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Chapter 1

1 Introduction

Playing the guitar effectively requires precise mapping between musical notes and the specific fingers used to execute those notes on the fretboard (Zatorre, Chen & Penhune 2007). In this regard, the work of Gibson (1962) distinguishes between passive touch and active touch. According to Herbert (accessed 26 September 2016), passive touch is a receptive sense from an outside source, for example, when someone taps us on the shoulder. Active touch is invoked when we run our fingers over surfaces, feel the contours of objects as we grasp them, or pull and lift objects with our hands. Therefore, the perceiver controls the tactile stimulation. Dynamic (effortful) touch is based on the deformation of muscles and related connective tissue, as when an object is supported and moved by the body (Turvey & Carello 2011). The sensory experience associated with the use of the hands for active exploration and identification of 3-dimensional objects is referred to as haptic perception.

Complex interactions between the sensory, motor and cognitive systems enable organisms to identify objects. Haptic perception creates a difference in experience for the perceiver between passive and active touch. For example, if someone pokes you with a sharp pencil (passive), you might perceive a pricking sensation on your skin. If you touch the tip of the pencil yourself (active), you might perceive a pointed object (Herbert, accessed 26 September 2016). In the haptic perceptual system, nearly the whole body is engaged, unlike other systems (visual, auditory, taste, smell) which use separate organs such as eyes, ears, mouth, and nose to perceive (Gibson 1966, 50). The hand can be thought of as an executive organ within the haptic system because it both perceives and takes action. The hand can discover many object qualities in the

environment by grasping, groping, feeling, pushing, pressing, rubbing or weighing of the object (Kilbourn & Isaksson 2007).

Gibson (1979, 127) analyses the manner in which the 'values' or 'meanings' of things in the environment are (or can be) directly perceived. Gibson (ibid.) defines affordances as relational potentials for action between the organism and its environment: "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill". Gibson implies that an organism directly perceives the value of the environment through affordances. Gibson's affordance theory suggests that we do not perceive qualities in objects, but rather in their affordances (Kilbourn & Isaksson 2007). Perception drives action and vice versa in accordance with the perception-action cycle (Fuster 2013). Krueger (2014, 2) argues that "action possibilities in a perceiver's environment are specified relationally". According to Krueger, action possibilities occur in accordance with particular structural features of the environment and objects in it and "the repertoire of sensorimotor capacities the perceiver employs to detect and respond to these structural features".

Gibson (1979, 130) mentions that affordances do not change as the perspective of the observer changes. The affordance is invariant and is always there to be perceived. According to Hinton (2014), affordances exist in the properties of objects in the environment, whether they are perceived in the moment or not. The stairs around the corner in a building might be out of sight, but that doesn't mean the stairs' ability to support climbing doesn't exist. Gibson (1979, 132) comments that "The central question for the theory of affordances is not whether they exist and are real, but whether information is available in ambient light for perceiving them".¹

¹ Gibson's early work was mostly on visual affordances.

Shaw (2001, 280) argues that “affordances remain dormant goals unless complemented by effective means that the agent who authors the intention can bring to bear.” Affordances and the related concept of effectivities together define the ecological boundary conditions of the perceiving-acting cycle. The boundaries of success in the environmental potentials are set by affordances while effectivity summons the organism’s capabilities for realising the intended encounter within the boundary conditions. Effectivities transform potential experiences into actual ones, “affordances dispose, while effectivities deliver (actualize)” (Arbib 2006, 470). Windsor & de Bézenac (2012), citing Baily (1992), note that the morphology of the instrument itself is intentionally constructed to fit the effectivities (quality of bringing about an effect) of the human body.

Baily (1992, 149) writes, “The way the human body is organized to move is, in certain respects, a crucial element in the structure of music. A musical instrument is a type of transducer, converting patterns of body movement into patterns of sound. There is a precise isomorphism between music structure and movement structure. The interaction between the human body, with its intrinsic modes of operation and the morphology of the instrument may shape the structure of the music, channelling human creativity in predictable directions.”

