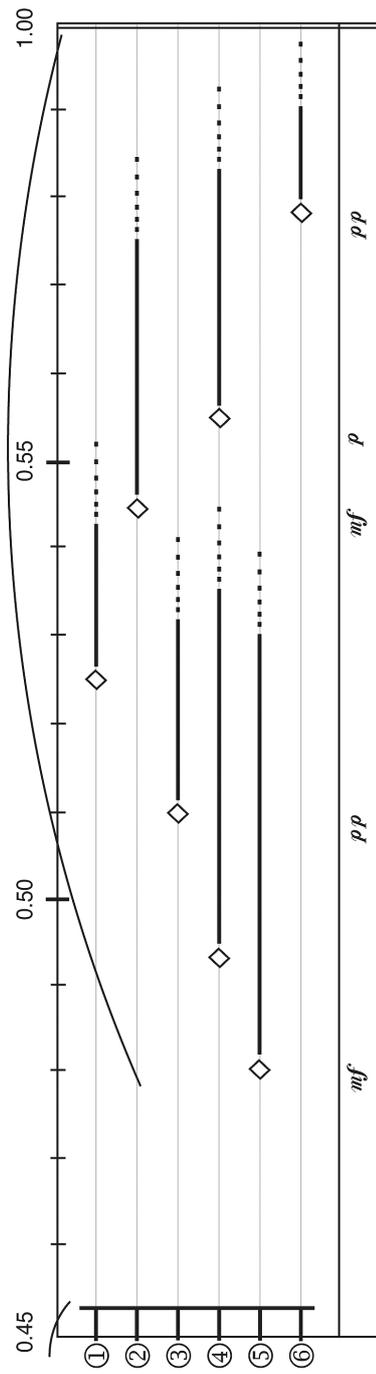
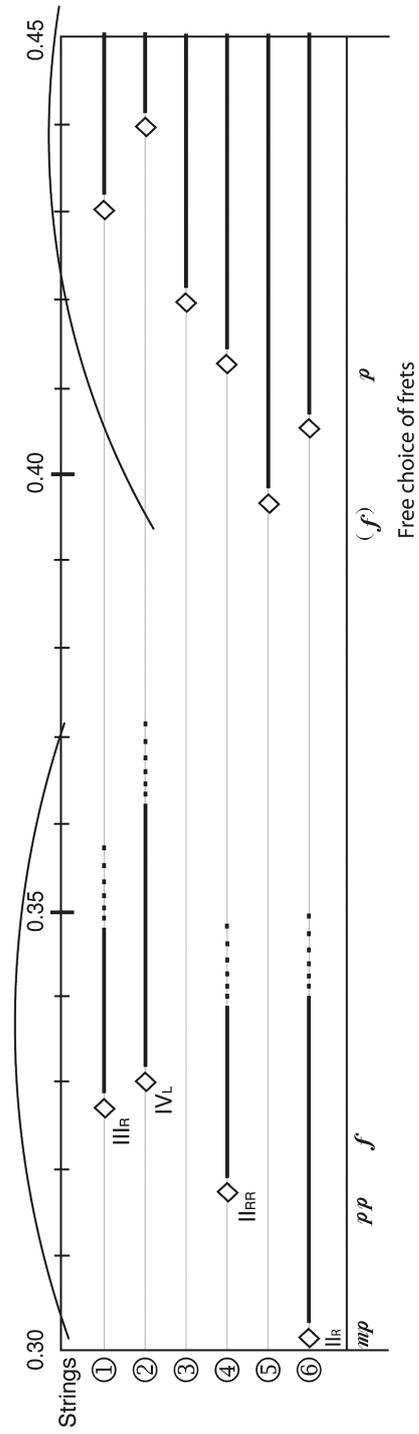
Adding higher harmonics on lower strings
Strings, frets, and pitches key

④ I/II A₆ II_L G₆ II_L F₆ II_{RR} E₆ II_R D₆ II/III C₆
 ⑤ I/II E₆ II_L D₆ II_L C₆ II_{RR} B₅ II_R A₅ II/III G₅
 ⑥ I/II B₅ II_L A₅ II_L G₅ II_{RR} F₅ II_R E₅ II/III D₅



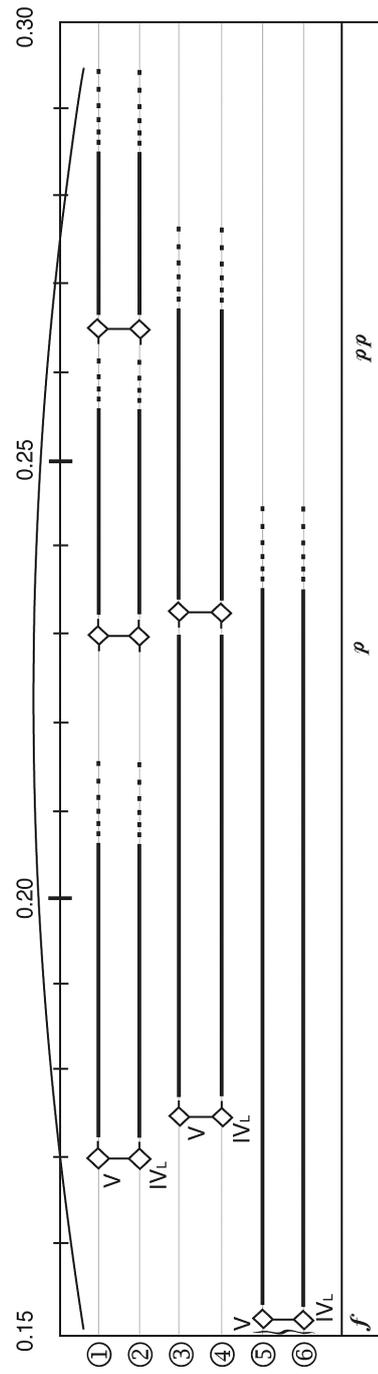
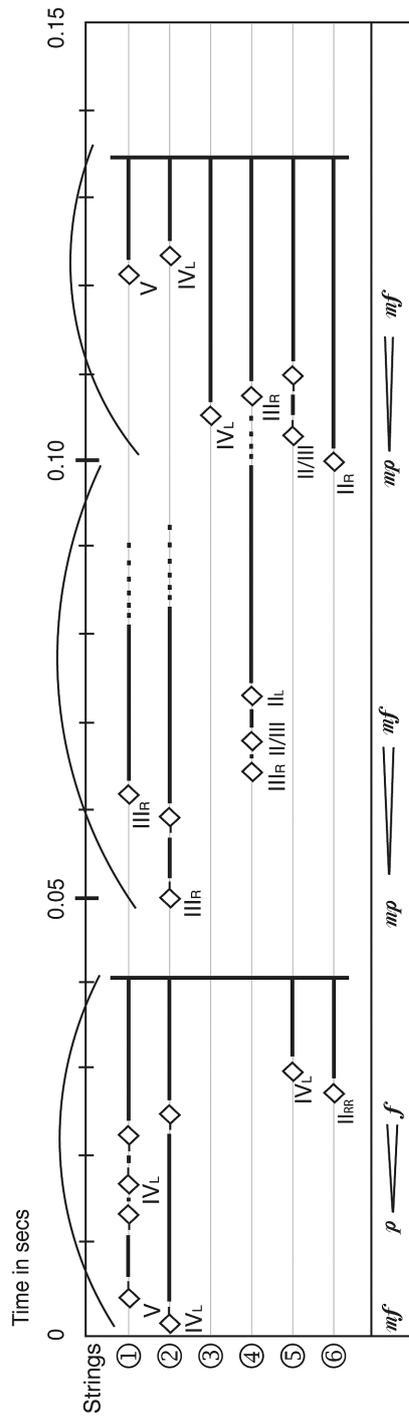
Sound example, track 20: Realisation of the phrase between 11" and 22"

Natural harmonics study 2: Longer phrases
Page 2



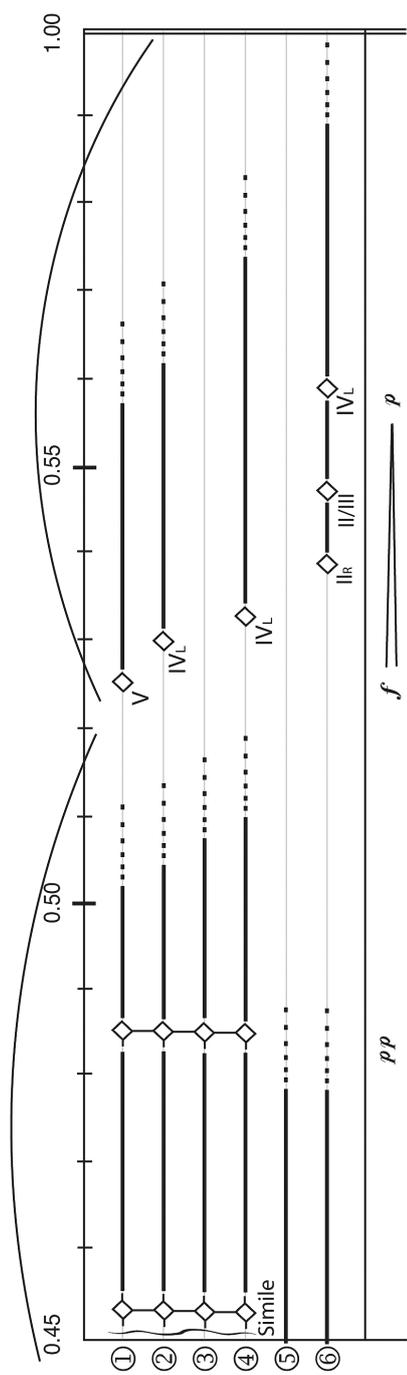
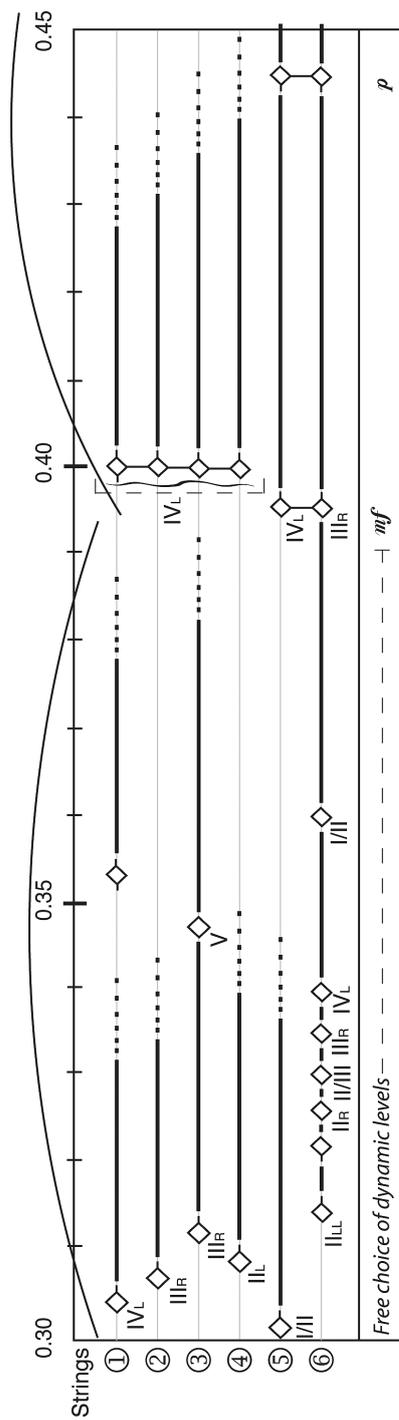
Sound example, track 21: Realisation of the phrase between 39.5" and 45"

Natural harmonics study 3: Arpeggios, interruption and echoes
Page 1

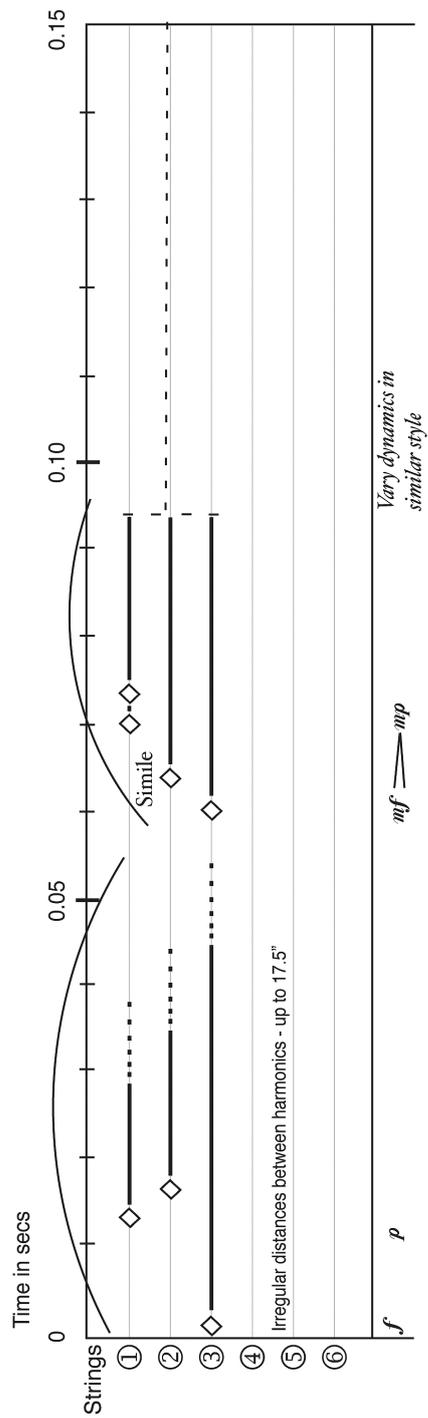


Sound example, track 22: Realisation of the section between 10" and 30"

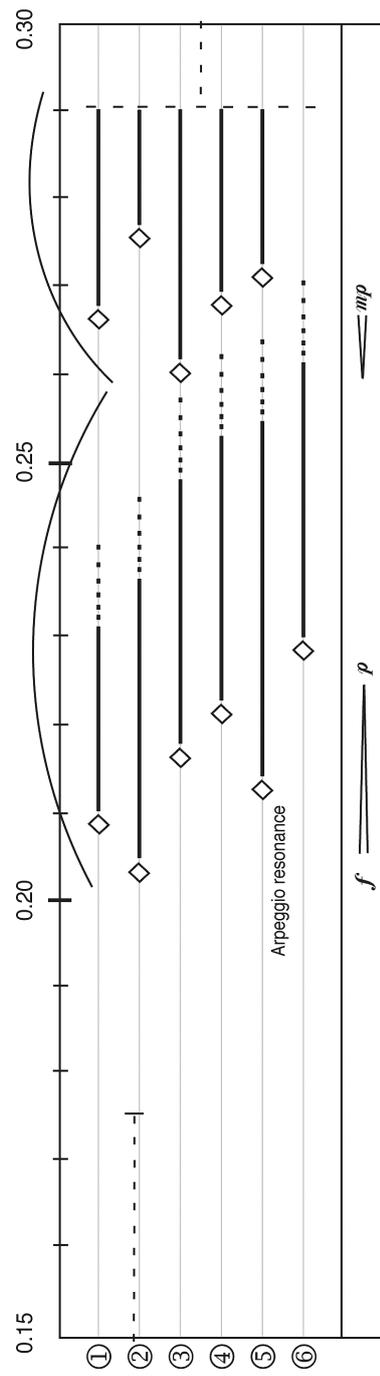
Natural harmonics study 3: Arpeggios, interruption and echoes
Page 2



Natural harmonics study 4: Improvisation 1
Page 1

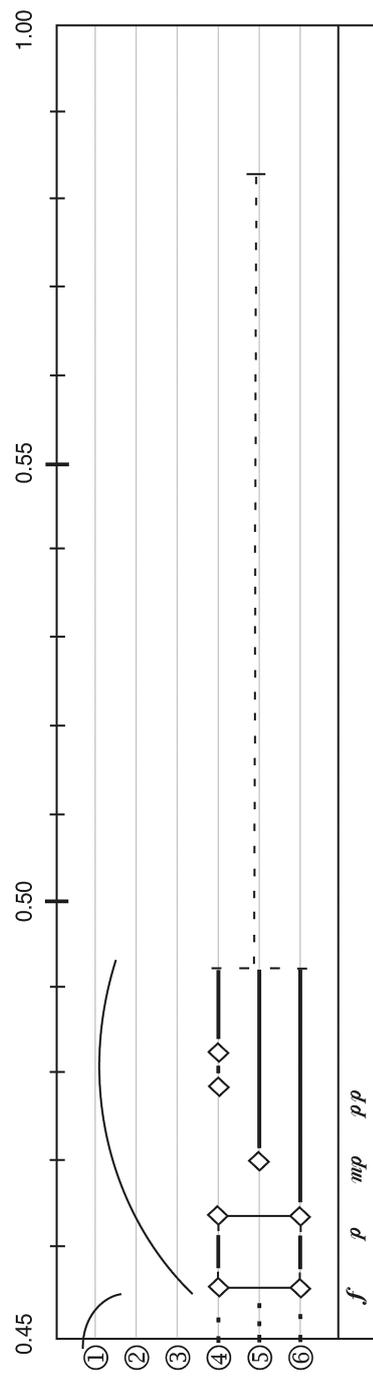
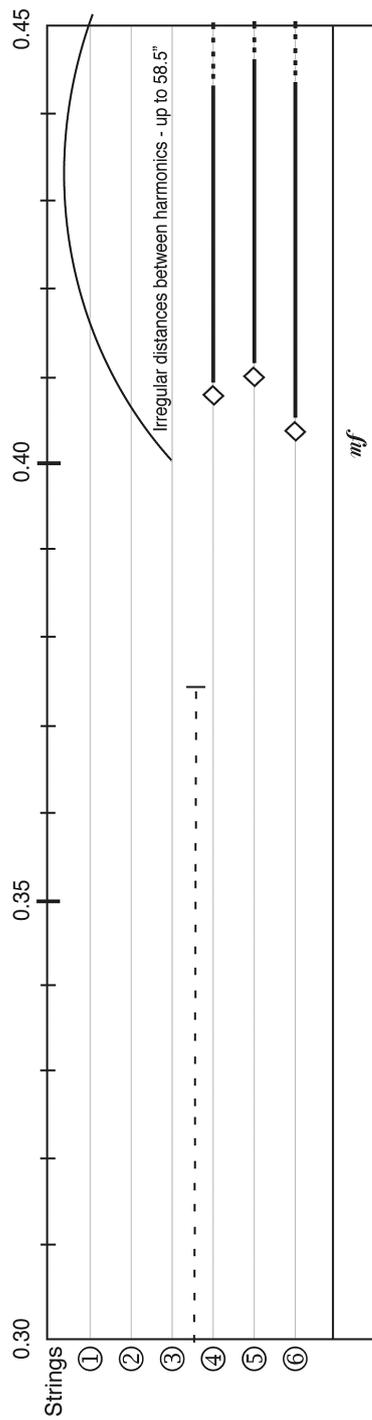


Free choice of frets
- - - - - | Improvise using the given material and ideas.
The vertical line indicates stop.

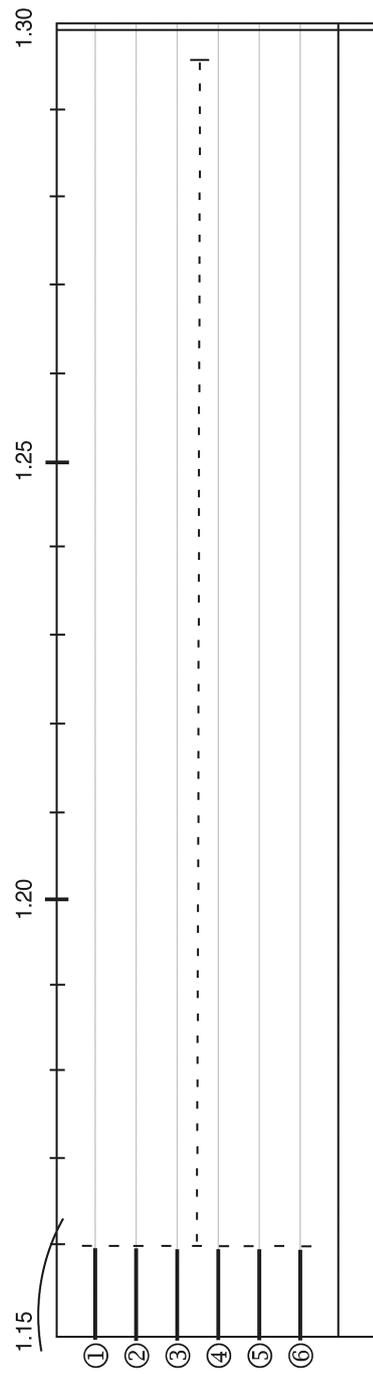
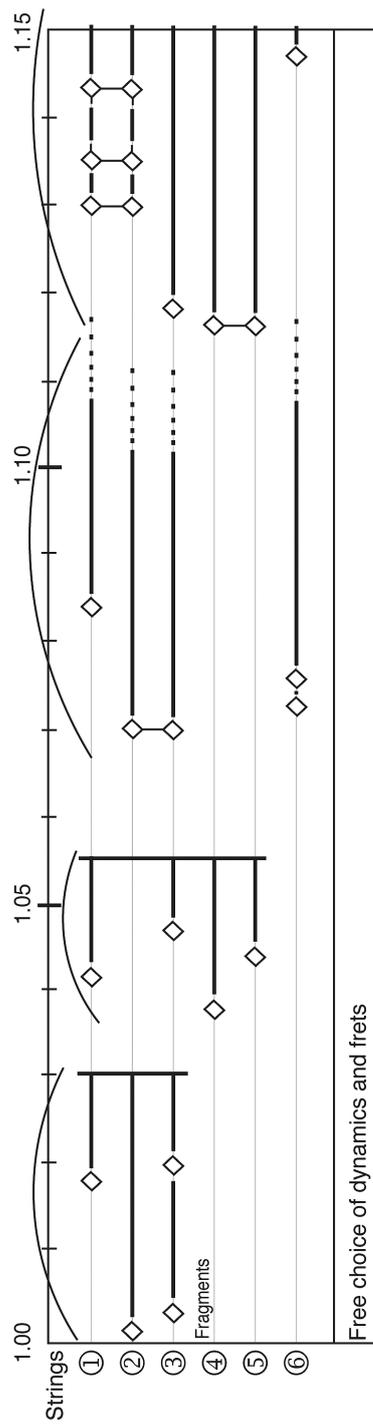


Sound example, track 23: Opening section (with improvisation)

Natural harmonics study 4: Improvisation 1
Page 2



Natural harmonics study 4: Improvisation 1
Page 3



Natural harmonics study 5: Improvisation 2
Page 1

Timescale = approx. 1 min for this box

Strings

①
②
③
④
⑤
⑥

Sempre decel

p Poco a poco cresc

f mp mf pp

Always vary dynamics

Free choice of frets - use the whole range

①
②
③
④
⑤
⑥

Note that boxes may be played in any order and as many times as the performer wishes.
When a box is repeated, however many times, the performer should strive to improvise on the given material.