In the case of a musical instrument such as the guitar, it is evident that the possible affordances that the instrument provides to a player do not change, but the realisation of these possibilities will depend on the player’s awareness of the effectivities on offer. De Groot (1978), in a classic article, investigated expert-novice differences in the domain of chess. His conclusions are applicable to expert performance in guitar playing. After a brief presentation (5 seconds), chess players reconstructed the positions of pieces on a chess board. Experts could recall many more pieces than novices could. De Groot compared reconstruction of a meaningfully arranged board

or randomly arranged board and found no differences in the recall accuracy of experts and novices. De Groot concluded that experts do not have a greater memory capacity than novices, but are superior at reconstructing the board because they perceive the pieces in terms of larger groups or chunks in comparison to the novices who perceive the pieces in fewer and smaller chunks. Related pieces are quickly recognised by experts as a cluster and stored in short-term memory as a single entity or chunk.

Short-term memory is limited to a maximum of more or less seven items (Miller, 1956; Snyder 2000), and therefore this chunking strategy greatly increases the number of pieces or patterns that can be recalled. According to de Groot (1978), the ability to encode quickly a complex configuration into familiar chunks is due to chess-specific patterns stored in long-term memory. Novices perceive relationships and structure through conscious reasoning processes, as opposed to experts who can perform the same task in less time by using unconscious pattern-recognition processes (Hoffman, 1992, 37-39; Beilock & Lyons 2015). Experts notice characteristics of information and meaningful patterns that are not always perceived by novices. Experts spend less time thinking about what action to take and more time analysing what is going on in the situation. Experts are able to monitor their own performance because of better metacognitive (process of thinking about thinking) skills. Experts detect problems and can spot abnormalities as a given situation progresses (Ross, Phillips, Klein and Cohn 2005).

De Groot (1978) discovered that chunking and pattern recognition enabled more experienced players to perform challenging tasks in less time. Youguo et al. (2008) argue that pattern recognition is one factor in fundamental human cognition or intelligence. Pattern recognition links to psychological processes such as the senses (for example, familiar smells, fingertips pushing down on guitar strings and so on), memory, study, and thinking, and is one of the

important windows through which we can obtain a perspective on human psychological activities. Human pattern recognition can be seen as a perception process that depends on knowledge and experience. Pattern recognition refers to a process of inputting stimulating (pattern) information and matching this with information in long-term memory (a system for permanently storing, managing, and retrieving information for later use) and then recognising the category to which the pattern belongs.

Pattern recognition depends on people's knowledge and experience, and without these two components, people cannot understand the meanings of the information stimulus pattern inputted (Youguo et al. 2008). Phrasher et al. (2011, 372) claim that pattern recognition (PR) is the most important quality of cognitive ability for both humans and animals. The ability to recognise patterns is directly related to intelligent behaviour. "The whole process involves extraction of information from the sensory signals, processing it using the information stored in the brain to reach a decision that includes some action". In our everyday life, we recognise voices, faces, places, to mention a few, and a multitude of other objects, by making use of pattern recognition.

By applying pattern recognition to the guitar, the player can quickly visualise the available notes on the fretboard that match the harmonic context of the moment, in real time. The improviser can pay more attention to the melody, rhythm and harmony by applying the available notes versus where the improviser has to allocate time to identifying the available notes on the fretboard. Efficient pattern recognition can also result in more efficient interaction when working with other musicians in a group. The guitar player is already aware of the location of available notes and has more time to listen and respond to what the other musicians are doing melodically, rhythmically, and harmonically.

A melody or a chord becomes a series of movements or a pattern of finger positions that are stored as muscular memories. A musical piece is thus stored both as visual figures and as tactile-motoric patterns. When we learn to play an instrument, we learn scales and chord shapes as finger routes, which are programmed into the brain and set frames for what we can play. Music that employs movements that lie outside these finger routes can be hard to play and demands extra effort (Lilliestam, 1996).

Similarly, Edwards (1989, x) notes how “The guitar is imbued with a pattern organization which can be considered an ergonomic interface between the player and their music.” The patterns are the interface for the four fretting fingers on the instrument side. Stringed instruments are either tuned in a symmetrical manner (meaning equal string to string intervals) or in a chordal manner (meaning tuned to a specific chord). Violins, violas, the electric bass, and many other stringed instruments are tuned using symmetrical systems.

For example, the violin is tuned GDAE in symmetrical fifths and the banjo is traditionally tuned GDGBD resulting in an open-string G major chord. The standard guitar-tuning system is neither symmetrical nor chordal. It is a characteristic of the instrument that it uses a unique tuning system made up of intervals of a 4th, 4th, 4th, 3rd, and 4th producing the notes EADGBE from bass to treble (Edwards 1989, ix-xi).²

By contrast, an instrument like the trumpet generally only produces one note at a time and is normally classified as a monophonic instrument. A guitar is a polyphonic instrument capable of producing multiple tones simultaneously, making harmonic material such as chords and their

² Although there may well be numerous articles and publications on the topic, this is useful to this specific study.

voicings possible. The curvature of the bridge of stringed instruments like the violin makes playing two, three, or four note double stops in one stroke on different strings harder to sound in tune. There are also some limitations of the four fretting fingers as a result of the symmetrical tuning system. The standard tuning system on guitar allows for optimisation of four fretting fingers and thus allows the player to finger chords even though the guitar also uses a curved bridge (Edwards 1989, ix-x). This thesis will be limited to discussing the standard tuning system because alternative systems afford different fingering patterns and are beyond the scope of the current research.

1.1 Aim

This study will focus on the application of the major and melodic minor scales and their modes to improvisation in different harmonic environments. Pattern and shape recognition are crucial components in fluid improvisation and will allow the guitar player to take action at a moment's notice. Each of the two scales will be memorised across the fretboard by using five patterns (with each pattern assigned to a different string as documented in Martino's reduction concept). Once these patterns have been stored in long-term memory, seven formulas corresponding to the seven modes of each scale will be introduced. Chunking (Snyder 2000) will play an important role in efficiently perceiving the correct pattern or shape that matches the harmony of the moment during the improvisation process. By efficiency I imply the definition as described in the Cambridge Advanced Learner's Dictionary & Thesaurus (2008) "the condition or fact of producing the results you want without waste, or a particular way in which this is done." To be skillful at jazz improvisation requires that the student develops the ability and vocabulary to improvise fluently in various musical situations.

The outcome of this research is based on a reduction concept that enables the guitar player to quickly recognise and execute possible note choices on the fretboard coinciding with the harmonic movement of a chord progression during improvisation. Emphasis will be placed on economy of movement from one pattern to the next. By economy I imply the definition as described in the Cambridge Advanced Learner's Dictionary & Thesaurus (2008) "the careful use and management of money or of time, energy, words, etc.:" The desired outcome of the study would be increased cognitive efficiency so that the patterns become integrated into motor memory, enabling the improviser to respond without thinking too much about the notes that make up the next phrase.

1.2 Rationale

I have taught jazz guitar at three different universities over the past ten years in Gauteng province, South Africa.³ During this time, I have observed that a number of students understand theoretical concepts and can even notate such concepts, but cannot always apply the theory fluently on their instruments during improvisation. It is my experience that novice improvisers often sound mechanical and lack imagination in attempting to apply theoretical concepts to the task of improvising over unfamiliar harmonic structures. While this may generally apply to novice instrumentalists, a key aim of this research is to assess the streamlining of this learning process for inexperienced performers.

³ University of the Witwatersrand from 2009-2016, University of Pretoria from 2009-2015, and Tshwane University of Technology (TUT) from 2007. I am still lecturing at TUT.

1.3 Statement of the research problem

It is in the nature of the guitar fretboard that the same note (or its octave equivalent) occurs on each of the six strings but in different areas (see Tagliarino 2003, 14-24). A pattern, for instance, a major scale, could be played on a single string. This would result in many inefficient movements on the fretboard. Therefore, patterns are rather played across multiple strings to solve the inefficiency problem when only using a single string. Two or three notes are usually formed on each consecutive string to make up patterns across multiple strings in a specific area or position. Goodrick (1987) says, “On the guitar, a position means a section of the fingerboard covering six frets across all six strings.”

One advantage of the standard tuning system on the guitar is that once a player has grasped a chord shape or scale pattern, that same shape or pattern can be moved up or down the fretboard to produce a similar chord or scale in a different key. (Similar results could also be obtained by other tuning systems). The use of multiple strings creates a more random layout of pitches across the guitar neck if compared to a piano, for example, that makes use of a linear layout. Tagliarino (2003, 13) writes, “The strings on the guitar are like six little pianos, each on a different string.” The random layout template on the guitar makes sight reading and voice leading of patterns quite difficult because any given pitch could be played on any of the six strings.