Sound example, track 24: Opening section (with improvisation)

Natural harmonics study 5: Improvisation 2
Page 2

Timescale = approx. 30 secs for each box

Strings

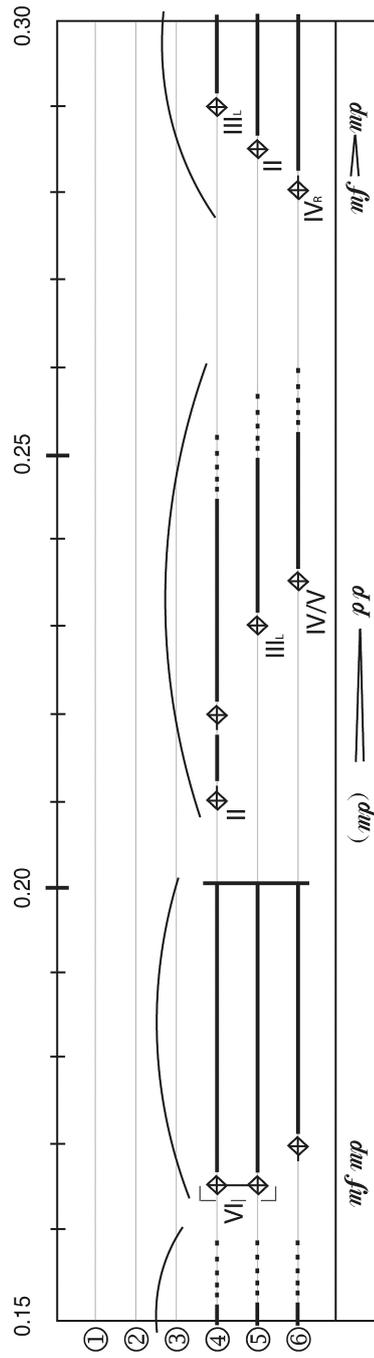
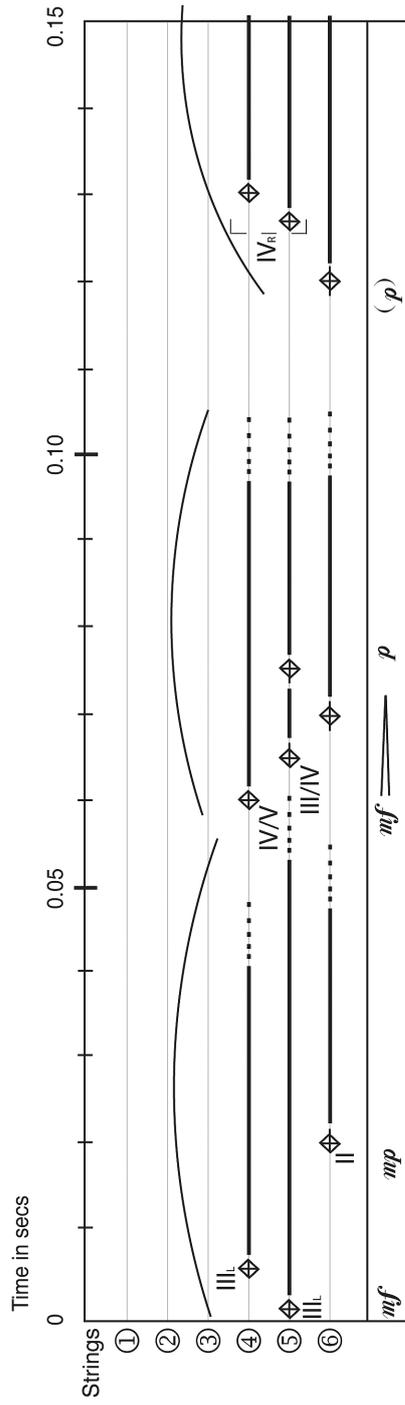
① IV_L
② IV_L
③ III_R
④ II_R
⑤ II_R
⑥ II/III

Free dynamics

① $Languid$
② $Energetic$
③ $Languid$
④ $Energetic$
⑤ p
⑥ $Free\ dynamics$

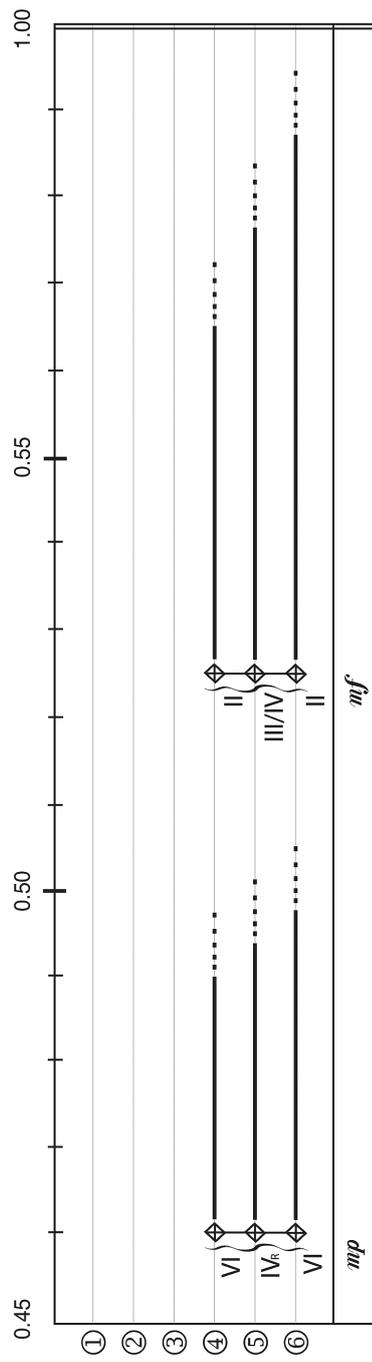
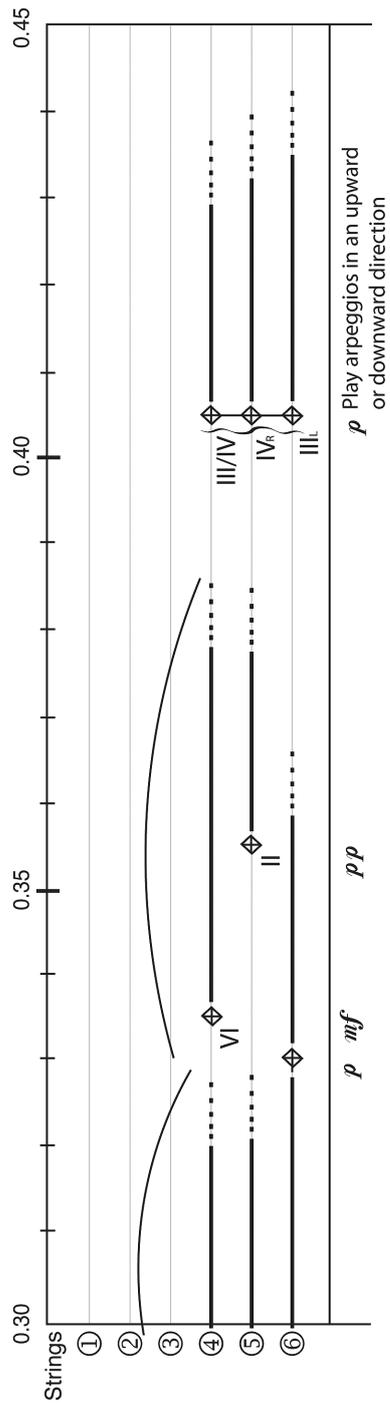
Free choice of frets

Multiphonic harmonics study 1: Simple patterns
Page 1

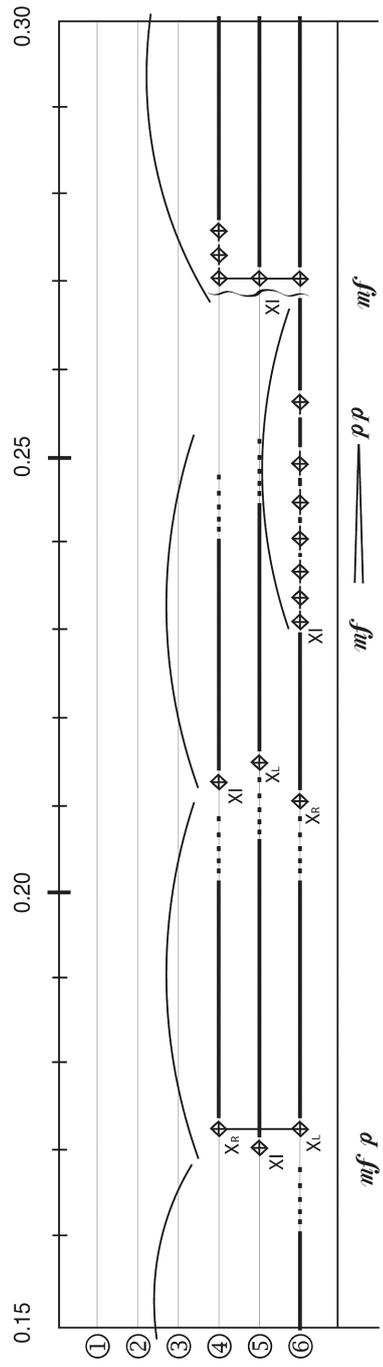
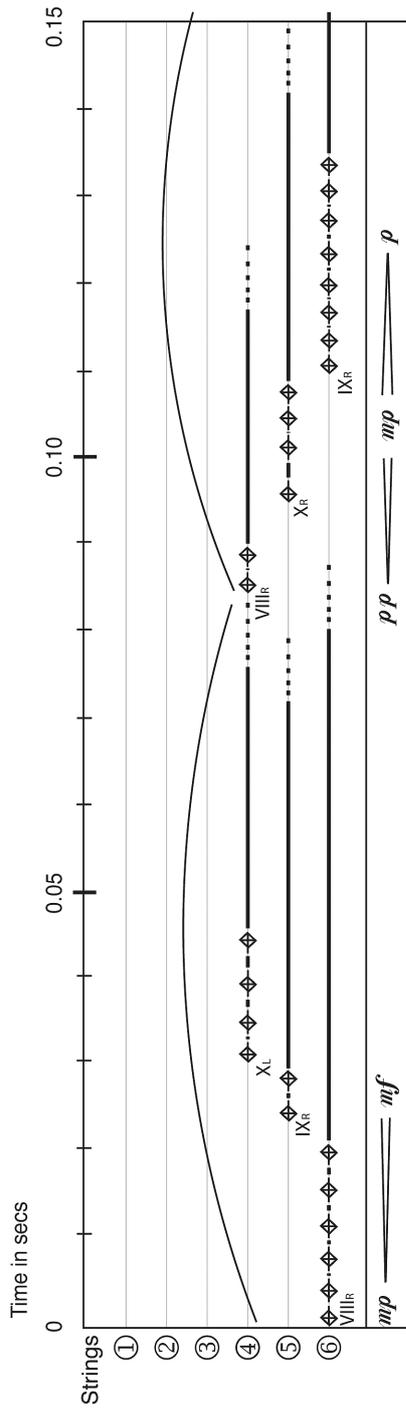


Sound example, track 26: Realisation of Figure 56 (opening phrase)

Multiphonic harmonics study 1: Simple patterns
Page 2

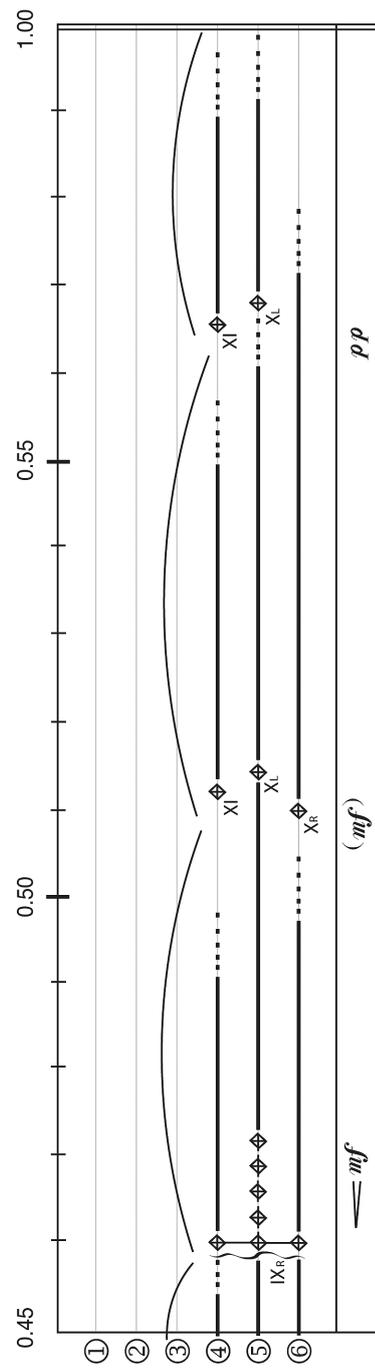
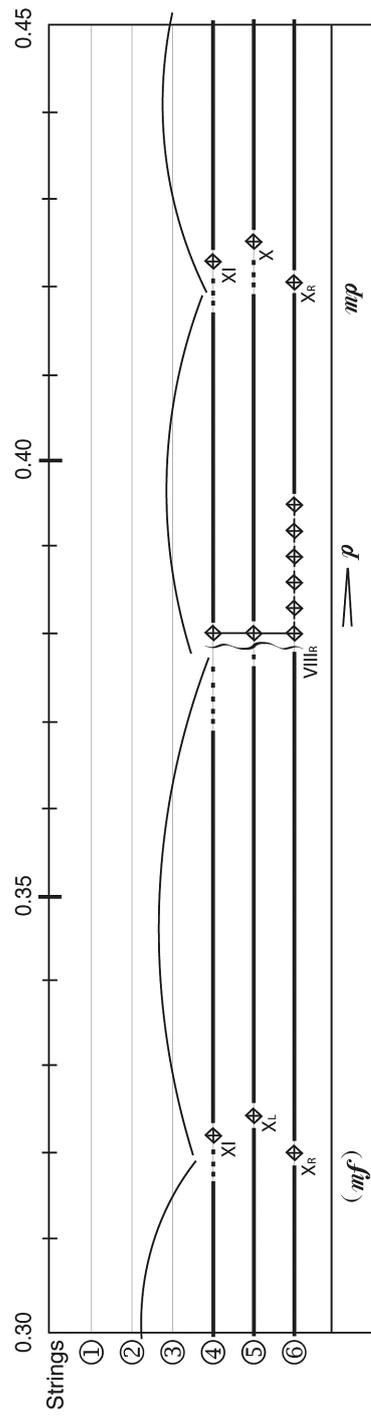


Multiphonic harmonics study 2: Iteration and periodicity
Page 1



Sound example, track 27: Realisation of opening phrase

Multiphonic harmonics study 2: Iteration and periodicity
Page 2



Multiphonic harmonics study 3: Improvisation
Page 2 - Box 3

Timescale = approx. 1 min for this box

Echoes and periodicity

Strings

①
②
③
④ VI VIII_R
⑤ VII_R (IX_R) (VI) (VII_R)
⑥ IX_R VI VIII_R (IX_R) (VI) (VII_R)

mp *p* *mf* *pp* *pp* *pp*

Left-hand fingering - finger 1 on fret VI, finger 3 on VIII_R, and finger 4 on XI_R.

(VIII_R)
mp *p* *pp*
simile (IX_R) (VI) *pp*

Sound example 30: Realisation of Box 3

Multiphonic harmonics study 3: Improvisation
Page 4 - Box 6

Timescale = approx. 30 secs for this box

Strings

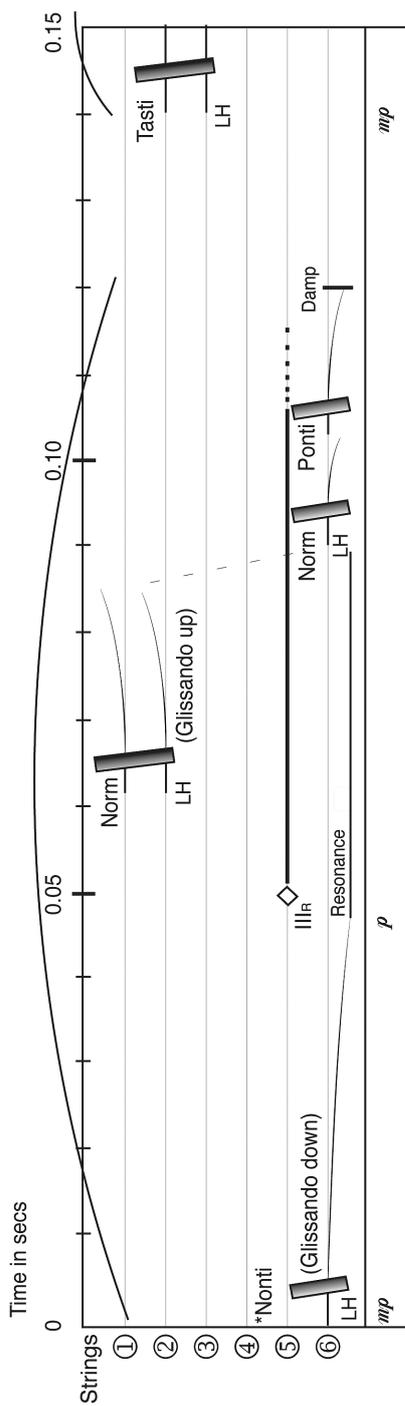
①
②
③
④
⑤
⑥

mp *p* *mf* *p* *mf*

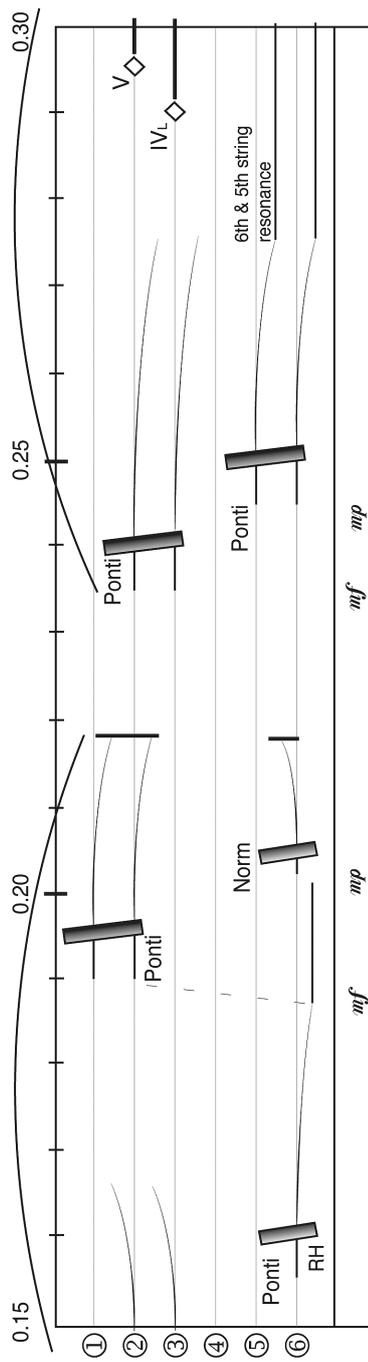
Free choice of all frets

Sound example, track 33: Realisation of Box 6

Bottleneck study
Page 1

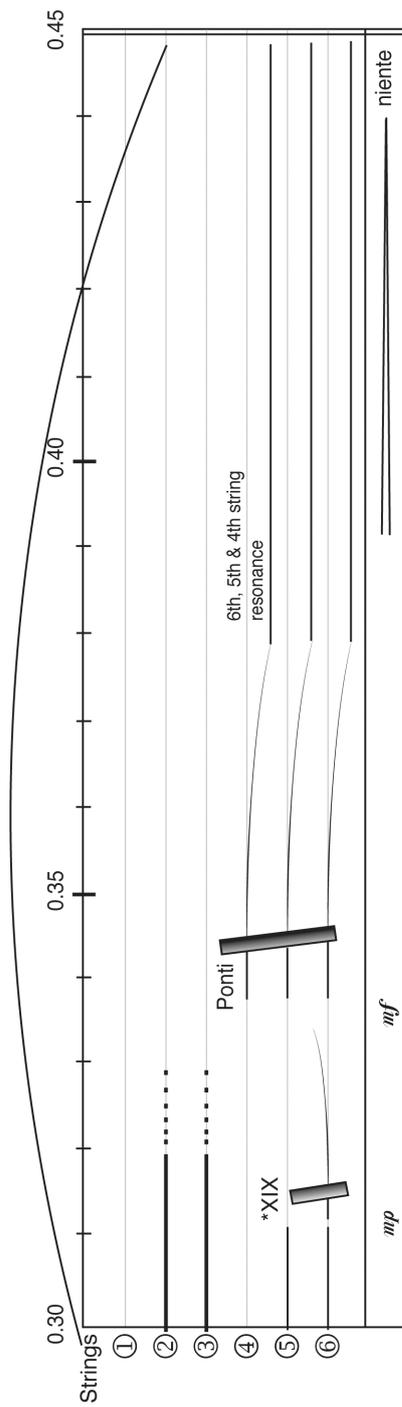


*Poniti, norm, and tasti indicate start points



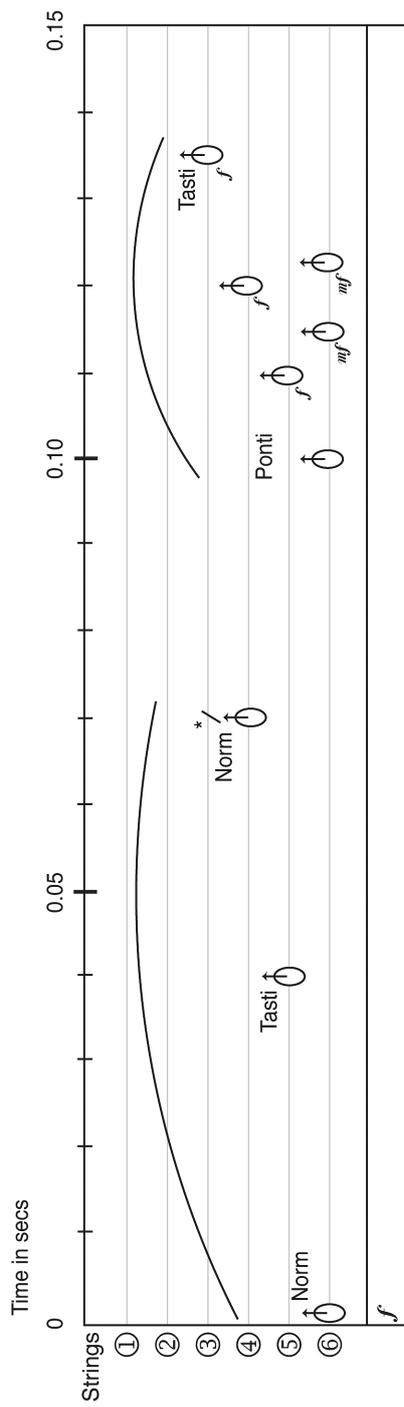
Sound example, track 38: Realisation of the closing phrase

Bottleneck study
Page 2

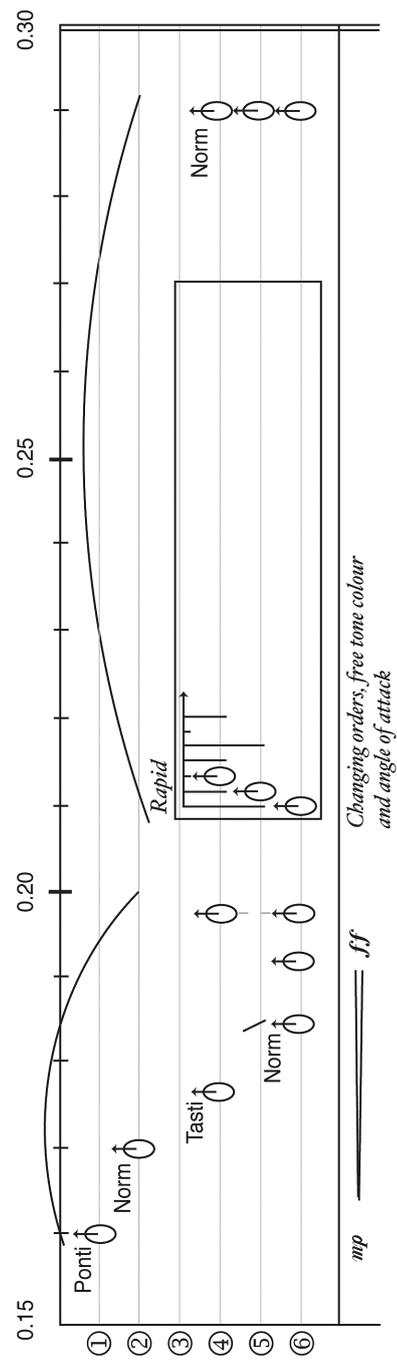


N.B. The pitches of the two harmonics (at 29" and 29.5") are B₅,
node point XIX on string 6 is B₃.