By voice leading, I imply the most economical movement from one pattern to the next. This concept could be applied in two ways. First, by moving economically from any note to the next during a single note improvisation. Second, by moving economically from any chord to another chord. The improviser has to visualise all of the possible patterns clearly within any given area on the guitar neck to move smoothly from the one to the next. Effective voice leading will

result in the most economical way to move between patterns, and this is one of the biggest challenges on guitar. Finding and evaluating economical ways to move around on the fretboard during the improvisation process will be crucial to this research project.

1.4 Research question

How do kinetically efficient actions and patterns interact to enable an improvising guitarist to navigate the fretboard most effectively?

1.5 Sub-questions

- 1) What is the most efficient way to structure patterns from the major scale and jazz melodic minor on the guitar by considering the layout of the instrument?
- 2) How can the benefits of chunking be applied to achieve cognitive efficiency, so that the economic patterns become part of motor memory?
- 3) What are the affordances that the guitar provides to the player and how do these affordances relate to dynamic touch and effectivities?
- 4) How would economy of movement be achieved from one pattern to the next?
- 5) How to test these on TUT guitar learners who have all completed a four-year guitar practical module?
- 6) How will evidence be collected and data be processed?

Chapter 2

2 Theoretical framework

From an empiricist perspective, John Locke (1664) introduces the ‘tabula rasa’ or blank slate picture of the mind. Locke argues that at birth the human being is like a blank slate; there is the potential to know things, but nothing is written on the slate yet. Locke (1894, 173) further claims that universal knowledge does not exist. Children start knowing nothing beyond certain physical needs and ‘idiots’ are incapable of recalling any information that they were exposed to during a learning process. According to Moshman (2005), development is the product of an active environment functioning on a passive mind with regards to Locke’s blank-slate theory.

Moshman (2005) argues that nativism is one alternative to empiricism and proposes that knowledge accumulated over the course of evolution is included in the human genetic heritage. The new-born’s mind represents knowledge of generations and is not just a blank slate. Developmental change is dictated by genes.

Moshman (2005) identifies constructivism as an alternative to both empiricism and nativism. The mind is an outcome of environmental and/or genetic heritage and an ‘active agent in its own development’. In the constructivist view, a creative process guided by the active mind promotes development.

To paraphrase Moshman (2005), an infant is surely not a blank slate, and the environment is not the only cause for development of the infant. There is an ongoing debate between psychologists about how minds, environments, genes and the amount of knowledge the infant has at birth interactively result in developmental change.

Klecun et al. (2016, 3) argue that constructivists “depict affordance as purely relational; not only as in relation to something but as constructed anew in the act of perceiving and enacting an affordance”. According to Klecun et al. (2016), Gibson (1968, 139), argues that “An affordance is not bestowed upon an object by the need of an observer and his act of perceiving it. The object offers what it does because it is what it is.” Klecun et al. (2006, 3) point out that this statement could sometimes be interpreted as implying that the actor’s general ability to perceive is independent of affordances. Klecun et al. (2006, 3) further argue that the actor’s understanding of affordances in contrast rather supports “affordances as properties that need to be (in general terms) perceivable”.

Klecun et al. (2006, 4), argue that a perceiving-acting system replaces an ‘animal’ as described in Gibson’s work, that may take advantage of affordances provided by the object. Klecun et al. (2006, 4) point out that this perceiving-acting concept is currently more often referred to in the field of ecological psychology. For example, Wagman and Carello (2001, 174) argue that “affordances are real possibilities for action for a perceiving-acting system”. Similarly to a perceiving-acting system made up of institutions and organisations as presented by Klecun et al., the perceiving-acting system in this study will be made up of guitar playing participants and a concept of reduction by applying patterns and formulas to increase the participants’ natural action capabilities in jazz improvisation. In this case, the jazz-improvisation goal will be to efficiently recognise and apply patterns to the guitar fretboard and voice leading effectively from one pattern to the next.

Klecun et al. (2016, 4) challenge the traditional associations of affordances as laid out by Gibson, where they assume that to exploit the potential of affordances, the affordances have to

be noticed and realised. This more current view of affordances links affordance theory to constructivism where the active mind promotes development.