Snap pizzicato study

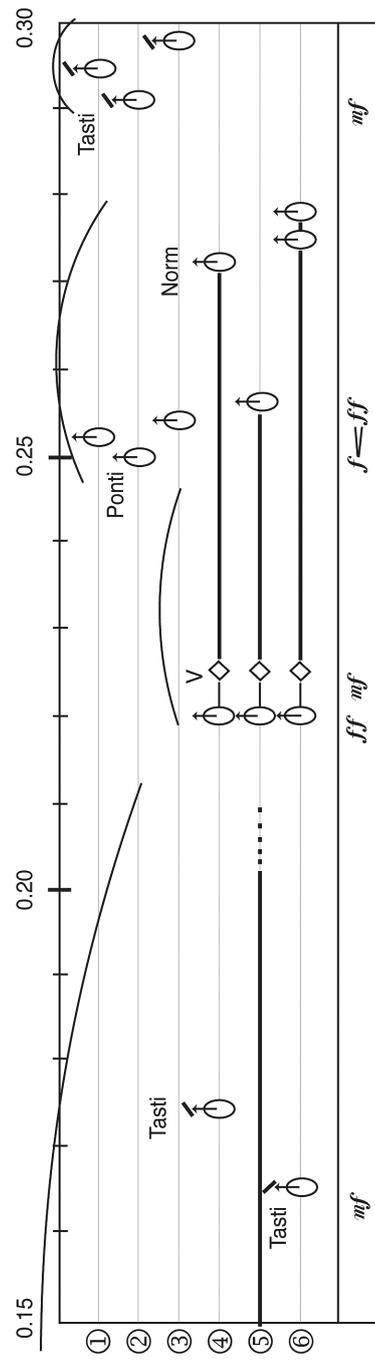
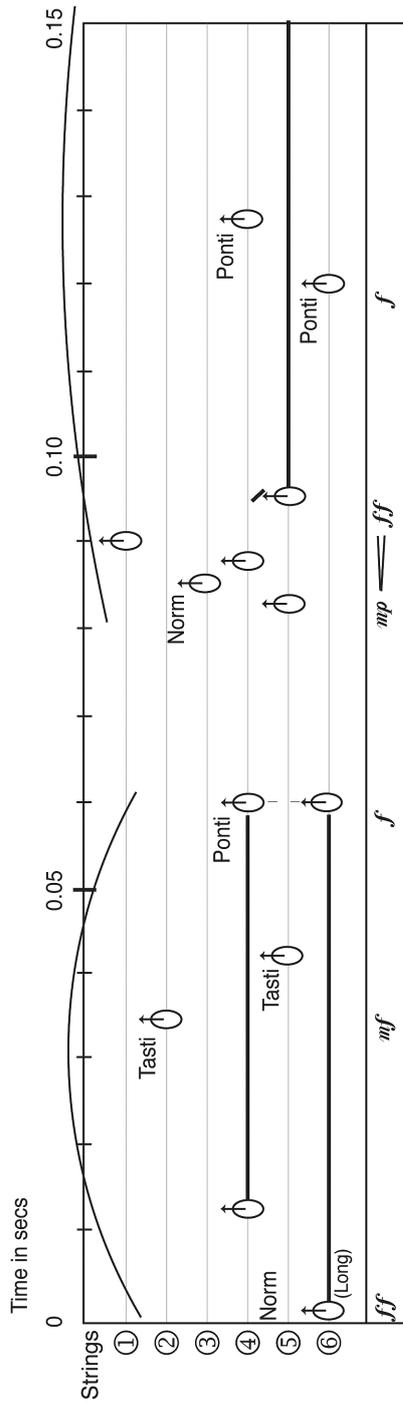


* angle of attack - \ upwards release or / downwards release. (See Volume 5.5.3, page 175.)



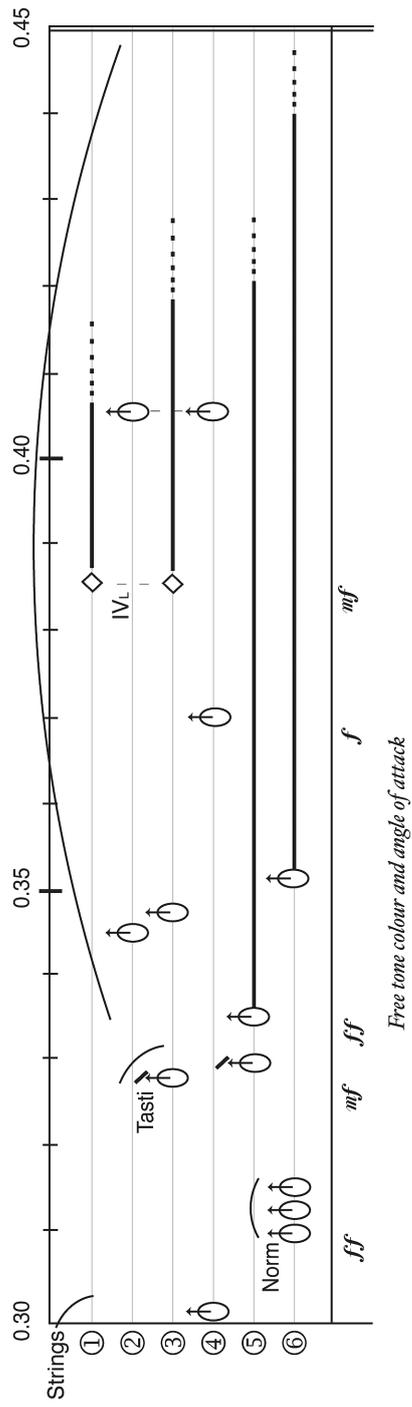
Sound example, track 43: Realisation of the opening two phrases

Snap pizzicato (long) study
Page 1



Sound example, track 44: Realisation of the first 25"

Snap pizzicato (long) study
Page 2



Cross stroke study
Page 1

Timescale = approx. one minute for the two boxes

Strings

① V p

② mp simile

③ L.V. mp

④ mp Ilrr mp V pp

⑤ mp mf

⑥ f

Tuning - E, A down to E, D up to E, G, B, E

① V mf

② mp

③ mf

④ mf

⑤ p mp

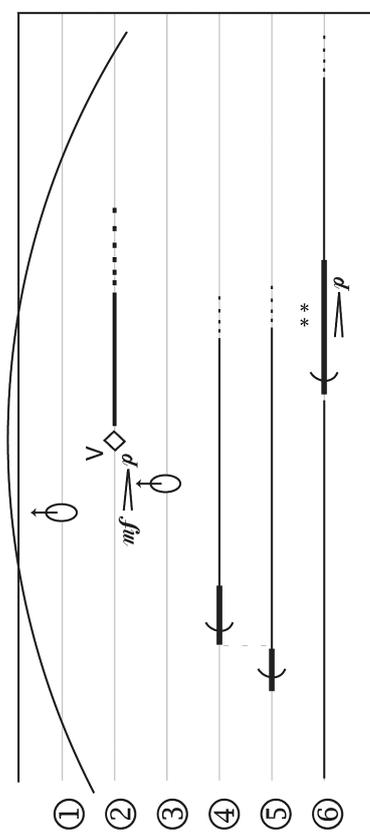
⑥ mp

Except for the occasional increase or decrease in dynamic level, cross stroke morphologies are always played at loudest level.

* N.B. Start slowly and softly then gradually increase speed and intensity of multiple attacks.

Sound example, track 47: Realisation of Box 1

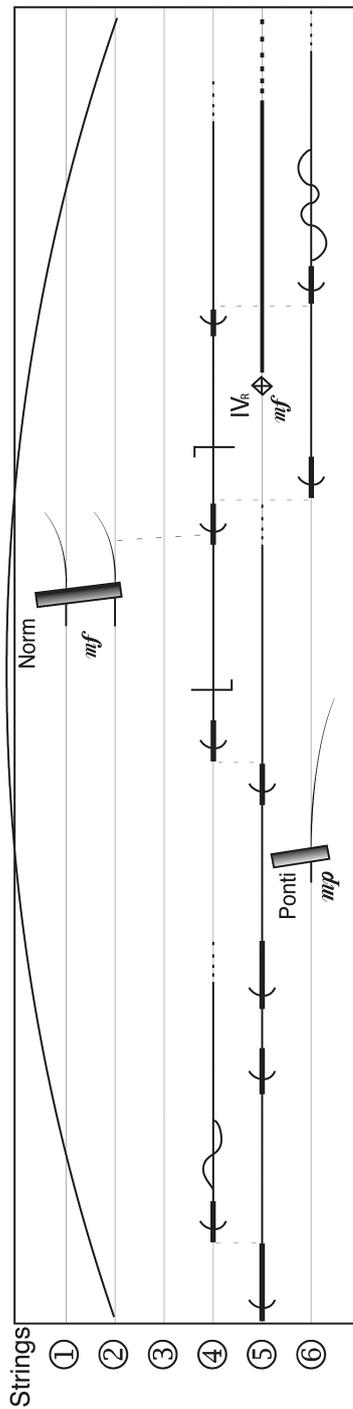
Sound example, track 48: Opening phrase of Box 2



** N.B. Gradually decrease speed and intensity of multiple attacks.

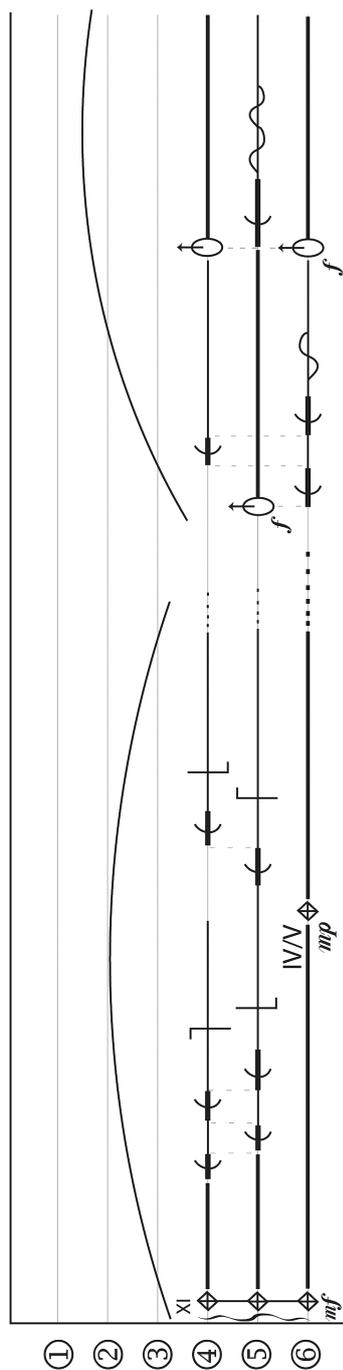
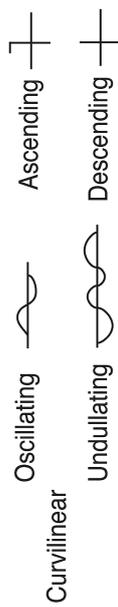
Cross stroke (active scordatura) study
Page 1

Timescale = approx. one minute for the two boxes



Cross stroke morphologies are always played at loudest level.

Tuning - E, A down to E, D up to E, G, B, E



Sound example, track 49: Whole of Box 1

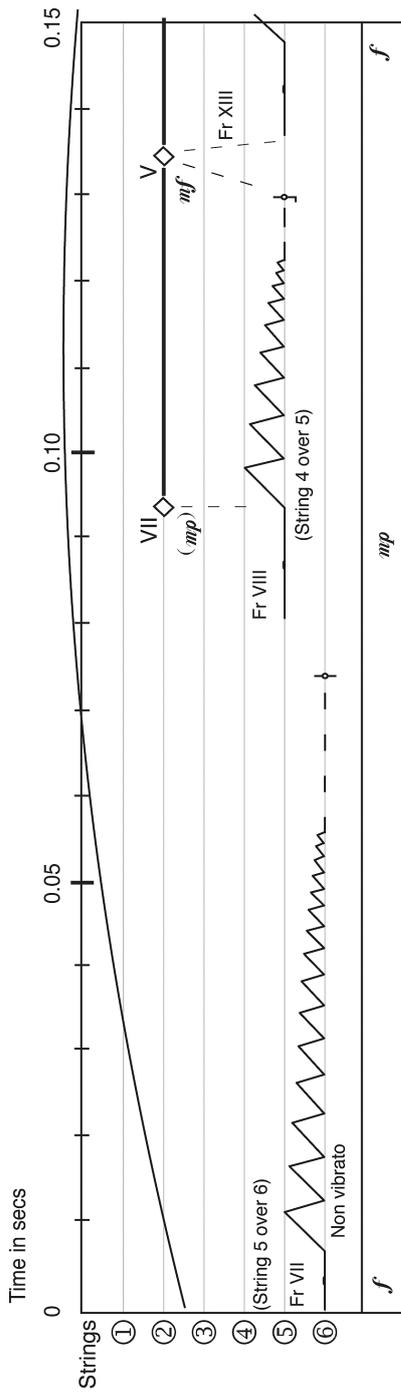
Sound example, track 50: Opening phrase of Box 2

Cross stroke (active scordatura) study
Page 2

①
②
③
④
⑤
⑥

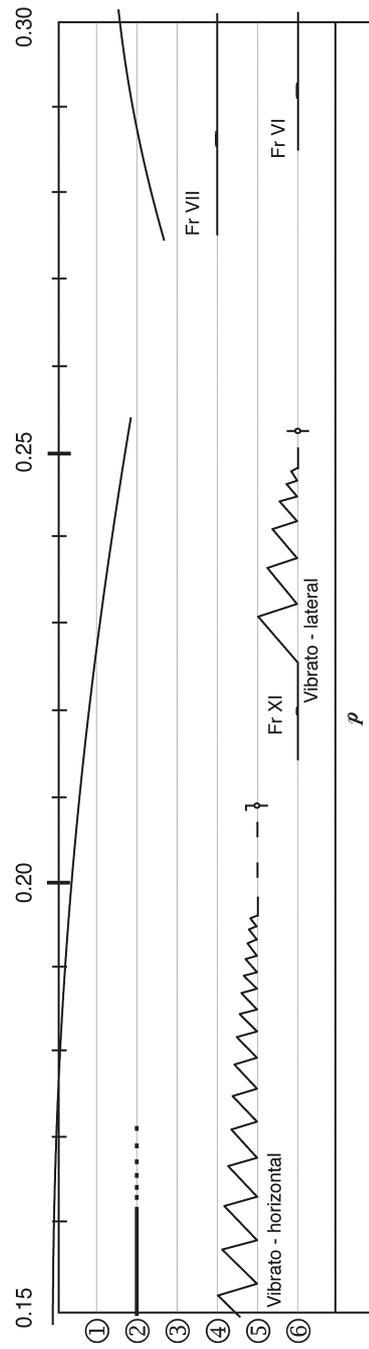
* N.B. Slowly played multiple attacks

'Snare drum' (normal) study
Page 1



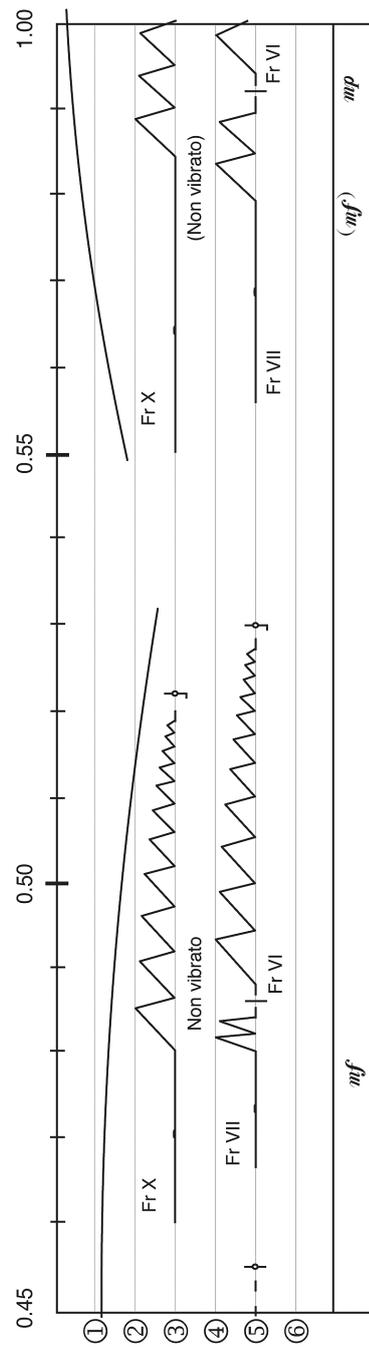
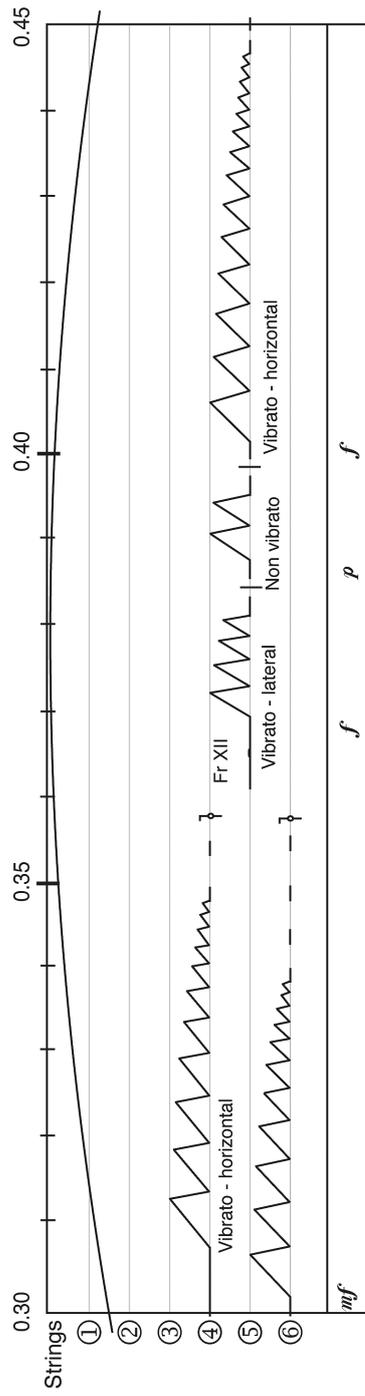
Release types:
 Left hand alone release ↵
 Right hand damping ↵
 Player chooses ↵

Interruption \mathcal{M}_1

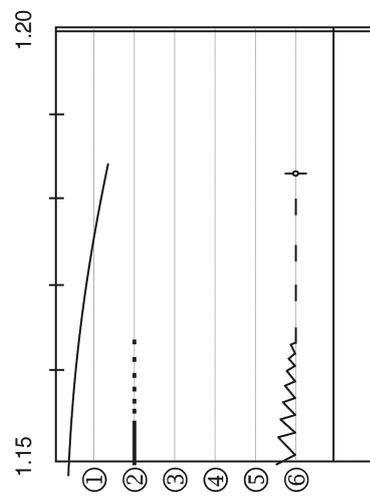
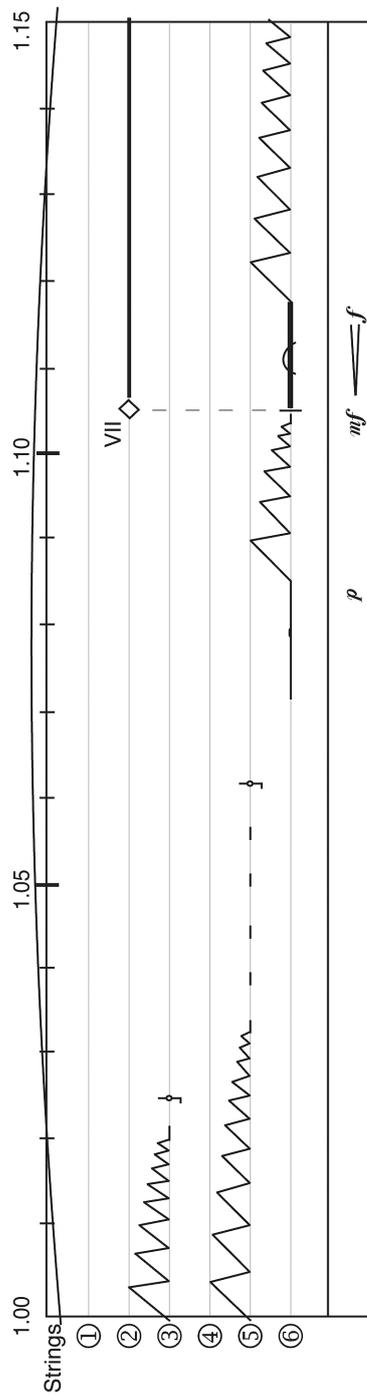


Sound example, track 54: Realisation of the whole study

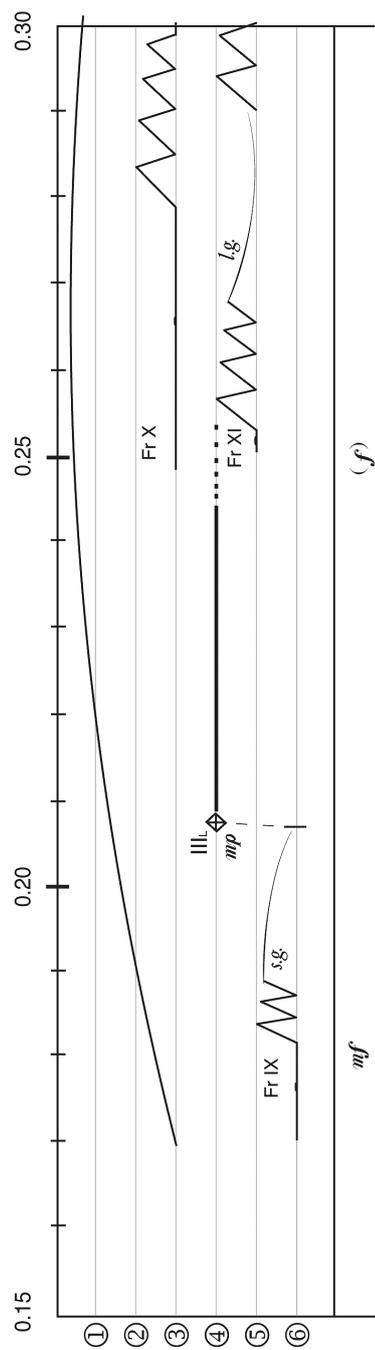
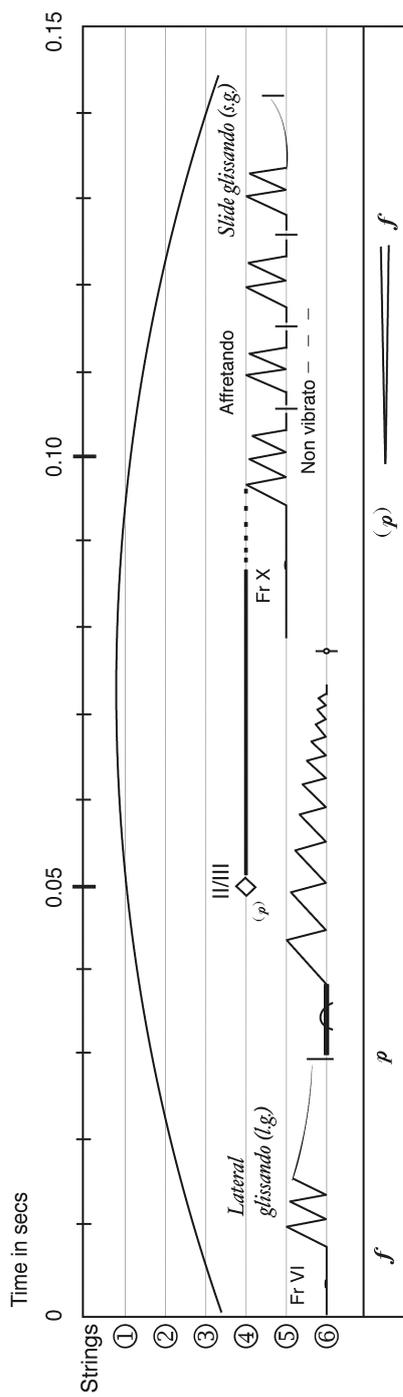
'Snare drum' (normal) study
Page 2