Constructivism grew out of hermeneutics, the study of interpretive understanding or meaning. Constructivist researchers see hermeneutics as a way to interpret the meaning of something from a certain situation or perspective (Mertens 2015, 16). Within a qualitative approach (as in Chapter 3) a constructivist worldview allows the researcher to establish the meaning of a phenomenon based on the views of participants. Observation of participants' behaviour during engagement in activities makes up one of the key elements of data collection (Cresswell 2014, 48). Subjects receive information from the researcher and theories, patterns and generalisations are built up starting with the views of participants. Observations of actions of the subjects in their natural environment can closely be monitored by the researcher, noting that multiple realities could exist within the different individual interpretations of the participants.

In constructivism, individuals are active and take responsibility for the learning process. Learning theories include cooperative learning, problem-based learning, and project-based learning. The participant is expected to produce conclusions by implementing high-level thinking skills, decision making, collaborating and using their creativity. Participants are encouraged to 'do something about' instead of 'learn something about' (Demirci 2009, 24). The concept of scaffolding aids the learner in 'doing something about'. Scaffolding (Reiser and Tabak 2014, 44) implies that a learner is encouraged to perform more complex tasks than they would be capable of performing on their own, drawing from the support and problem-solving capabilities of a more knowledgeable individual.

Reiser and Tabak (2014) highlight an example in David Ausubel's work to apply a cognitive stance to pedagogy, regarding his notion of 'ideational scaffolds' as follows:

The term scaffolding also appears in Ausubel's (1963) work to refer to the ways advance organizers facilitate learning from texts. The advance organizers, short expository texts or concept maps, introduce novel terms and concepts, as well as their meaning and the relationships between the terms and concepts. These advance organizers enable learners to form an initial mental structure Ausubel called an 'ideational scaffold' that can help process subsequent text by providing an organization for integrating new knowledge. In this way, the advance organizer forms conceptual scaffolding for subsequent knowledge, similar to the way a building is built with the aid of scaffolding. This use of the term scaffolding is not typically referenced in the research on scaffolding within the learning sciences, which is mostly associated with sociocultural approaches to learning. However, it points to the alignment between how scaffolding is conceived of within the learning sciences and the broad perspective of constructivism, *in which learners are seen as active agents who construct their own knowledge based on their prior knowledge and their interaction with new experiences.* (Reiser and Tabak 2014, 44, emphasis added).

All of the participants in Chapter 4 already obtained certain skills or knowledge when they enrolled in the first year at Tshwane University of Technology (TUT). The participants proceeded to ask many specific and interesting questions and seek solutions to these questions, either from more experienced musicians or through transcribing material where the concepts were applied by experienced musicians. In jazz improvisation, the setback is often caused by processing large quantities of information versus playing meaningful melodies. By meaningful I imply melodies that correspond to the related harmonic implications of the moment but that also have melodic intent and direction in order to construct a melodic line with a communicative outcome.

The concept of reduction was introduced to the participants as one possible solution, but it was up to each individual to interact and explore the material to become proficient at applying the concept in a real-time situation. As students, the participants worked in ensemble groups, had

one-on-one lessons and collaborated and interacted with fellow musicians. The participants found the collaboration process invaluable to development as improvisers and to applying patterns on the guitar to improvisation.

Constructivism as a means of development in education is closely connected to experience. Learners have their own experiences and a cognitive structure based on those experiences that may suggest valid, invalid or incomplete preconceived structures. When connected to knowledge that is already in memory, new information or experiences will help learners reformulate their existing structures. For the new idea to become an integrated and useful part of memory, inferences, elaborations and relationships between old perceptions and new ideas must be personally drawn by the learner. If memorised facts or information are not connected with prior experiences, the information will quickly be forgotten (Demirci 2009, 26).

However, having factual knowledge about the instrument and the mechanics of how it is played does not mean that one can pick up a guitar and play it. A person can obtain information about hand position, finger motions, which strings to pluck, the sequence of notes to be played or chord shapes, but this does not enable the person to play a simple song on the guitar (Pascual-Leone 2001). Zatorre et al. (2007) argue that playing a musical instrument involves multiple components of the central (brain and spinal cord) and peripheral (nerves outside the brain and spinal cord) nervous systems. Motor systems in the brain control both gross and fine movements required to produce sound. The auditory circuitry processes the sound, which in return can adjust signalling by the motor-control centres as per the perception/action cycle (Zatorre, Chen, Penhune 2007). Fuster (2013, 123) writes, “The perception/action (PA) cycle is the circular flow of information that runs through the cerebral cortex and the environment in goal-directed behaviour, reasoning, and language.”