'Snare drum' (normal) study
Page 3

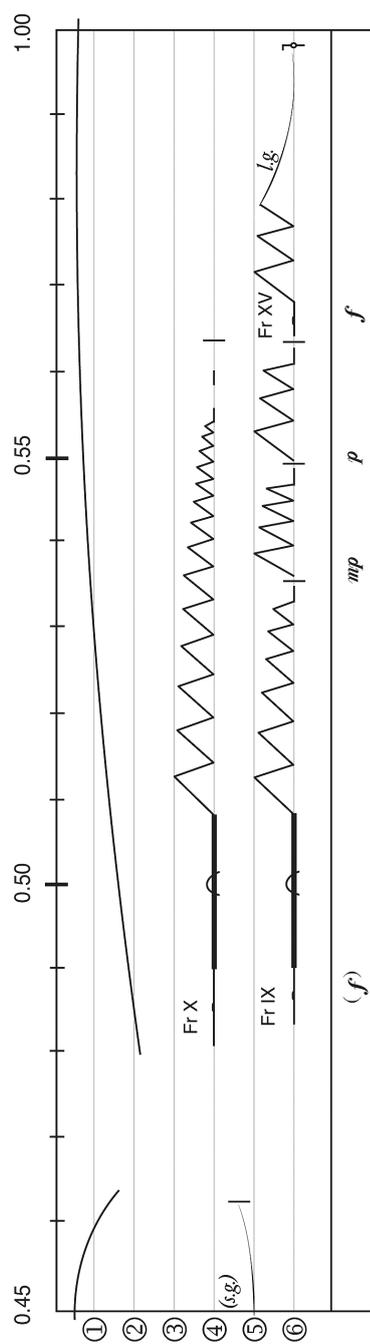
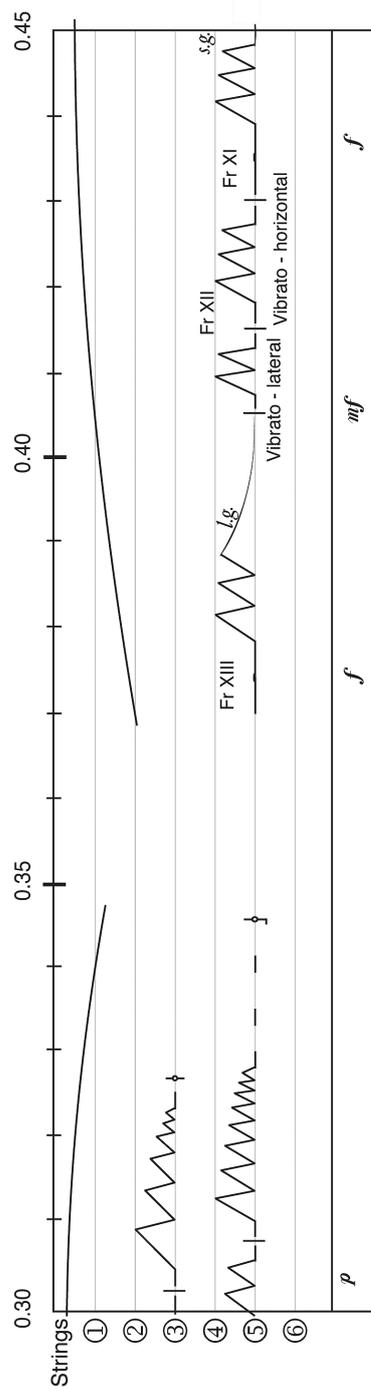


'Snare drum' (normal), slide glissando and lateral glissando study
Page 1

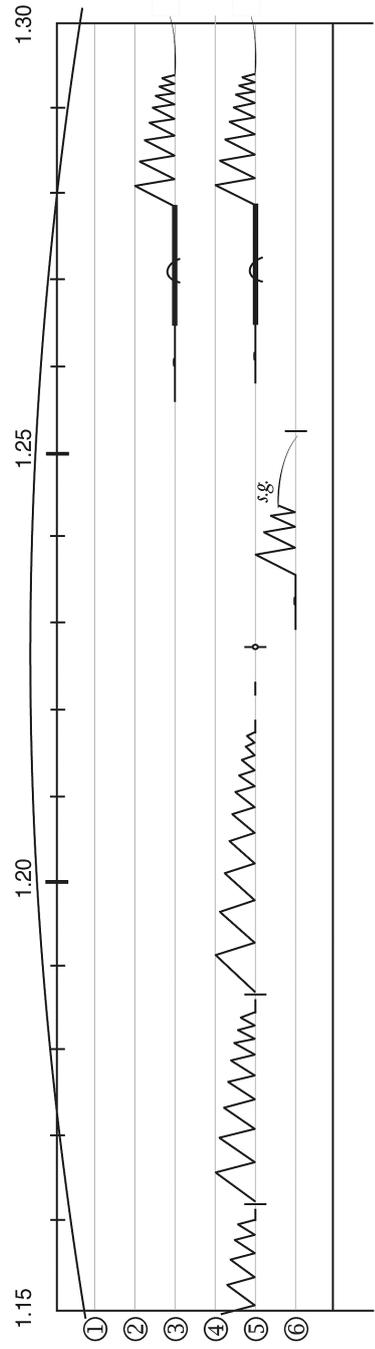
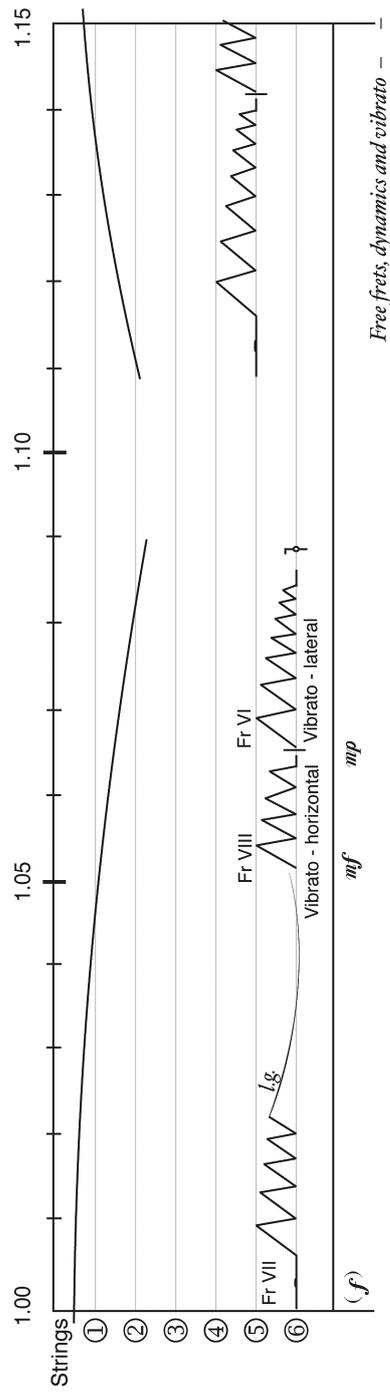


Sound example, track 55: Realisation of the opening phrase

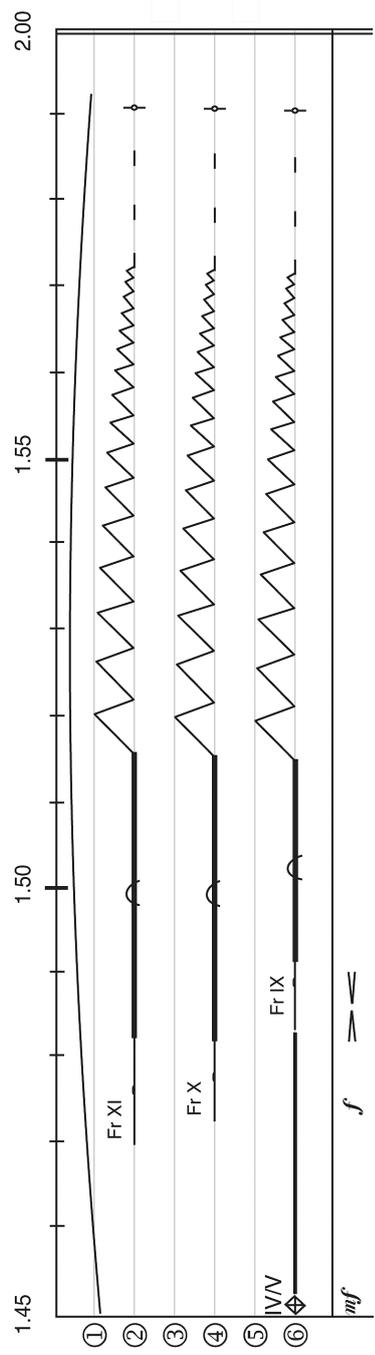
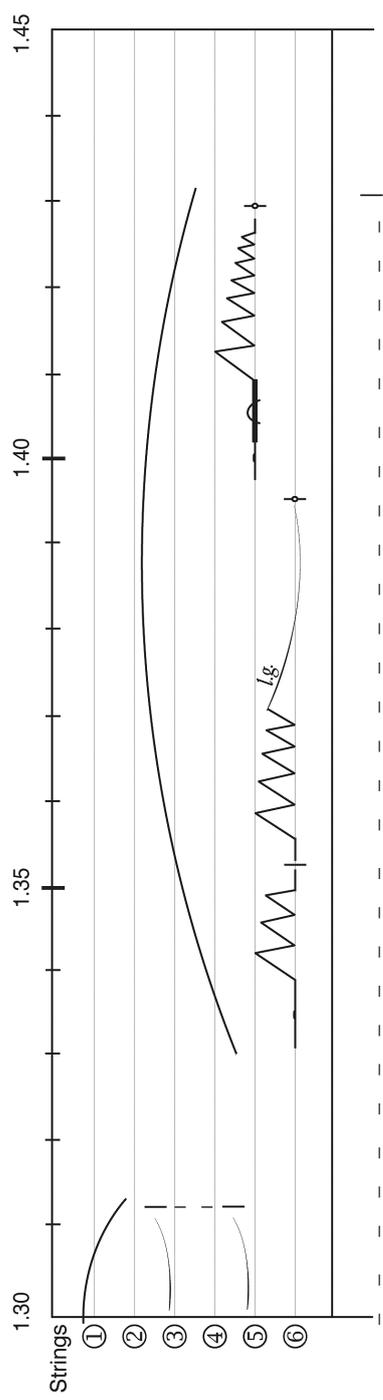
'Snare drum' (normal), slide glissando and lateral glissando study
Page 2



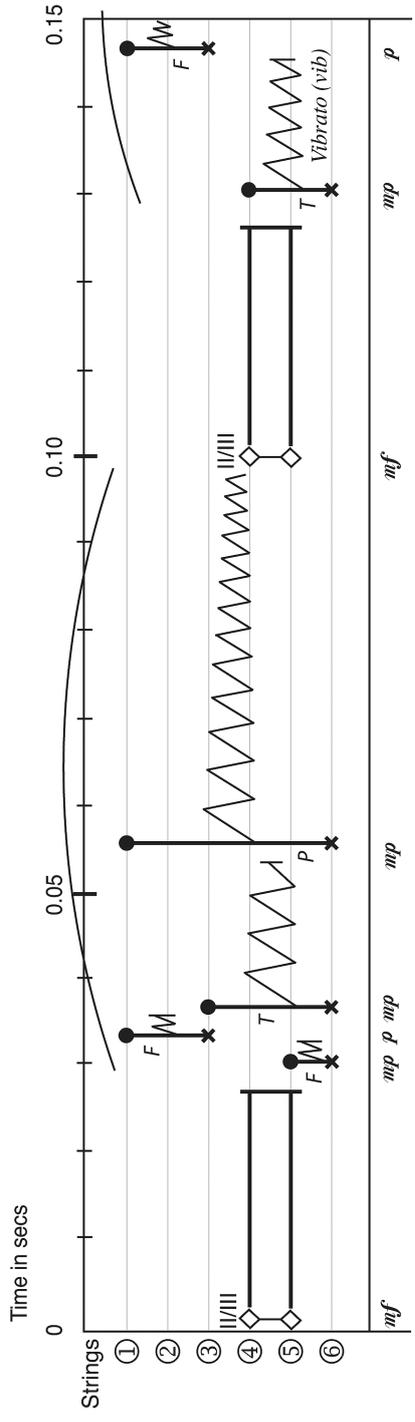
'Snare drum' (normal), slide glissando and lateral glissando
Page 3



'Snare drum' (normal), side glissando and lateral glissando
Page 4

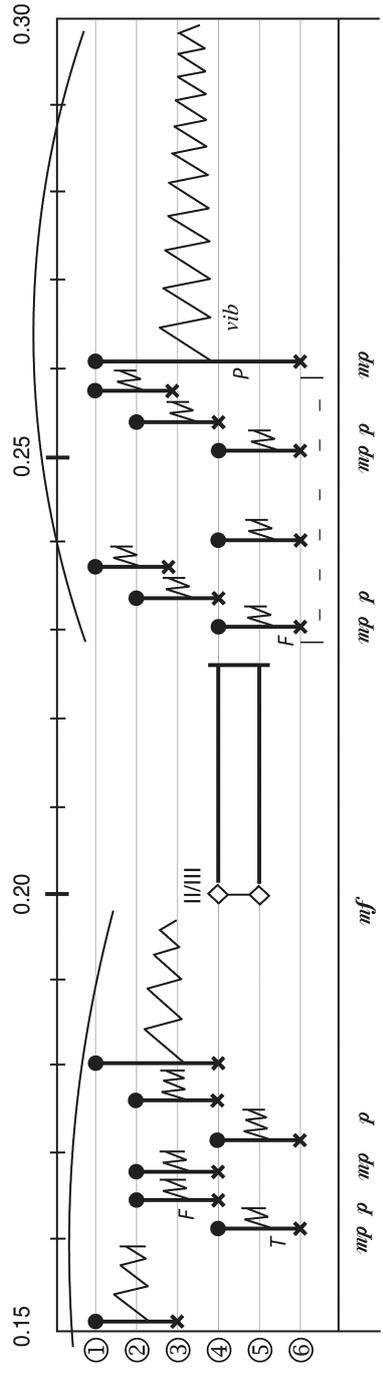


Palm, fist, or thumb study
Page 1



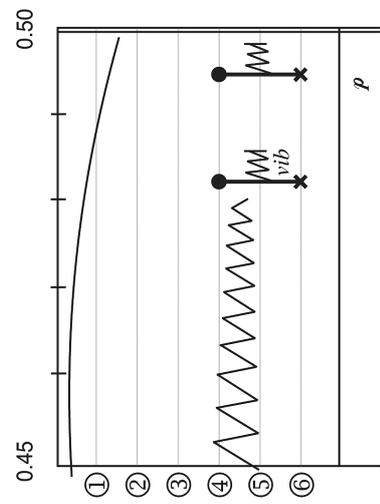
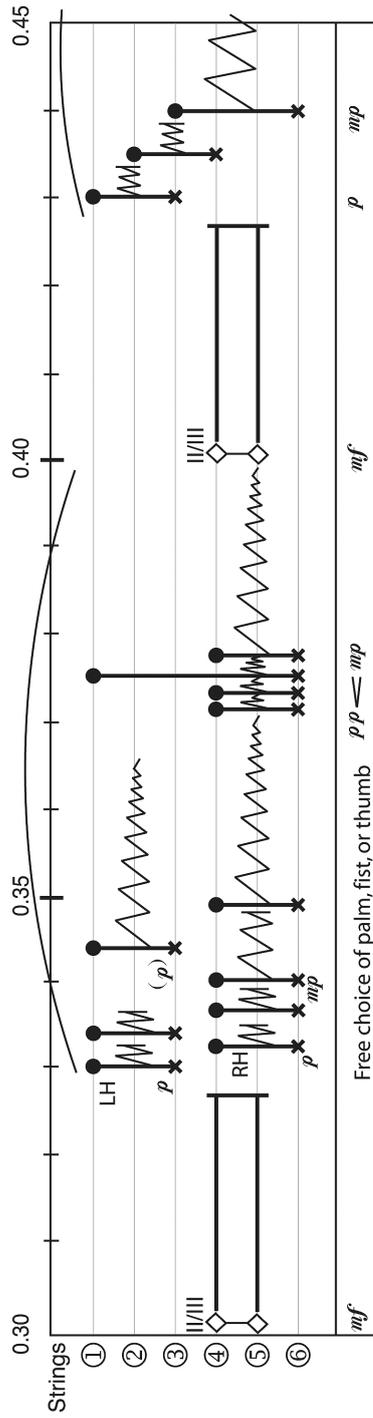
Palm = P
Fist = F
Thumb = T

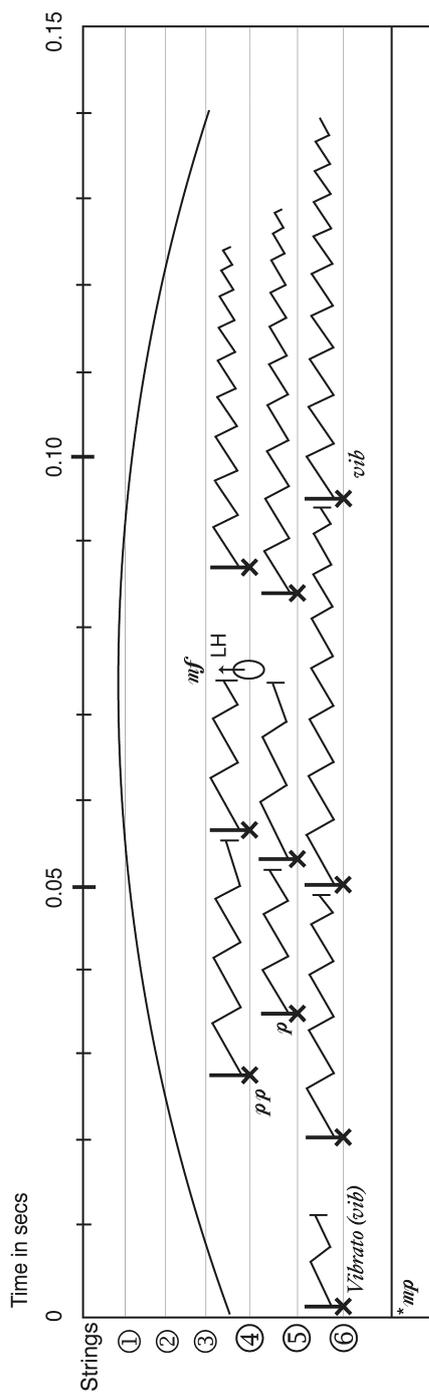
Interruption: as termination
by intervention



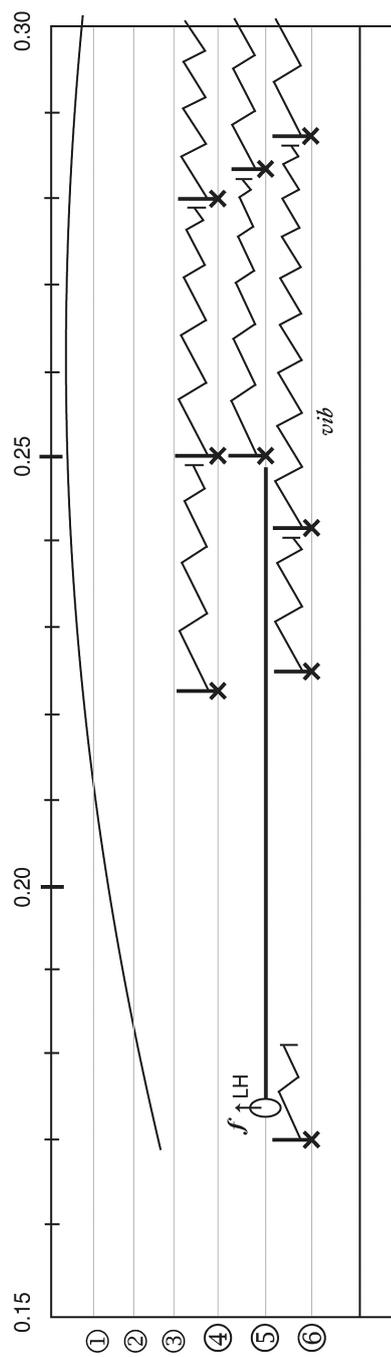
Sound example, track 59: Realisation of the opening phrase

Palm, fist, or thumb study
Page 2

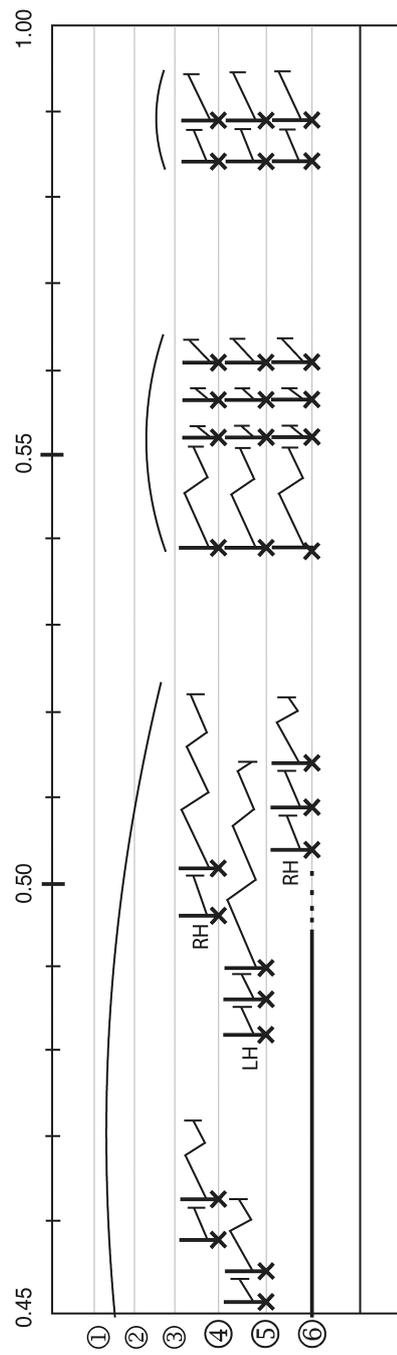
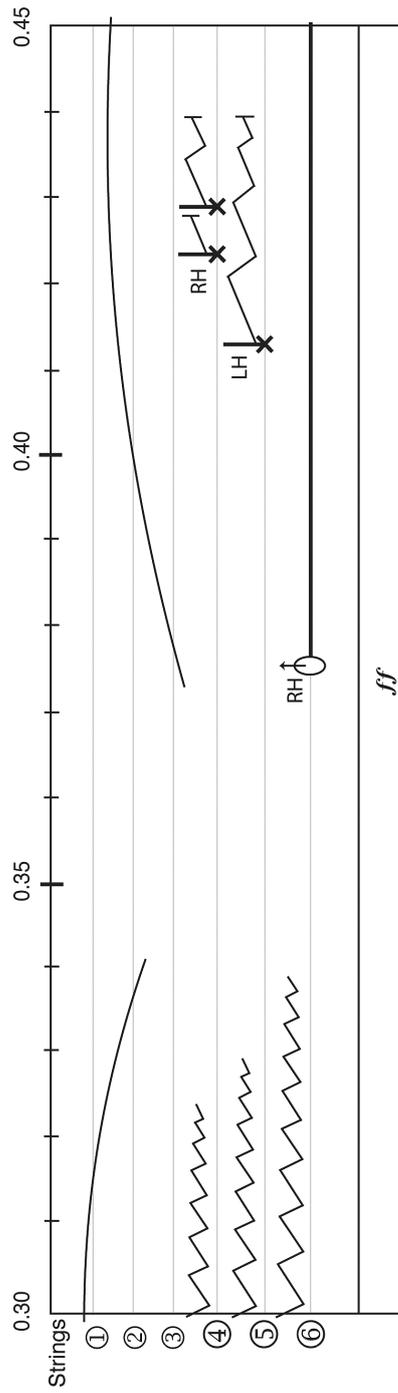




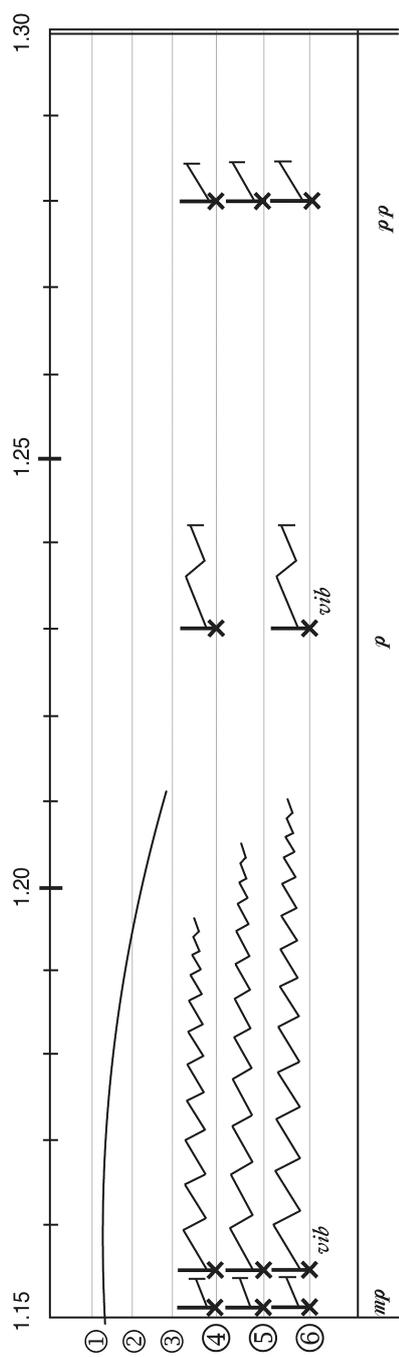
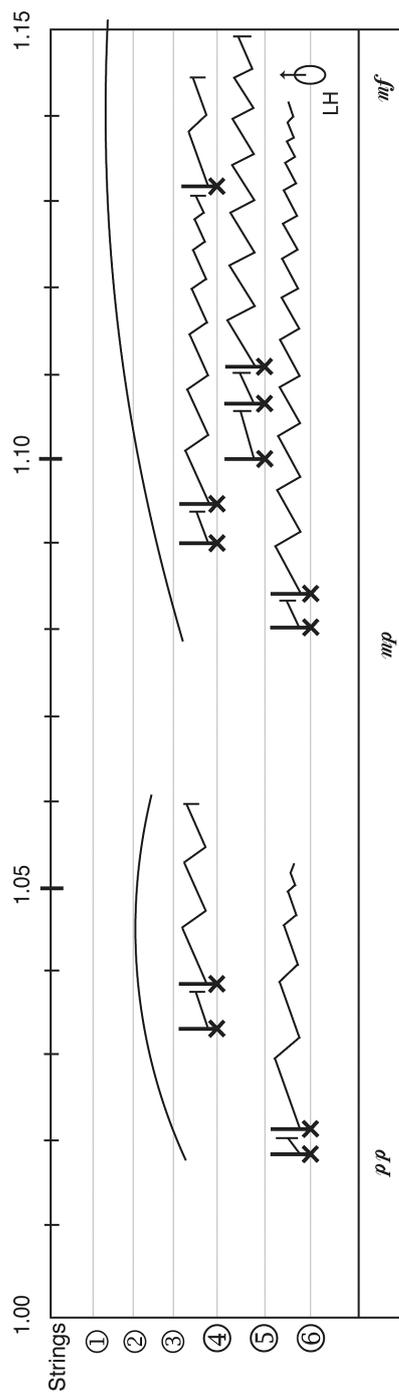
*Dynamic levels are at their loudest level throughout. (See 5.8.2 Volume 1, page 190.)



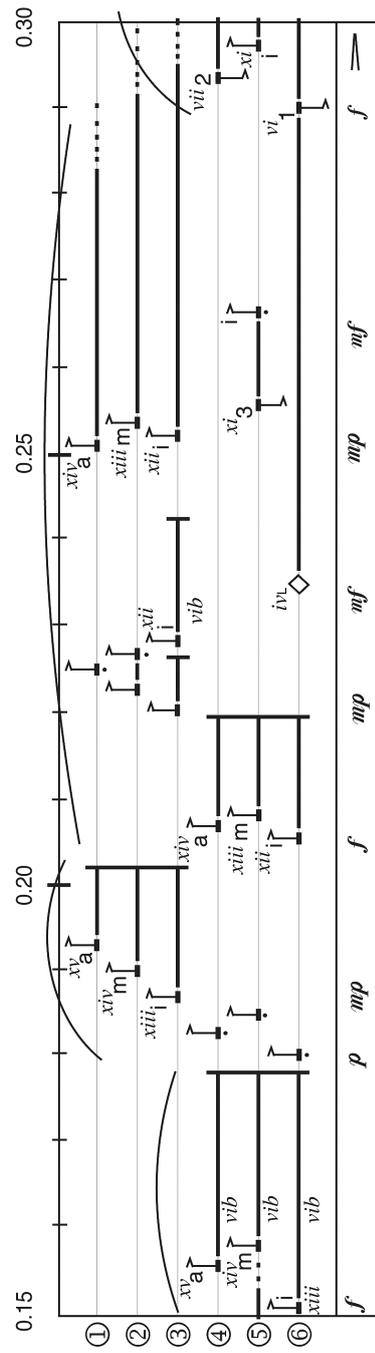
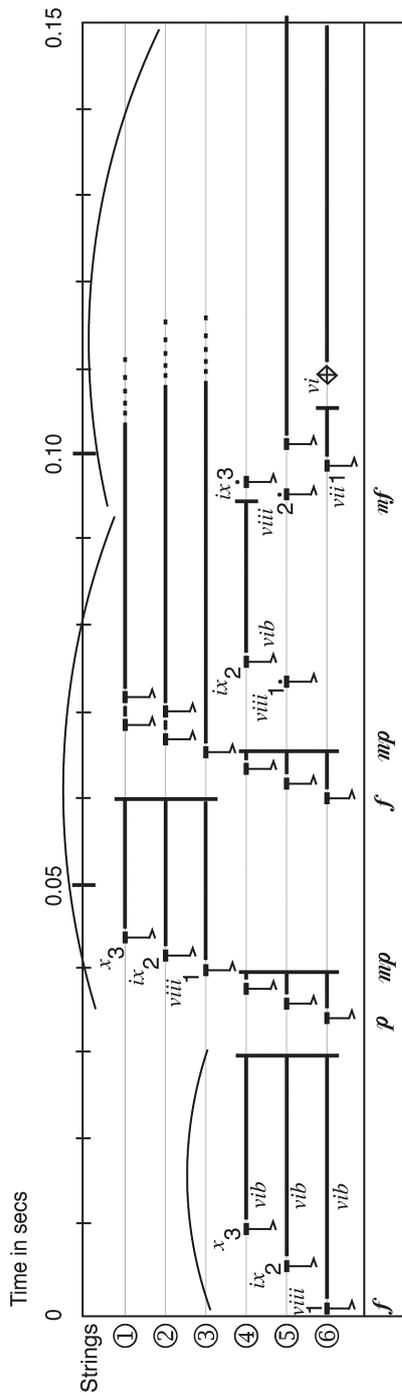
Sound example, track 60: Realisation of the opening phrase



Buzz study
Page 3



Bi-tone tapping study 1: Merged and consecutive morphologies
Page 1



Sound example, track 66: Realisation of the section 9.5" to 15"

Bi-tone tapping study 2: Improvisation
Page 1

Timescale = approx. 30 secs for each box

Strings

① $\overset{xi}{a}$

② $\overset{xi}{m}$

③ $\overset{x}{i}$

④ $\overset{viii}{4}$

⑤ $\overset{vi}{2}$

⑥ $\overset{v}{1}$ *sf*

Free dynamics

Construct short phrases based on the given material and ideas

mp *mf*

① $\overset{xiv}{e}$

② $\overset{xi}{m}$

③ $\overset{x}{i}$

④ $\overset{vii}{1}$

⑤ $\overset{p}{ix} 3$

⑥ $\overset{viii}{2}$ *sf*

Free dynamics

Construct short phrases based on the given material and ideas

mp *mf*

Sound example, track 68: Realisation of Box 1

Bi-tone tapping study 2: Improvisation
Page 2

Timescale = approx. 30 secs for each box

Strings

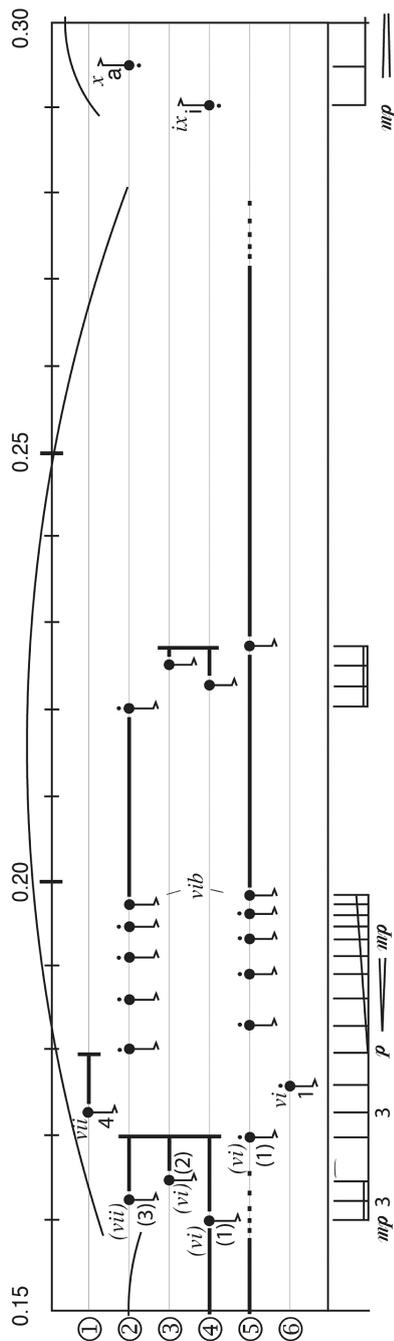
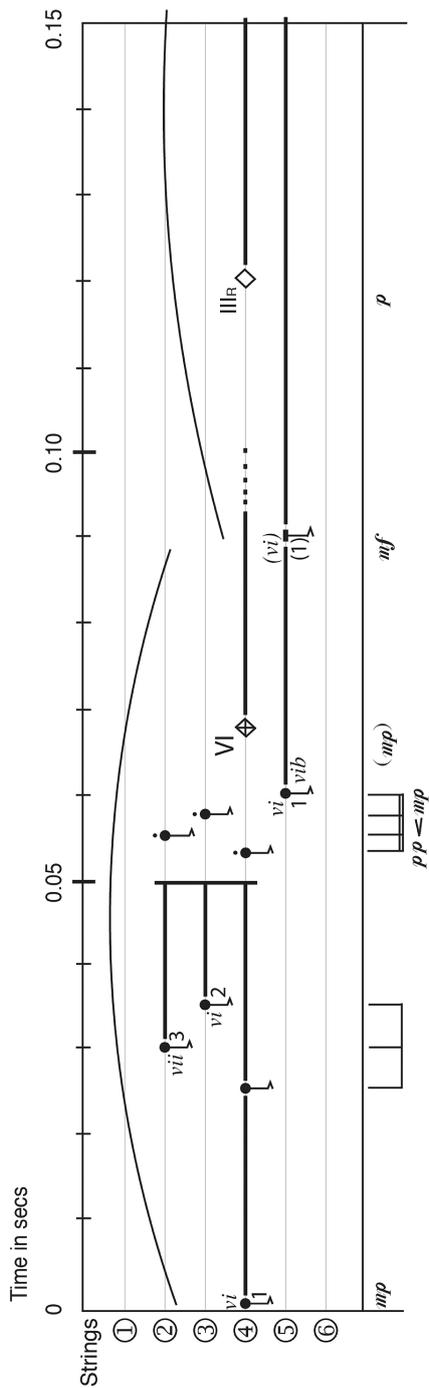
Construct short phrases based on the given material and ideas

mp

vib

vib (mp)

Mute tapping study 1: Merged and consecutive morphologies
Page 1



Sound example, track 70: Realisation of the opening phrase

Mute tapping study 1: Merged and consecutive morphologies
Page 2

Strings

① ② ③ ④ ⑤ ⑥

0.30 0.35 0.40 0.45

pp *p* *mp* *mf* *p* *mp*

(ix) *(ix)'* *(a)* *vii* 4 *vi* 2 *(vi)* *(1)* *VII* *(mp)*

① ② ③ ④ ⑤ ⑥

0.45 0.50 0.55 1.00

p *mp* *p* *pp* 3 *rit*

vii 2 *vib*

Mute tapping study 2: Iterative rhythmic patterns
Page 1

Arpeggios

Strings

① ix a, vii 3, ix m, vii 2, ix i, vii 1

② vii 3, ix a, viii 2, ix m, viii 1, ix i

③ vii 3, ix a, vii 2, ix m, vii 1, simile

④ ix a, v 3, ix m, v 2, ix i, v 1

⑤ ix a, v 3, ix m, v 2, ix i, v 1

⑥ ix a, v 3, ix m, v 2, ix i, v 1

Changing orders

Poco a poco crescendo

Rhythm cells

pp

Use this cell only - repeat

Use mixture of this and previous cell

① ix a, v 3, ix m, v 2, ix i, v 1

② ix a, viii 3, ix m, viii 2, ix i, viii 1

③ ix a, viii 3, ix m, viii 2, ix i, viii 1

④ ix a, viii 3, ix m, viii 2, ix i, viii 1

⑤ ix a, viii 3, ix m, viii 2, ix i, viii 1

⑥ ix a, viii 3, ix m, viii 2, ix i, viii 1

mp

f

This cell only

Sound example, track 71: Realisation of the opening section

Mute tapping study 2: Iterative rhythmic patterns
Page 2

Strings

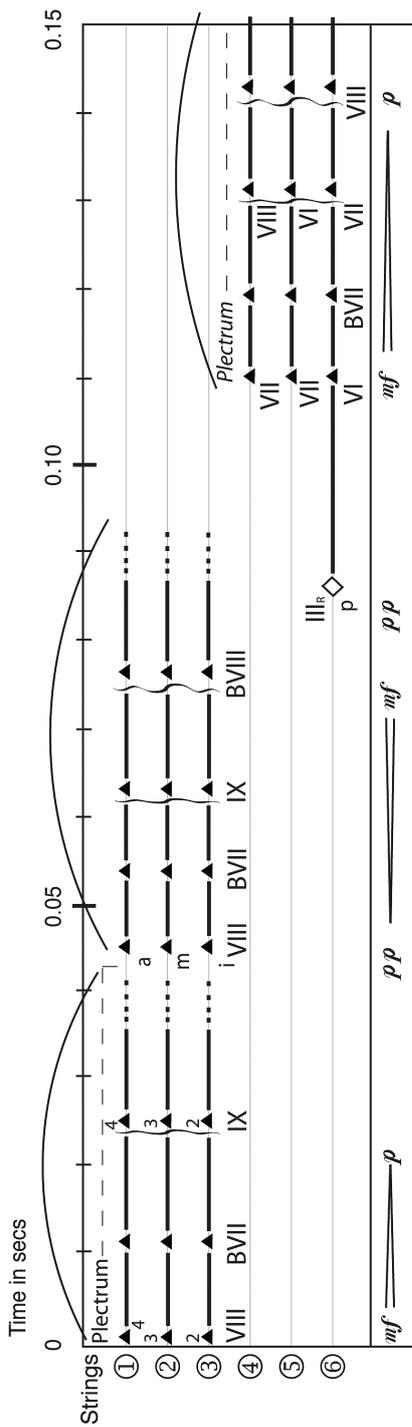
① ② ③ ④ ⑤ ⑥

pp *Poco a poco crescendo* *simile*
This cell only *Use mixture of this and previous cell*

① ② ③ ④ ⑤ ⑥

mp *Diminuendo* *pp niente*
This cell only

Nut-side study
Page 1



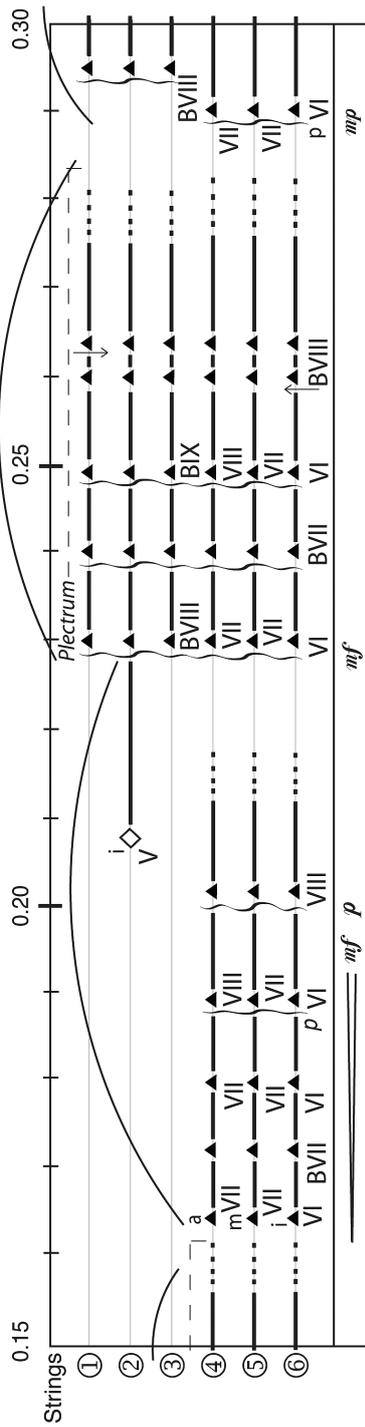
▲ Play nut-side

◆ Barré or half-barré BVII on fret eight

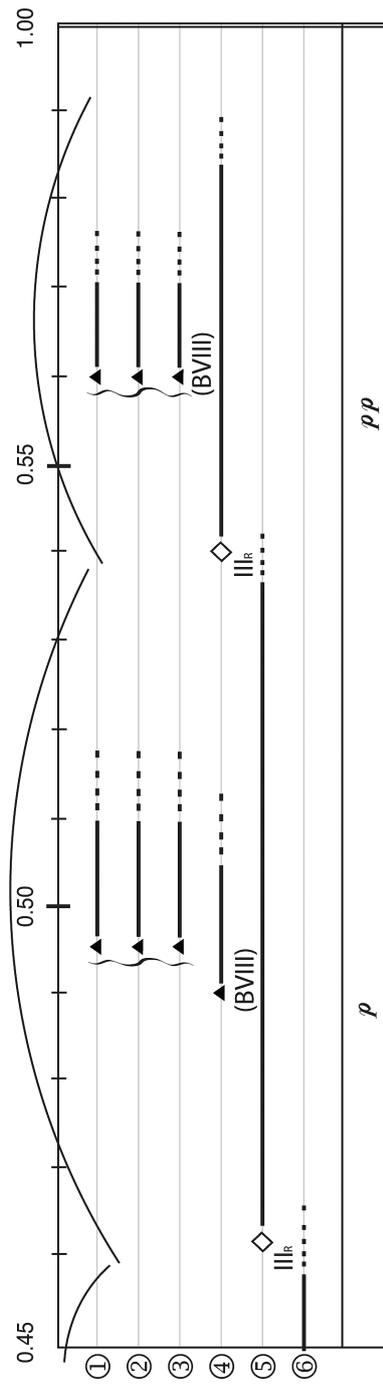
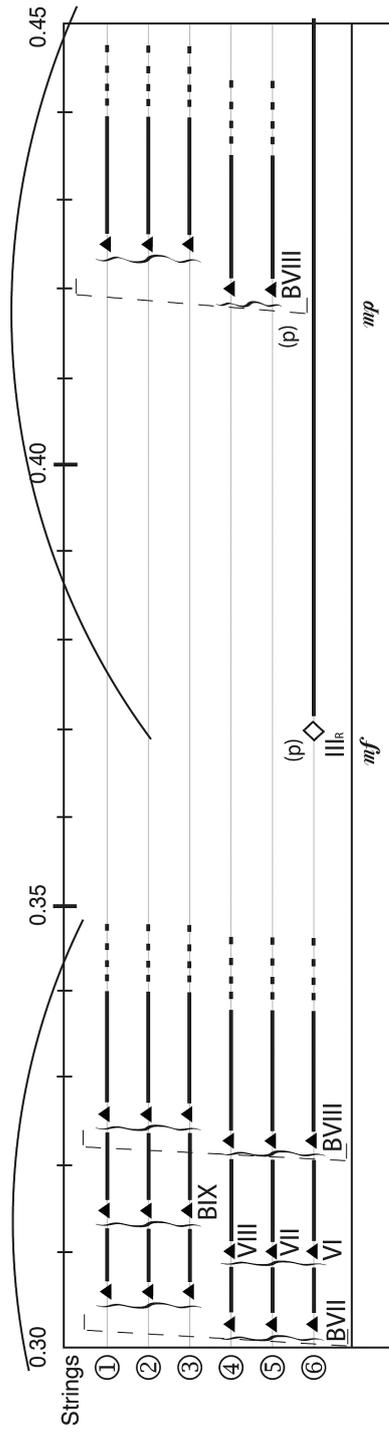
▲ Spread chord - upwards

▲ Quick strum - upwards

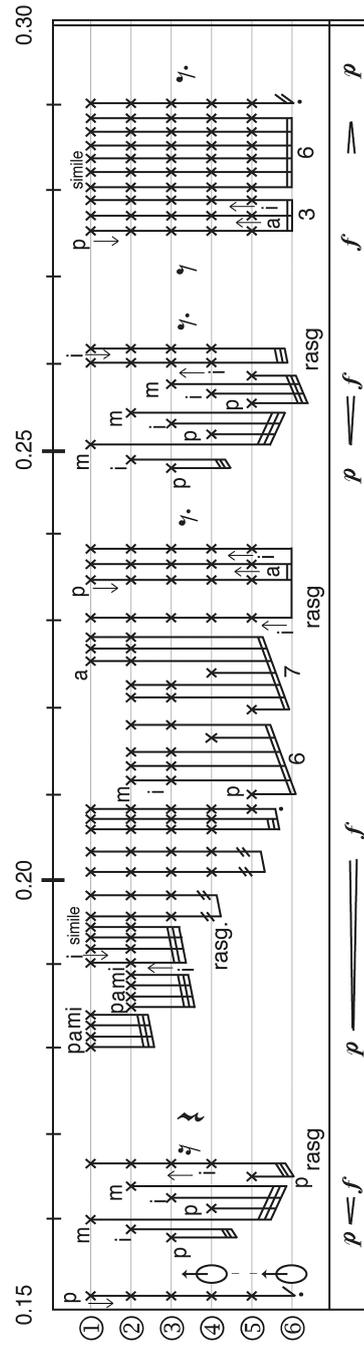
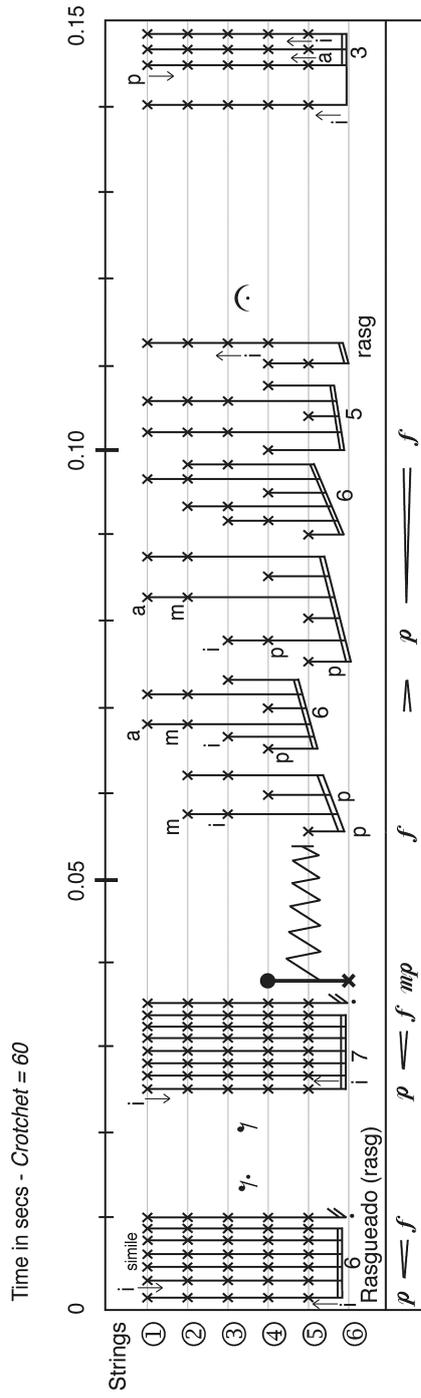
▼ Quick strum - downwards



Sound example, track 73: Whole of the nut-side study



Rapid mute study 2: Synchronous morphologies



Sound example, track 82: Realisation of the opening section

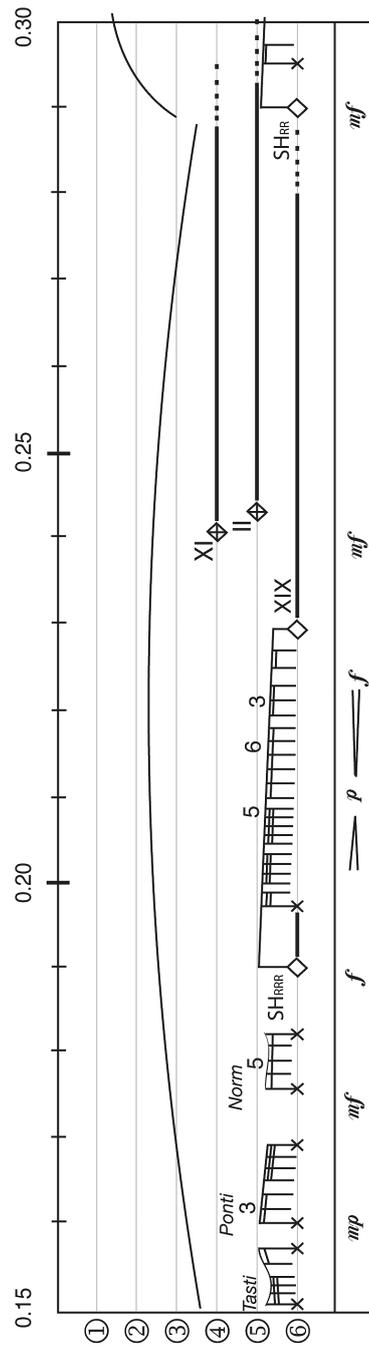
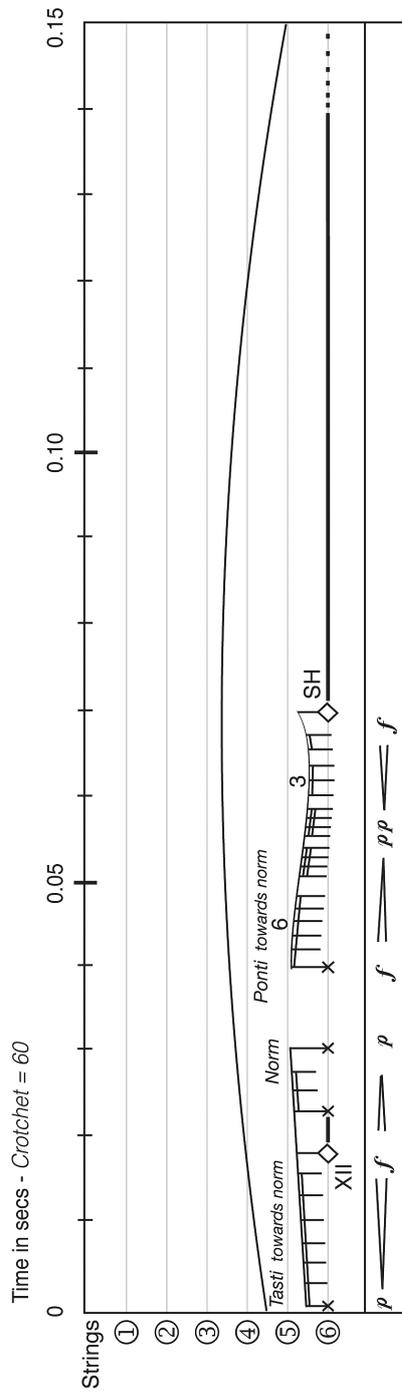
Rapid mute study 4: Linear and undulated glissandi
Page 2

The musical score is written for six strings (labeled 1 to 6) and spans a time range from 0.30 to 0.45. The notation includes various techniques and dynamics:

- String 1:** Starts with a glissando from 0.30 to 0.35, marked with *m* and *i*. At 0.35, it has a note with *m* and *i*. At 0.40, it has a note with *p* and *m*. At 0.45, it has a note with *mf*.
- String 2:** Starts with a glissando from 0.30 to 0.35, marked with *m* and *i*. At 0.35, it has a note with *m* and *i*. At 0.40, it has a note with *p* and *m*. At 0.45, it has a note with *mf*.
- String 3:** Starts with a glissando from 0.30 to 0.35, marked with *m* and *i*. At 0.35, it has a note with *m* and *i*. At 0.40, it has a note with *p* and *m*. At 0.45, it has a note with *mf*.
- String 4:** Starts with a glissando from 0.30 to 0.35, marked with *m* and *i*. At 0.35, it has a note with *m* and *i*. At 0.40, it has a note with *p* and *m*. At 0.45, it has a note with *mf*.
- String 5:** Starts with a glissando from 0.30 to 0.35, marked with *m* and *i*. At 0.35, it has a note with *m* and *i*. At 0.40, it has a note with *p* and *m*. At 0.45, it has a note with *mf*.
- String 6:** Starts with a glissando from 0.30 to 0.35, marked with *m* and *i*. At 0.35, it has a note with *m* and *i*. At 0.40, it has a note with *p* and *m*. At 0.45, it has a note with *mf*.

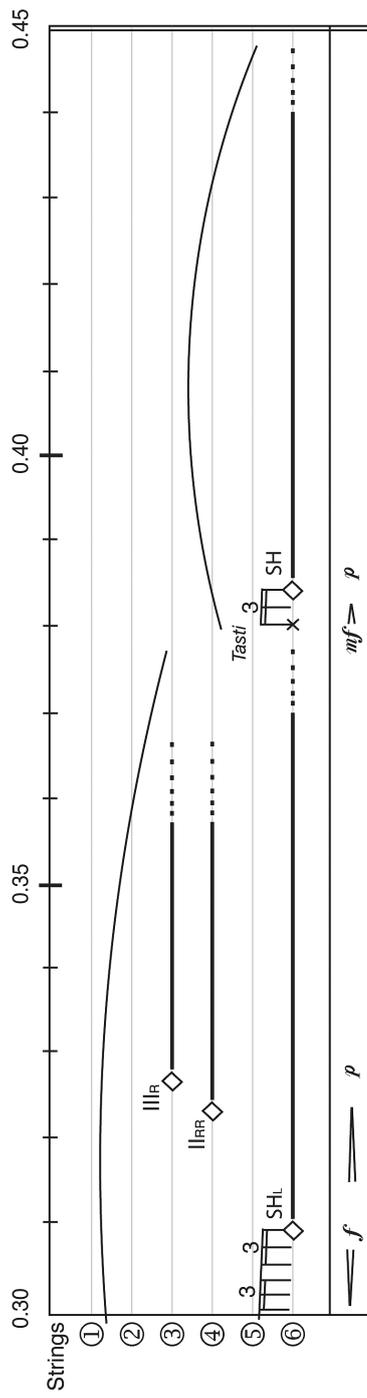
Other markings include *a*, *simile*, *Tasti*, *Pontic*, *Norm m*, *f*, *p*, *pp*, and *mf*. The score also includes a dashed line indicating improvisation: "Improvise using the given configurations as a basis".

Rapid mute study 5: Sixth string (linear and undulated glissandi)
Page 1

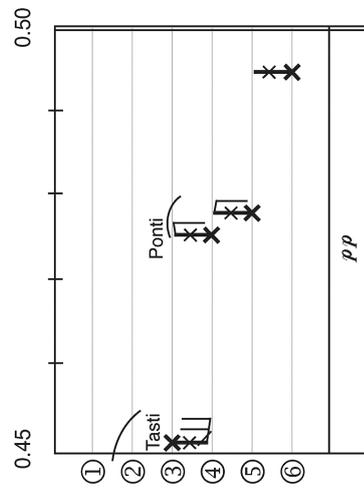
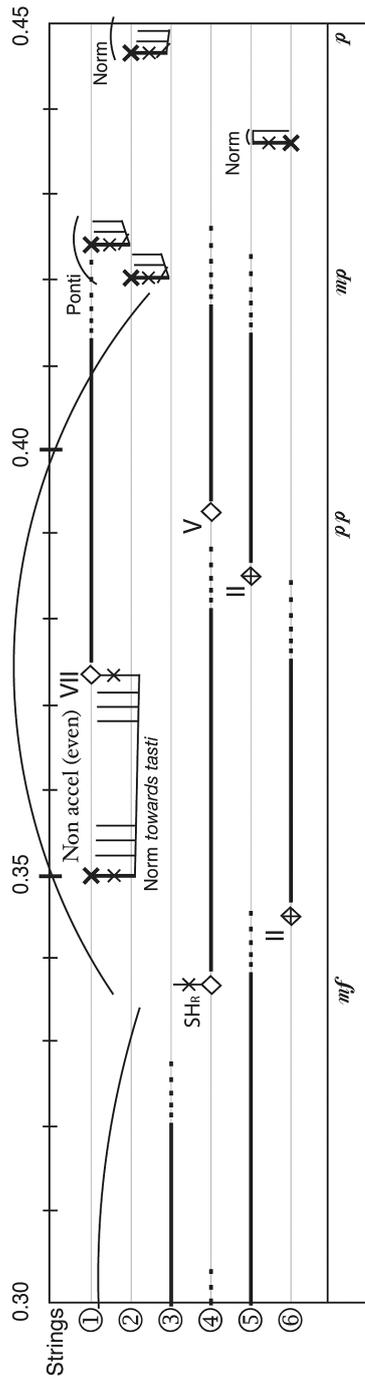


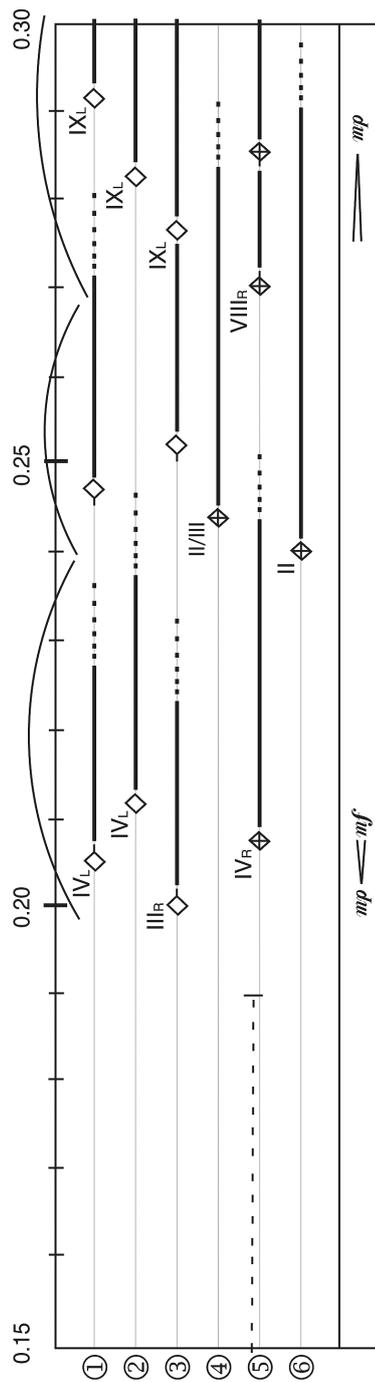
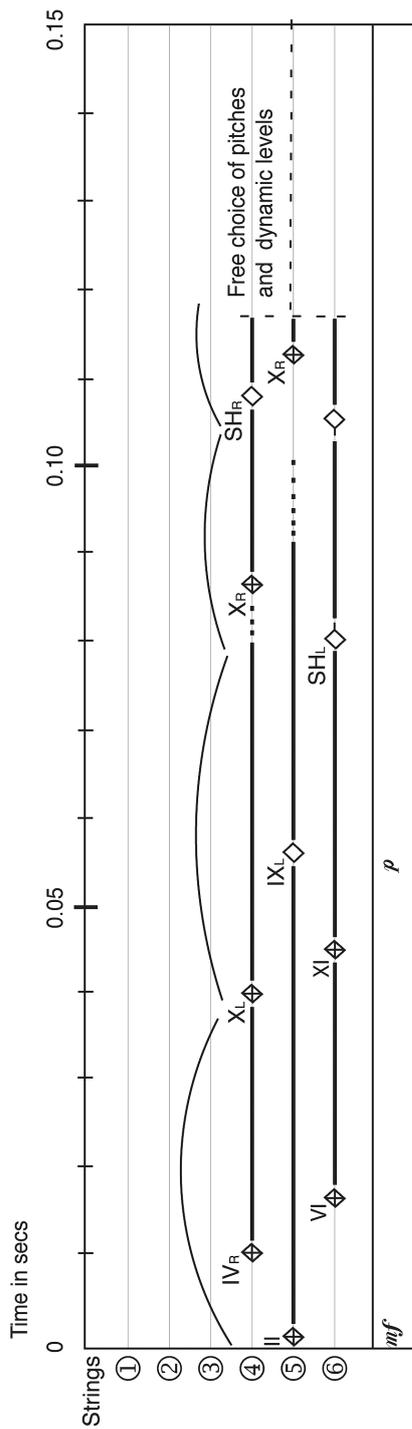
Sound example, track 85: Realisation of the opening section

Rapid mute study 5: Sixth string (linear and undulated glissandi)
Page 2

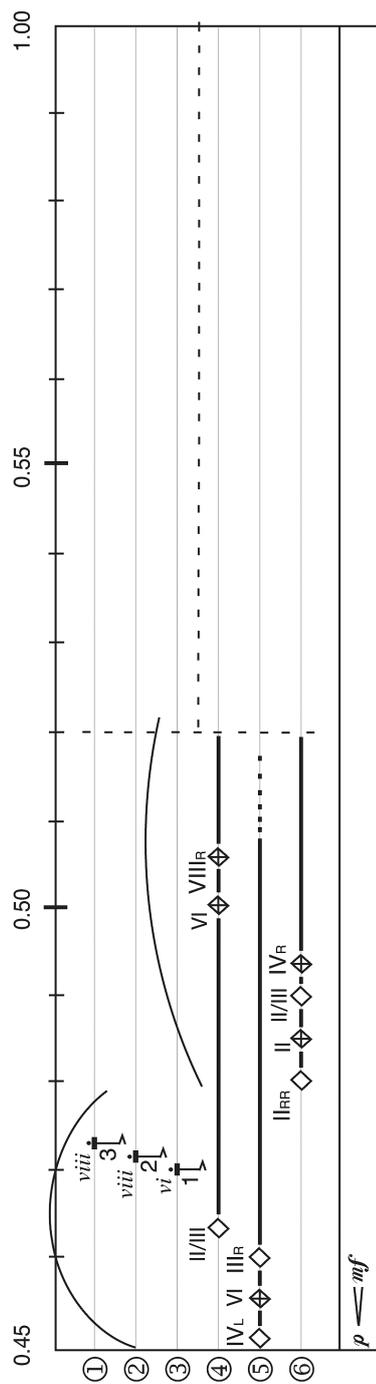
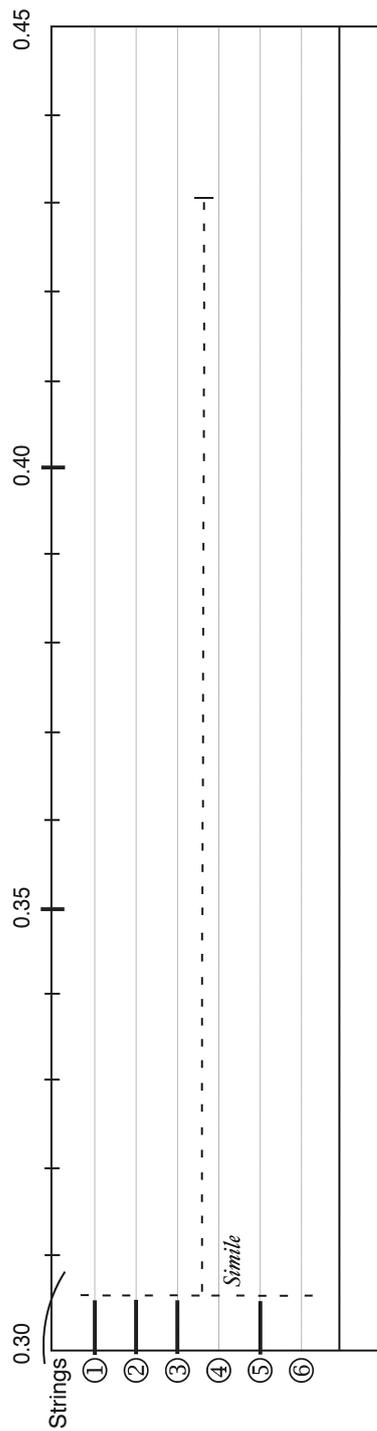


Pinch mute study: Nodes
Page 2

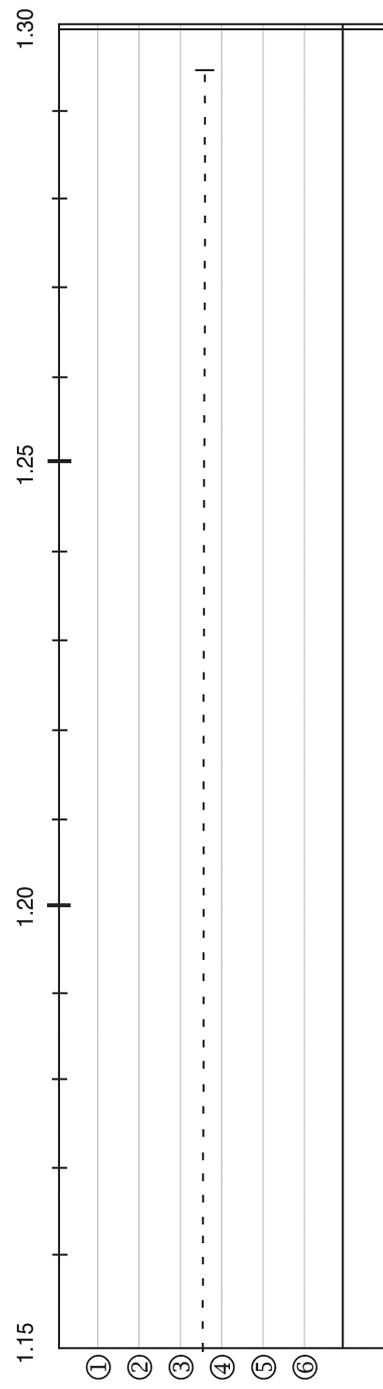
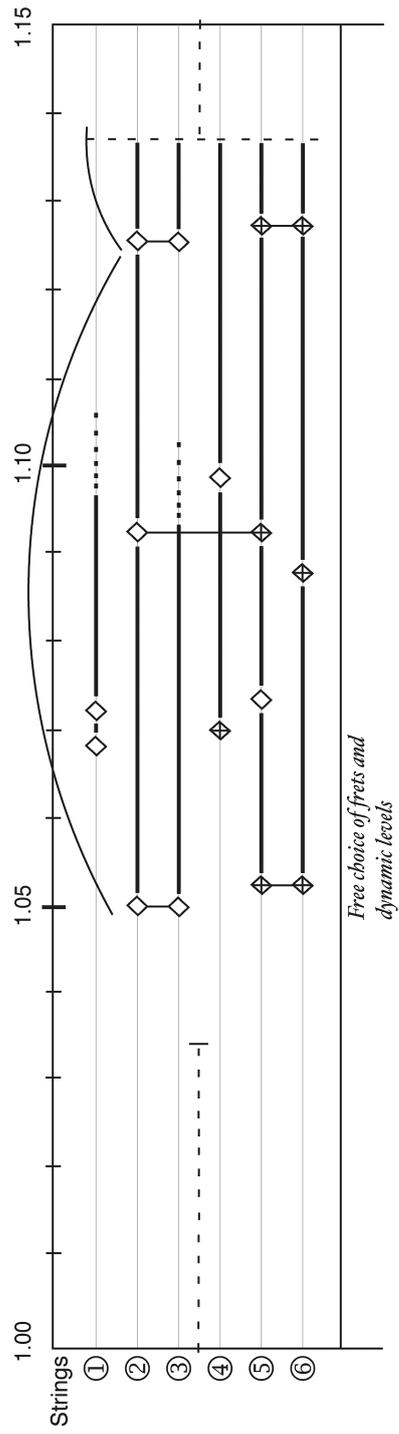




Sound example, track 90: Realisation of the opening section



Combined natural and multiphonic harmonics study: Improvisation
Page 3



'Snare drum' and snap pizzicato combined study
Page 1

Timescale = approx. 1 min for all five boxes

Normal

Strings ① ② ③ ④ ⑤ ⑥

Normal

Lateral glissando

Fret VI *f* vib - lat non vibrato *mf* *f* Fret VIII *mp* Fret IX *mf* Fret X *f* Fret XIV *s.g.* *ff*

Ponti

Free dynamics and vibrato

Slide glissando

Strings ① ② ③ ④ ⑤ ⑥

Slide glissando

All

IX.L *p* Fret IX *s.g.* *mf* Fret XIV *s.g.* *f*

Free frets and vibrato

Free tone colour and angle of attack

ff *mp* *mf* *ff*

Sound example, track 93: Realisation of Box 1

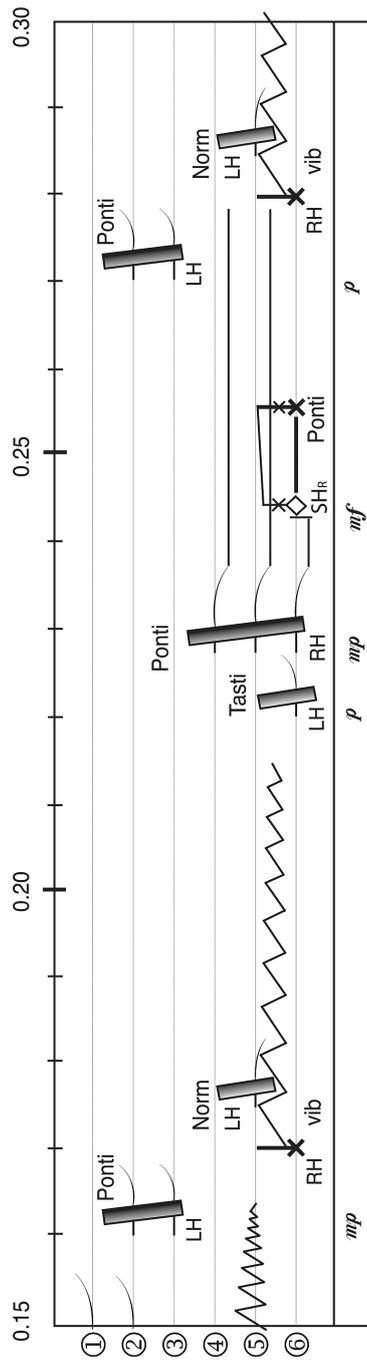
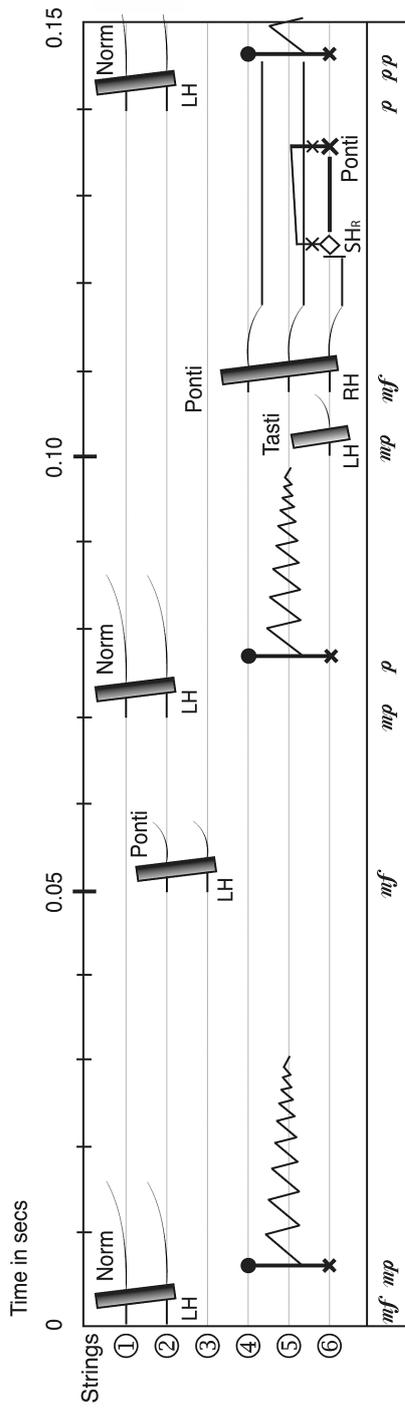
Sound example, track 94: Realisation of Box 2

Synchronicity

The diagram illustrates six strings (labeled 1 to 6) with various musical notations and techniques:

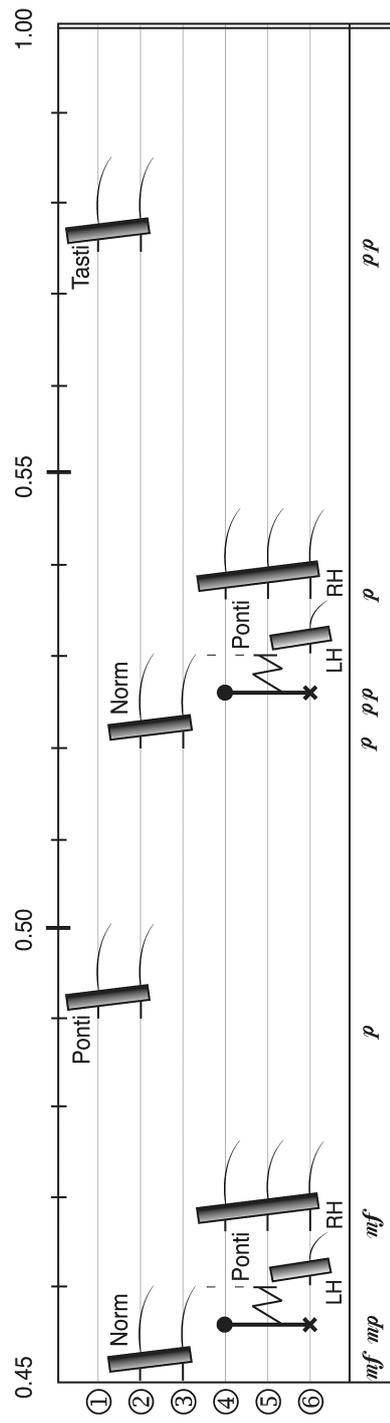
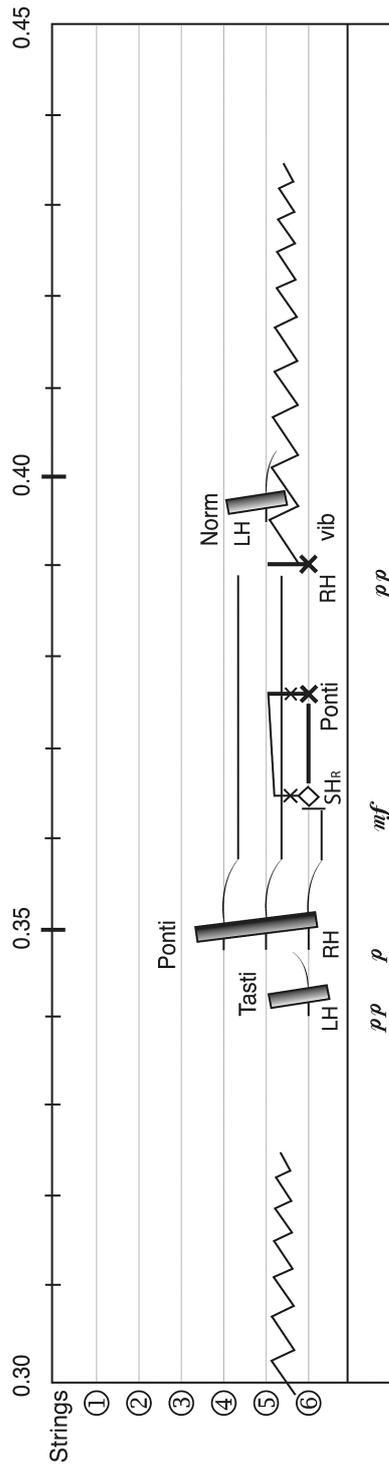
- String 1:** A single note with a wavy line above it labeled *sg*.
- String 2:** A note with a wavy line above it labeled *sg*, followed by a vertical line labeled *Fret IX*.
- String 3:** A note with a vertical line above it labeled *Fret IX*, followed by a horizontal line labeled *Free frets*.
- String 4:** A note with a wavy line above it labeled *sg*, followed by a vertical line labeled *Fret X*.
- String 5:** A note with a wavy line above it labeled *sg*, followed by a vertical line labeled *f*.
- String 6:** A note with a wavy line above it labeled *sg*, followed by a vertical line labeled *f*, then a horizontal line labeled *Free tone colour and angle of attack mf*, then a wavy line labeled *mf vibrato - horizontal*, and finally a note with a wavy line above it labeled *ff*.

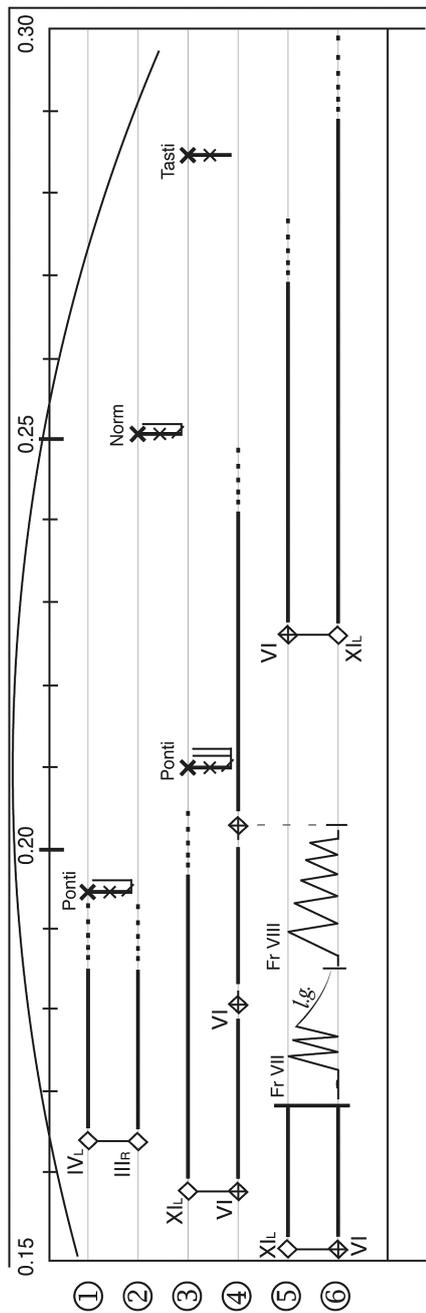
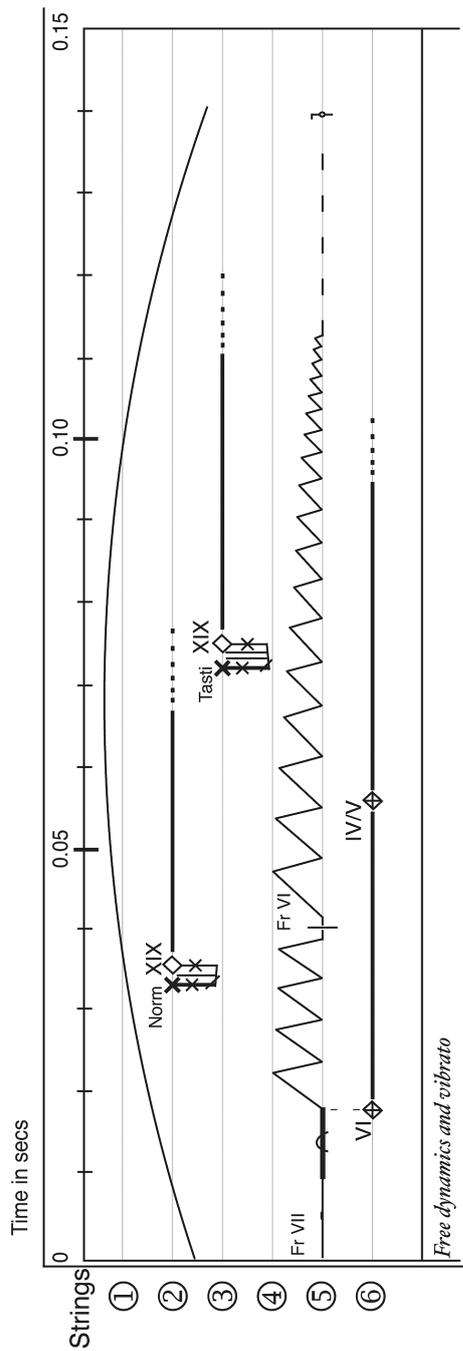
Bottleneck and soundhole resonances combined study
Page 1



Sound example, track 95: Realisation of the whole study

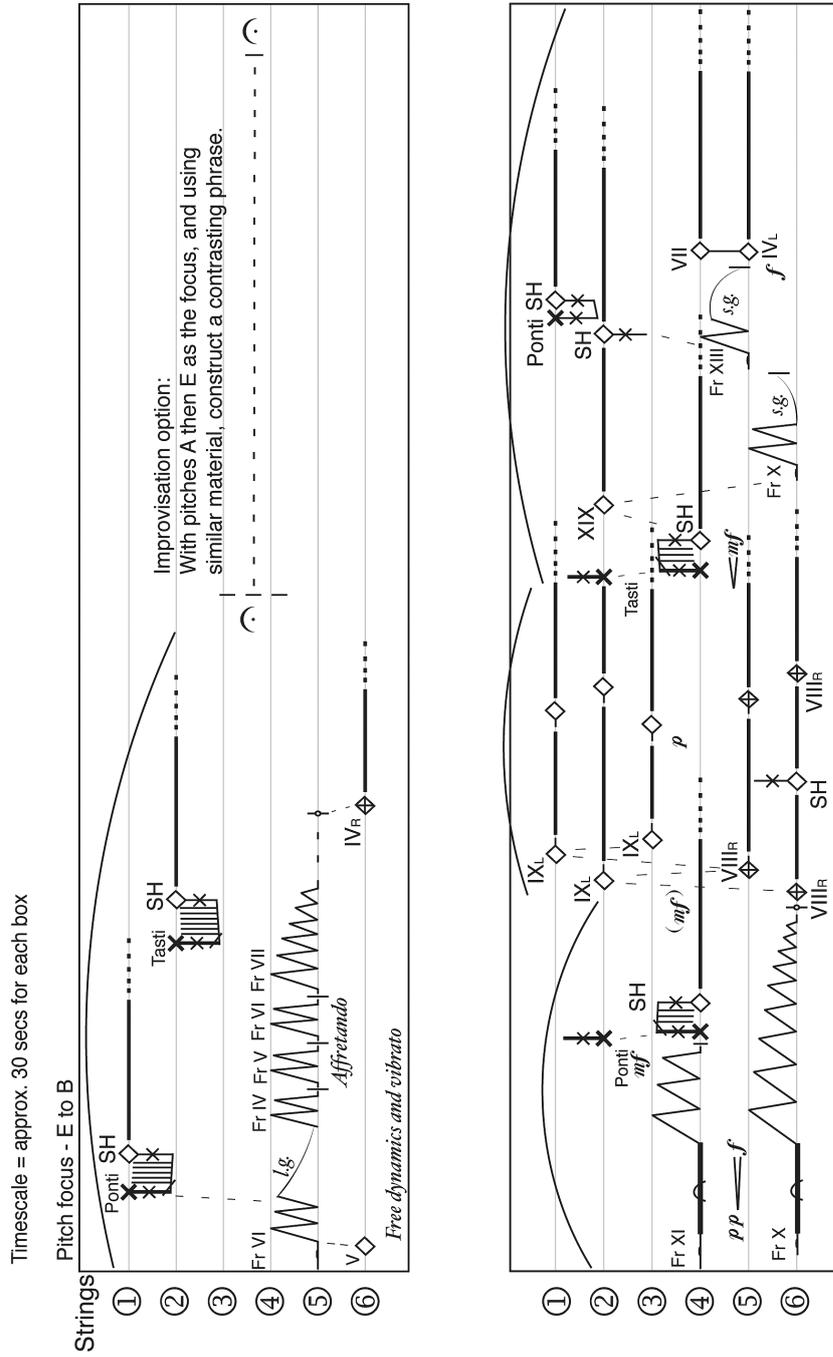
Bottleneck and soundhole resonances combined study
Page 2





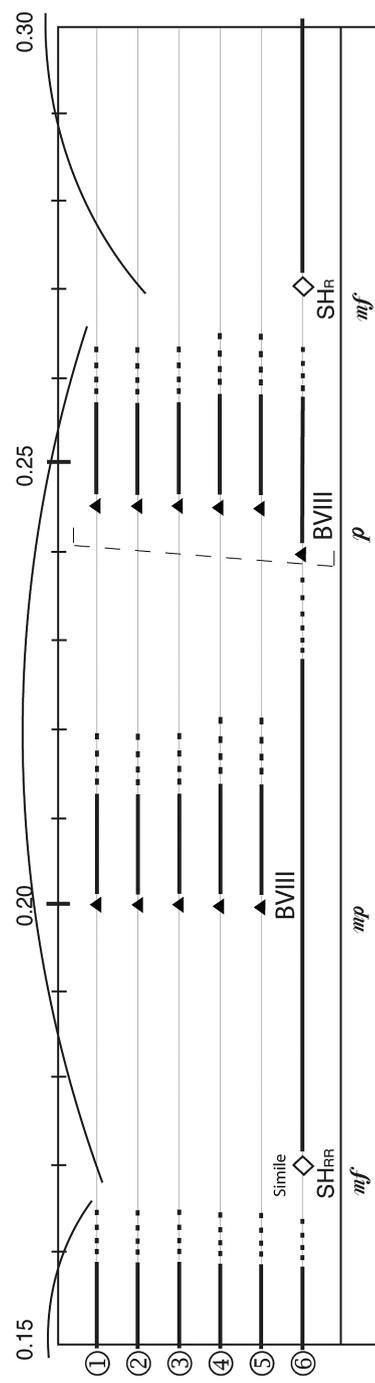
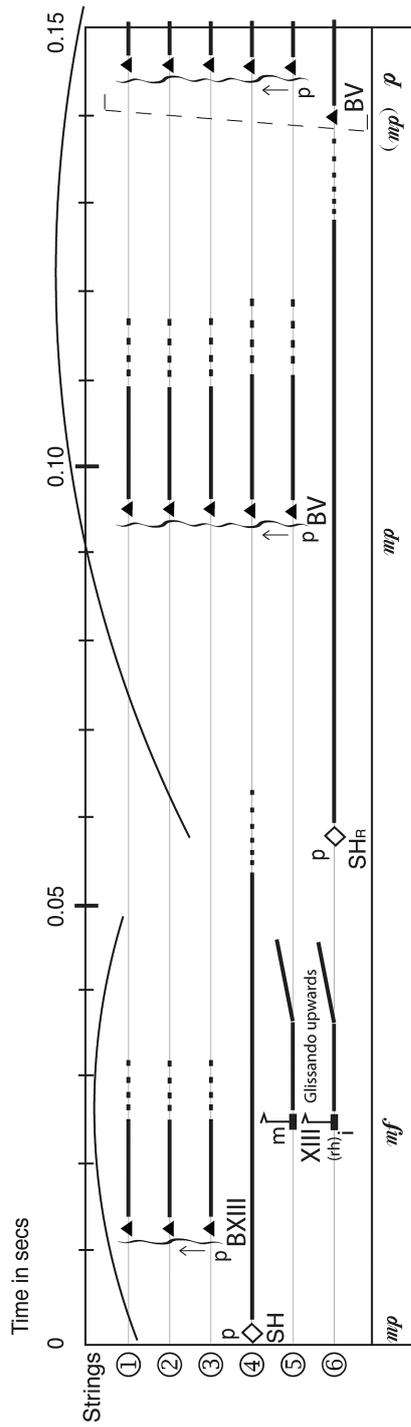
Sound example, track 96: Realisation of the whole of Box 1

Harmonics, 'snare drum' and pinch mute combined study
Page 2



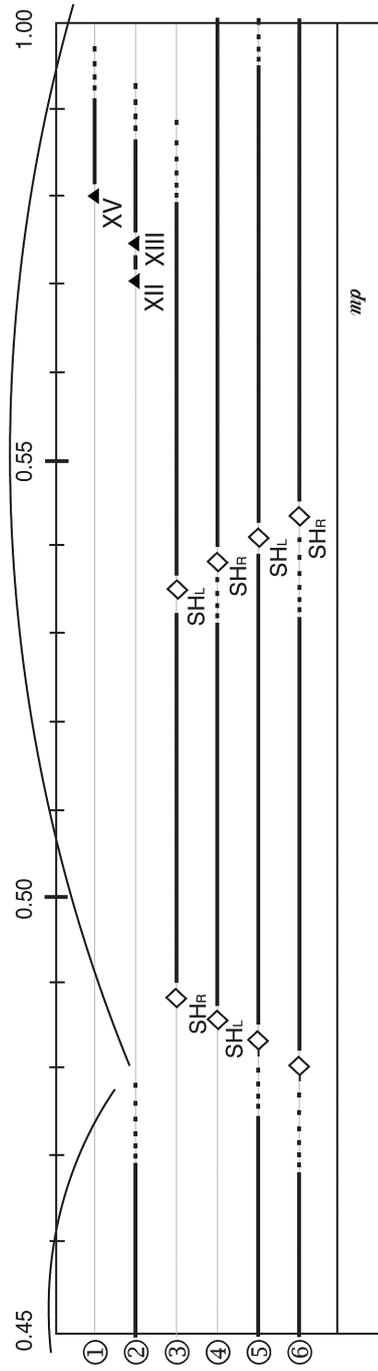
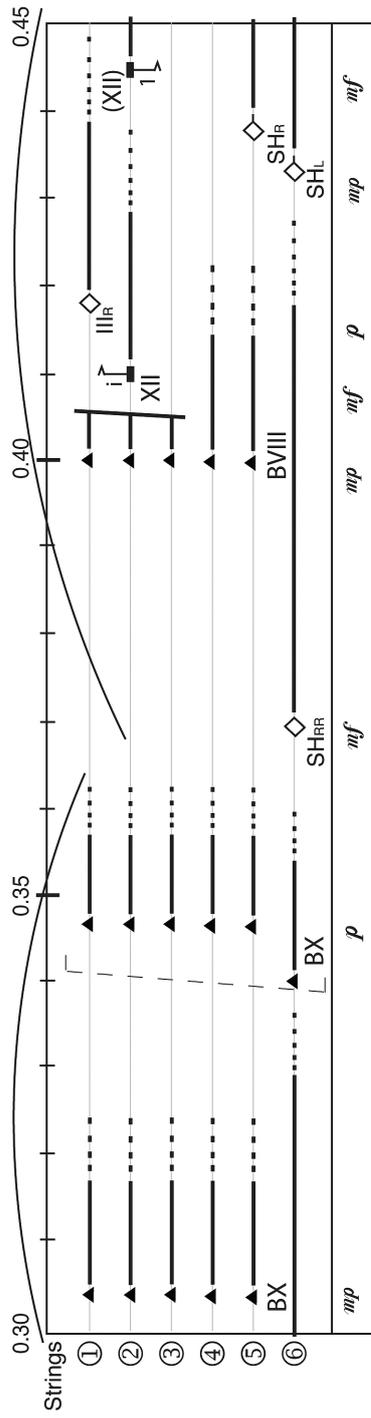
- Sound example, track 97: Realisation of the opening section of Box 2
- Sound example, track 98: Realisation of the opening gesture of Box 3
- Sound example, track 99: Realisation of the closing section of Box 3

Soundhole harmonics, bi-tones, and nut-side combined study
Page 1



Sound example, track 100: Realisation of the whole study

Soundhole harmonics, bi-tones, and nut-side combined study
Page 2



Soundhole harmonics, bi-tones, and nut-side combined study
Page 3

Time in secs

Strings

1.00 1.05 1.10 1.15

① (XV)
② XII XIII XII XIII
③
④
⑤ i Glissando downwards XIII
⑥ 1 VI

p *mf*

Construct three similar phrases, allowing the resonances to decay to relative silence.

**Choose from the following:
Nut-side - frets V, VIII, X, and XIII, soundhole harmonics - SHL and SHr; bitones - frets XII, and XIII.**

Free dynamics

1.15 1.20 1.25 1.30

①
②
③
④
⑤
⑥

Soundhole harmonics, bi-tones, and nut-side combined study
Page 4

1.30 1.35 1.40 1.45

Strings ① ② ③ ④ ⑤ ⑥

mf *mp* *pp* $\leftarrow mf \Rightarrow p$ *mp* *mf* *pp*

SHR BX SH BXIII BX Rasg BVII Rasg

X Glissando upwards p BXIII BX i Rasg

SH BXIII SH BXIII

Simile p BXIII

Simile i Rasg

1.45 1.50 1.55 2.00

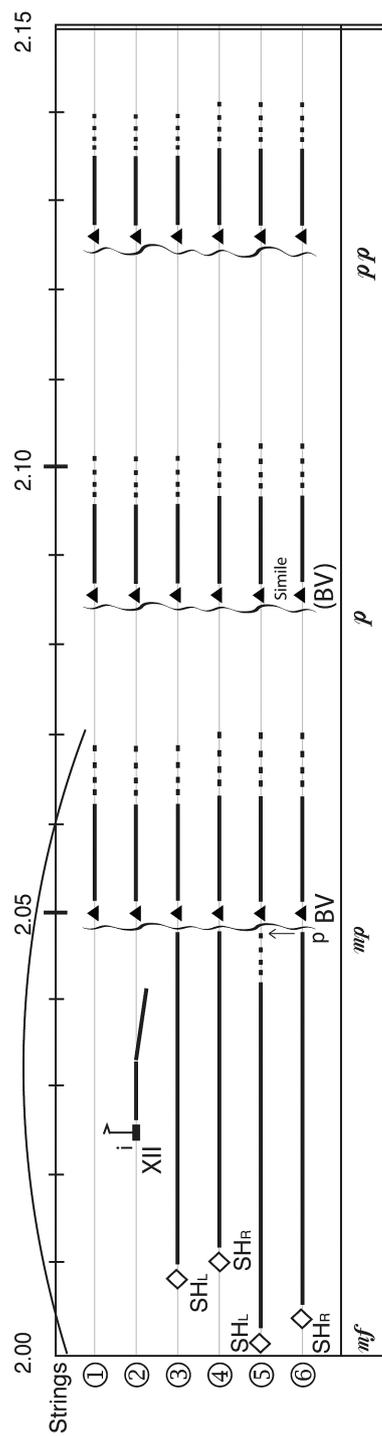
Strings ① ② ③ ④ ⑤ ⑥

mf *mf* *p*

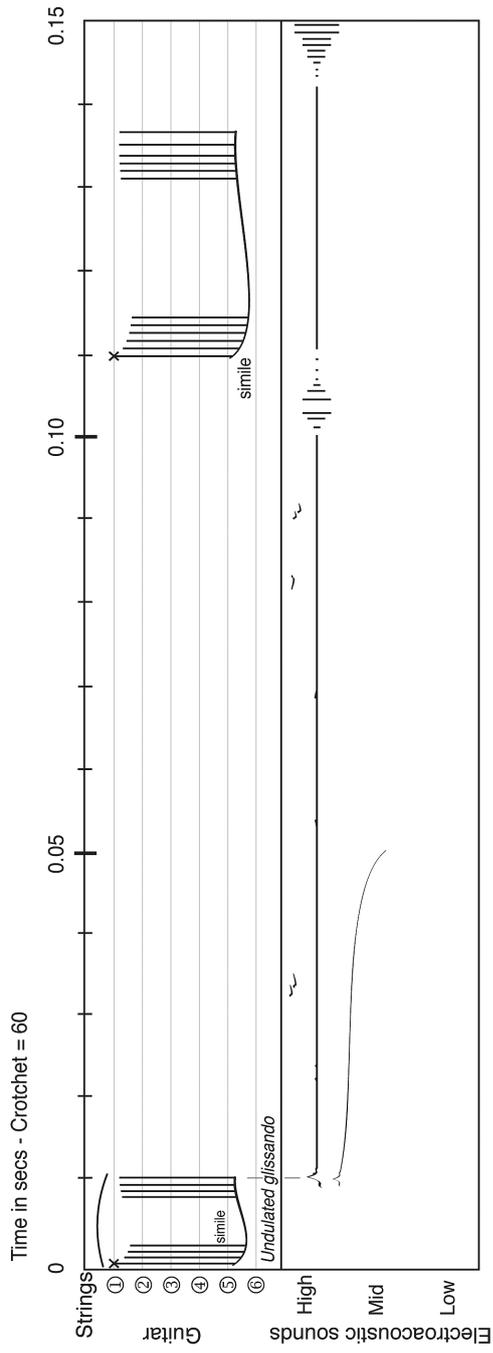
XII^m XIIⁱ Vib XIIⁱ XII

III_R III_R SHL V BV

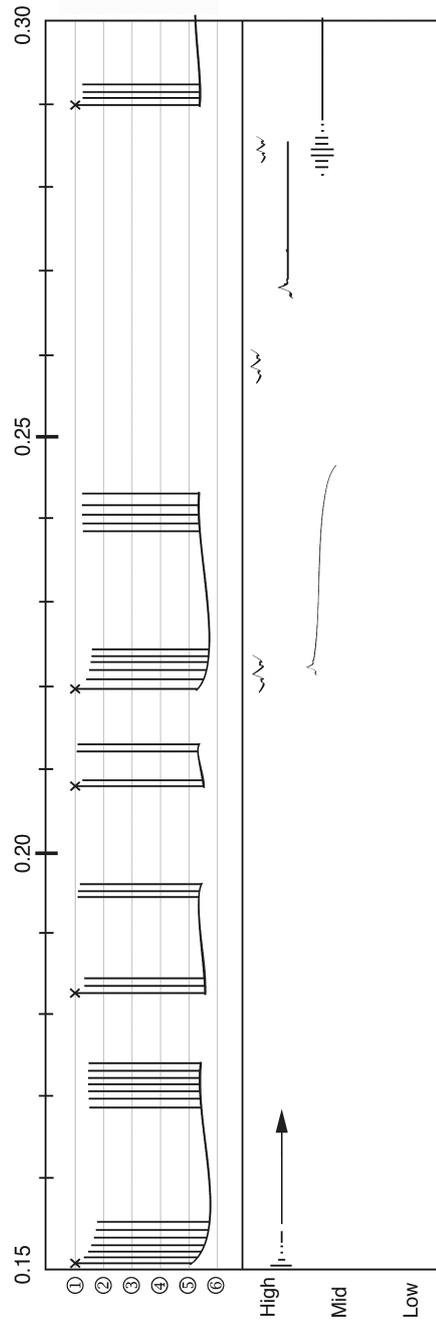
Soundhole harmonics, bi-tones, and nut-side combined study
 Page 5



Rapid mute study for guitar and electroacoustic sounds
Page 1

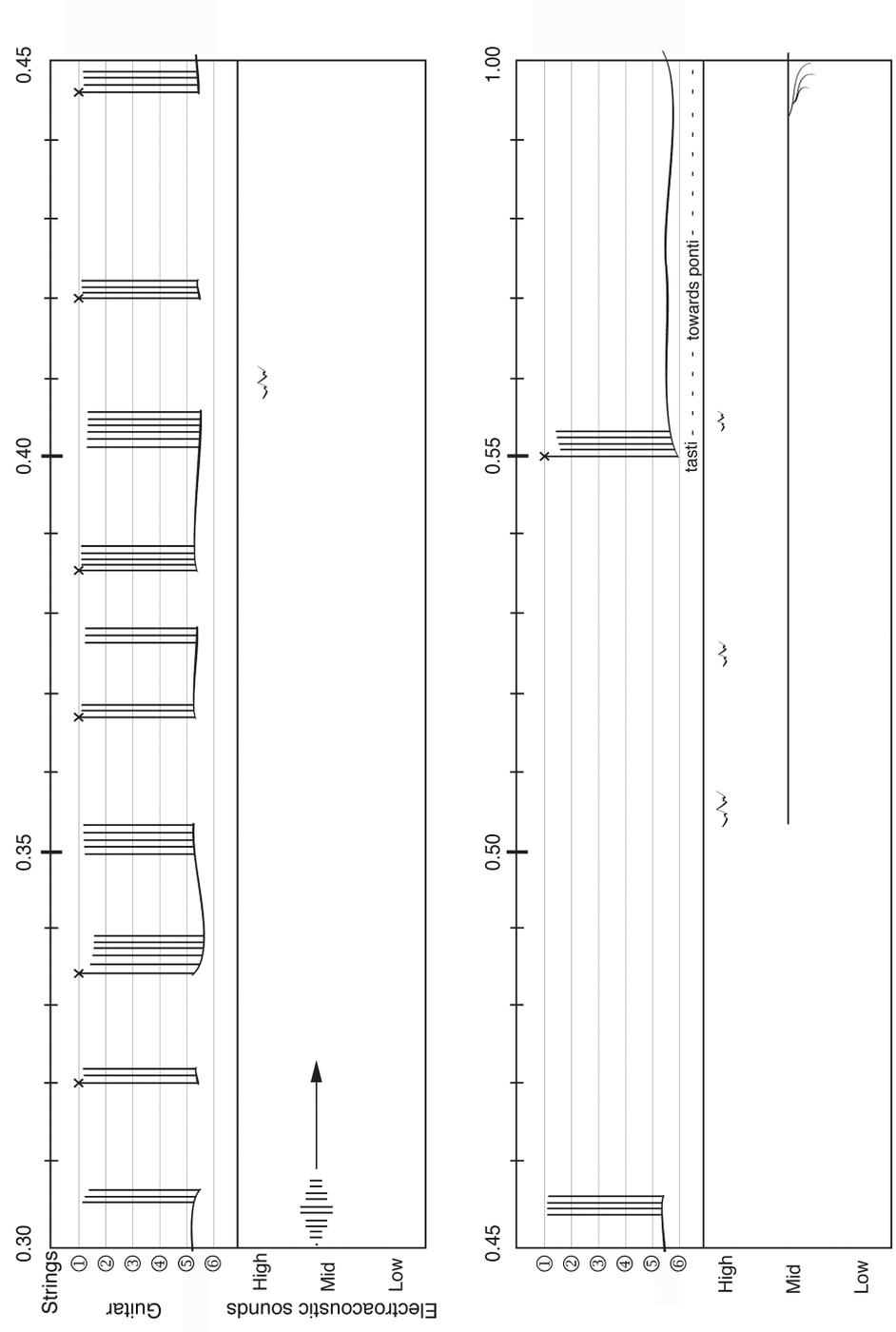


Free choice of upper strings (1 to 5), dynamic levels, right-hand tone colour, and left-hand movement.

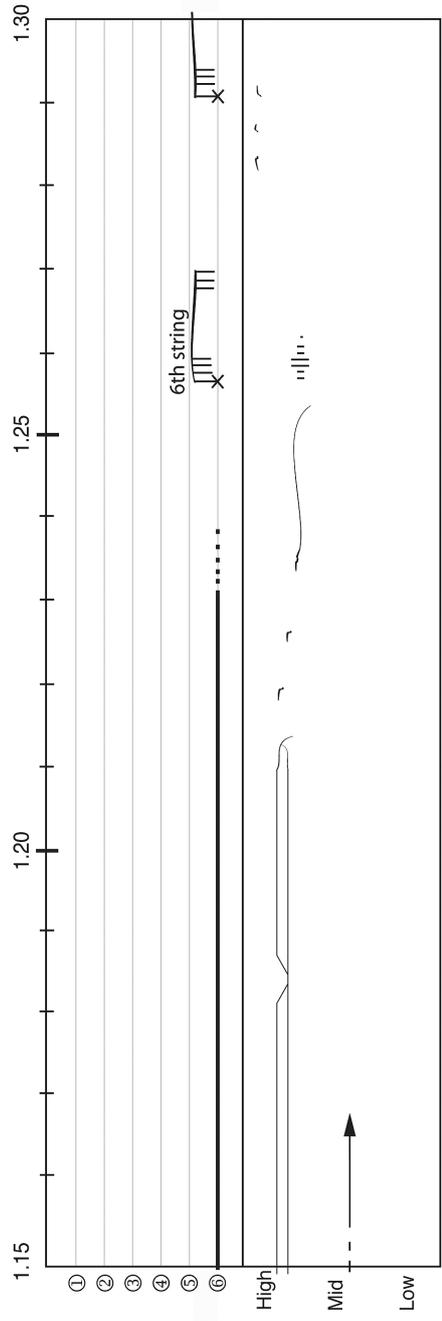
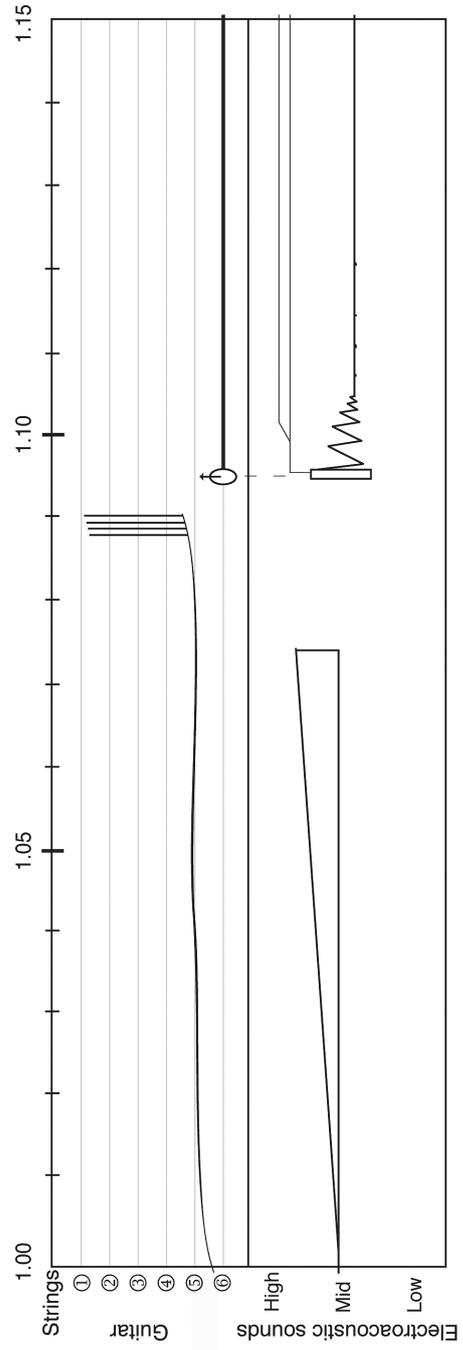


Sound example, track 108: Rapid mute study for guitar and electroacoustic sounds

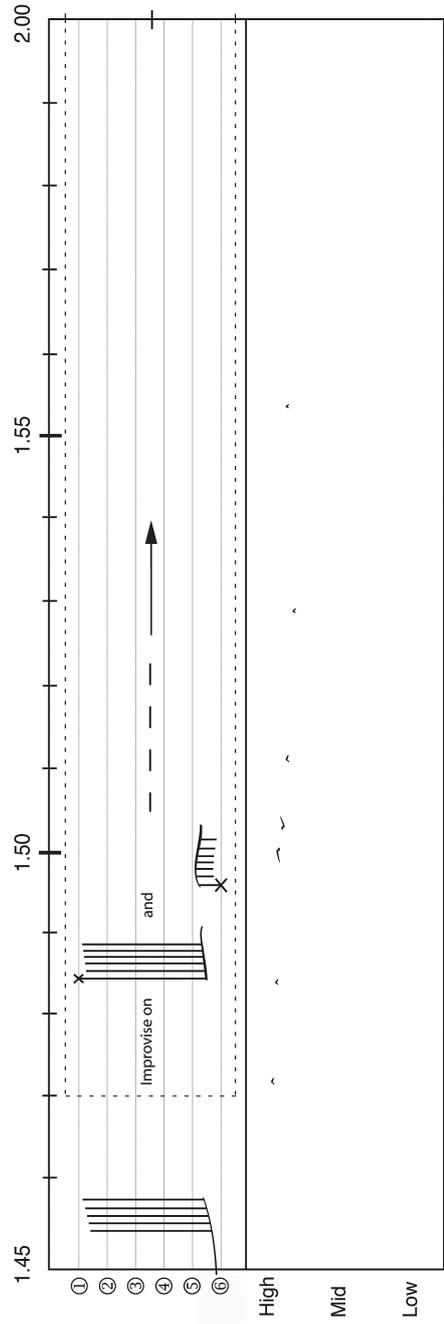
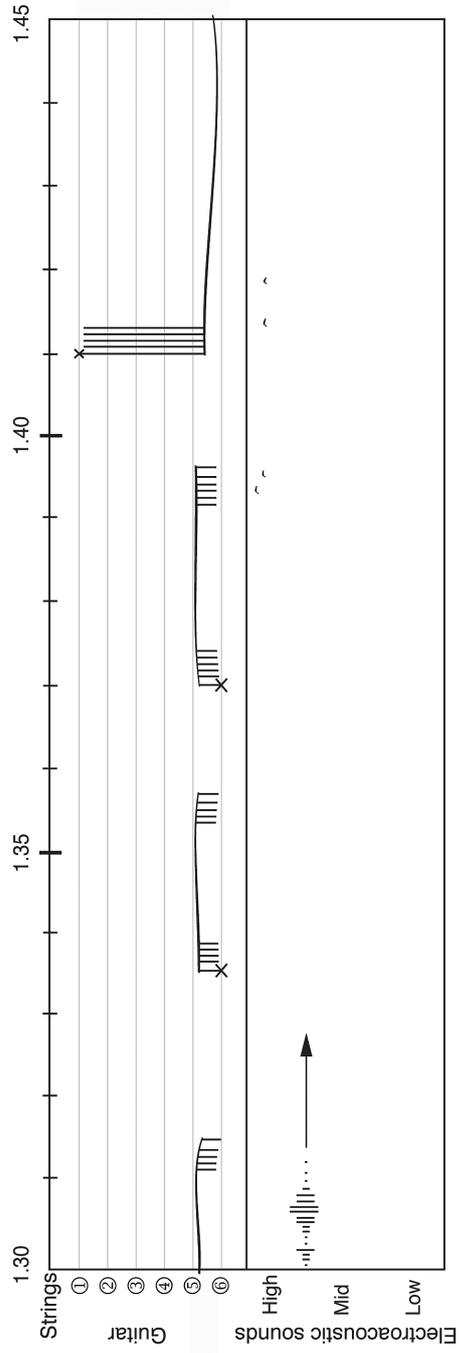
Rapid mute study for guitar and electroacoustic sounds
Page 2



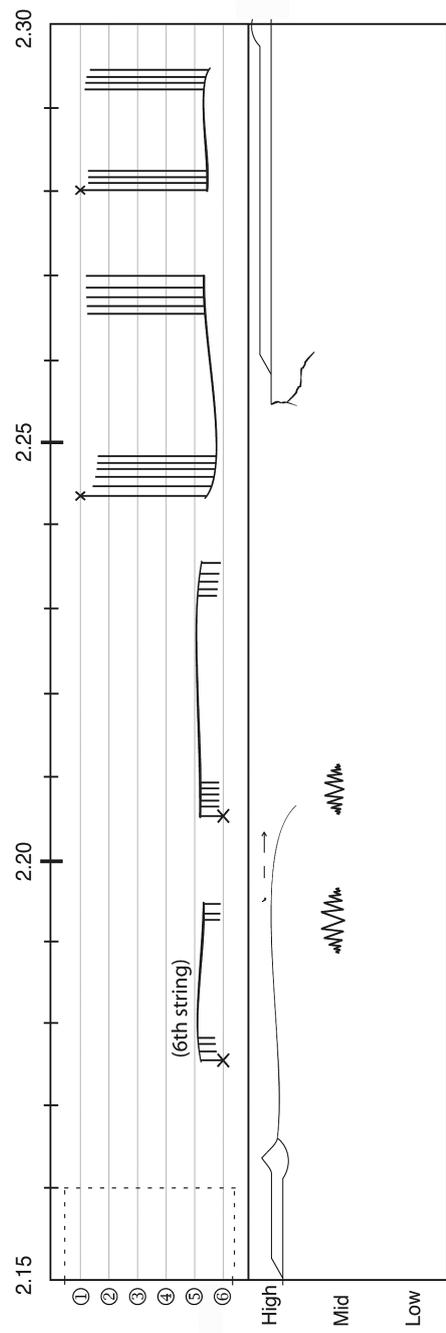
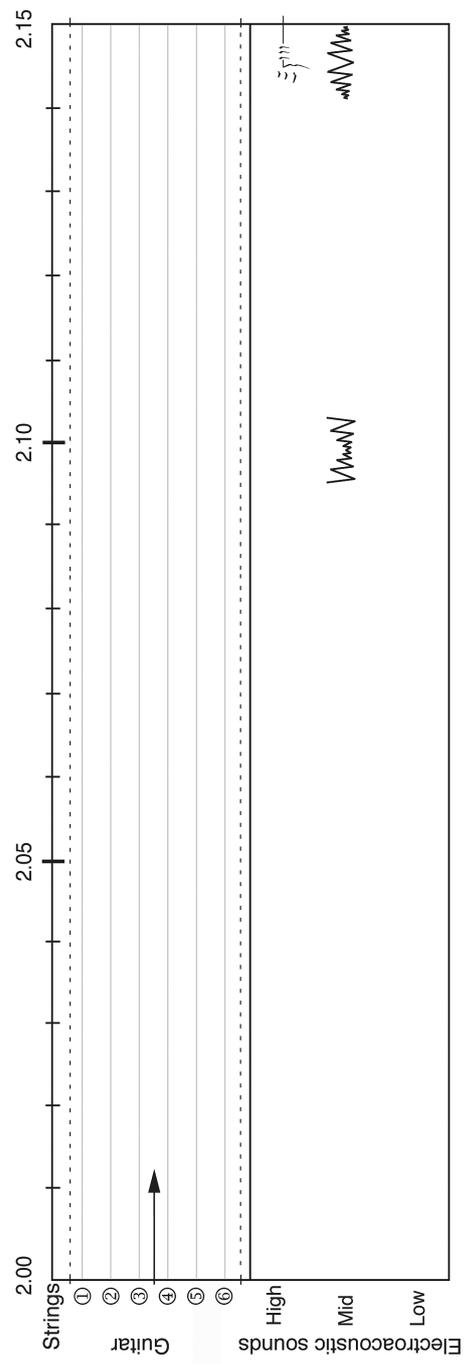
Rapid mute study for guitar and electroacoustic sounds
 Page 3



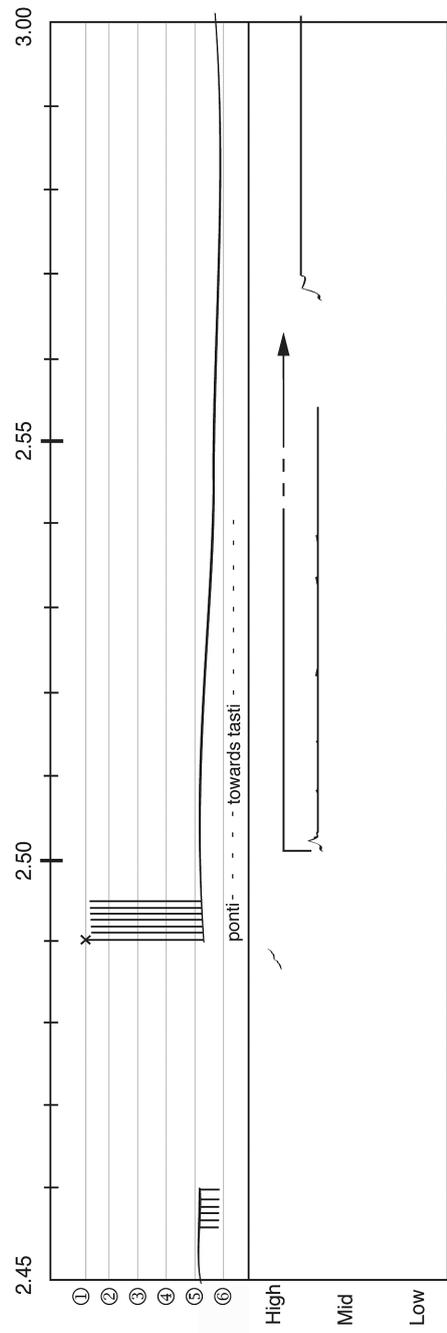
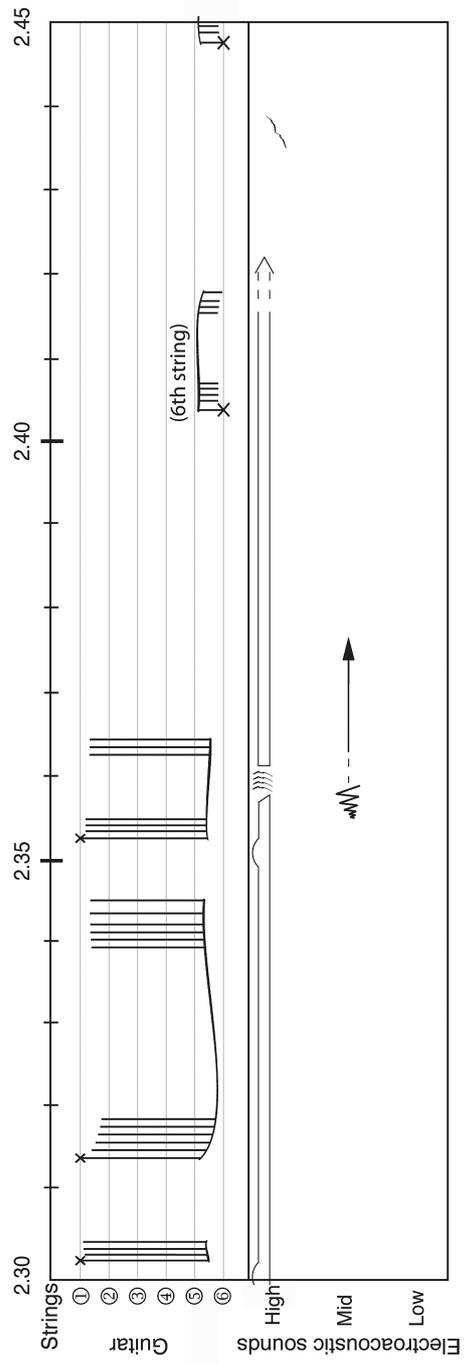
Rapid mute study for guitar and electroacoustic sounds
Page 4



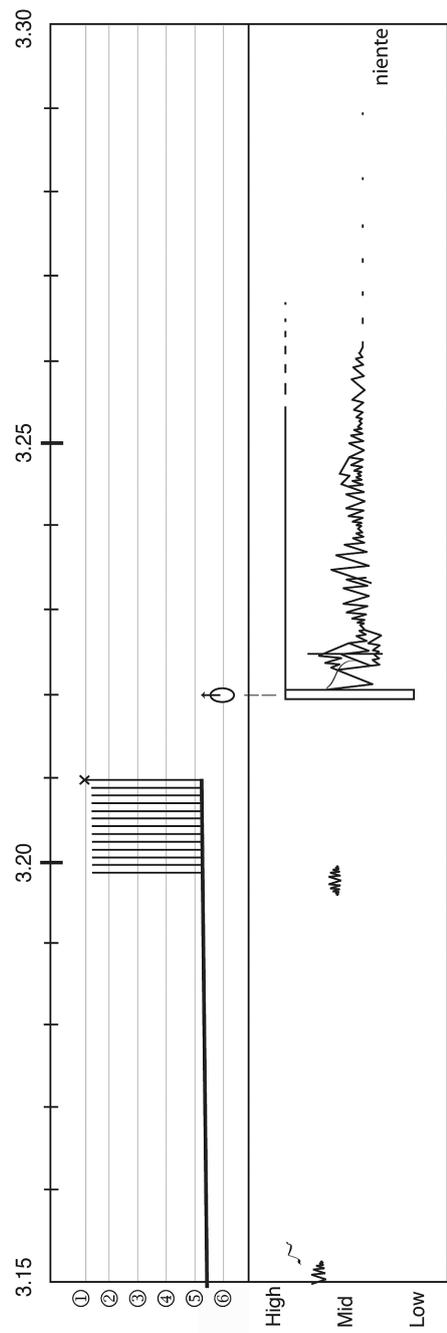
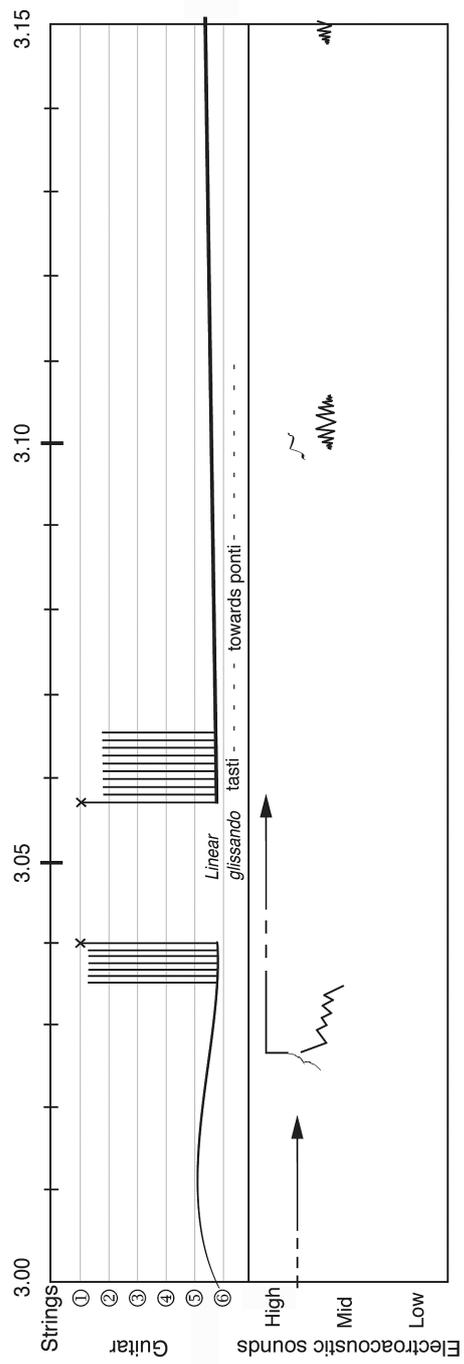
Rapid mute study for guitar and electroacoustic sounds
Page 5



Rapid mute study for guitar and electroacoustic sounds
Page 6



Rapid mute study for guitar and electroacoustic sounds
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