If a musician has to learn a new composition, both sensory and motor aspects have to be exquisitely coordinated. At first, the limbs move slowly, with variable accuracy and speed. Over time, visual, proprioceptive (the ability to sense stimuli arising within the body regarding position, motion and equilibrium), and auditory feedback allow for more successful execution of the task at hand. With sufficient practice, each movement is refined and the various movements chained into the correct sequence with the desired timing, resulting in fluency during execution (Pascual-Leone 2001). Repetition of the application of various concepts during jazz improvisation: for example, the execution of various scale or arpeggio patterns will over time, and through practice, result in a more fluent and economic execution of these patterns. Because of the application of the standard tuning template relevant to this study, the guitar affords an improviser the ability to quickly recognise patterns that can be moved in a vertical or horizontal direction on the guitar fretboard. I have noticed that many novice guitar students prefer to opt for a chord-scale approach as opposed to a chord tone (arpeggio) approach because they find the step-wise scale patterns easier to play than the wider intervallic arpeggio patterns.

According to Crook (accessed August 4, 2017), more and more jazz players have opted to use the chord-scale approach when improvising chords in progressions. The chord-scale approach implies that if a chord is diatonic to a scale, the scale can be used as a source to derive a melody from that chord. Crook further states that the chord-scale approach allows improvisers greater melodic and rhythmic mobility because scales can be played in steps as opposed to a chord tone approach where arpeggios are played in wider intervals or leaps. He argues that consecutive steps are much easier to play at fast tempi than consecutive leaps. Crook's argument is particularly relevant to the fretboard topology of the guitar.

A chord scale by definition has a combination of chord tones and tensions, and therefore contains more information than the chord tone approach that only consists of the basic chord building blocks. Crook argues that chord scales allow the novice player to utilise colourful melody notes that they may not be able to find by relying only on the ear. The result of this could be nondescript, shapeless, or meandering melodic lines.

Crook argues that the pioneers of jazz improvisation relied on their listening skills and their ability to outline the basic chord sound accurately. He recommends that novice players should first become acquainted with playing inside the chords before adding the tensions or colour tones.

2.1 Literature survey

In my own teaching experience, I have encountered the same problems that Crook identified immediately above in novice players when applying chord scales in jazz improvisation. At first, the student appears to be purely focused on locating the correct scale pattern applicable to the chord of the moment on the guitar fretboard. Typically, random but ‘diatonic’ notes are executed that do not always seem to connect with the ear of the player. If the ear does not hear melodies during improvisation, the fingers and eyes are pointlessly guided by scale patterns on the guitar fretboard. Even though the ‘correct’ notes are applied, improvised lines usually sound more mechanical and nondescript. It usually takes about two or three years before a motivated student can construct meaningful melodies that are not nondescript, shapeless, or meandering over chord changes by applying chord scales in jazz improvisation. The students are also generally more comfortable with the sound of the major scale modes as opposed to the more abstract-sounding melodic minor modes.

I have noticed that if an improviser has the ability to recognise patterns quickly, the improviser has more time to think about what they want to play instead of just focusing on locating the 'correct' notes using the 'paint by numbers' approach. For example, if the improviser economically recognises the correct notes at the beginning of a bar instead of halfway through the bar, the improviser has time to purposefully pick out notes versus just playing any random notes guided by a mechanical sounding chord scale pattern. The ability to quickly recognise patterns on the guitar fretboard could be an affordance to the improviser. Gibson (1977) defines the term 'affordances' as environmental action possibilities. In this study the affordance of the reduction concept is where the fingertip meets the fretboard. The affordance does not change for different players but rather the effectivities will change, this implies the relationship between the player and instrument will change and allow the improviser more fluency and economy. This concept has been developed in later work on music by Clarke (2005) and Windsor (2012).

A key part of this study will be to explore the affordances that the guitar and reduction concept provide to the player as well as the effect of dynamic touch (Gibson 1966). The direct musical environment can also present affordance to the player, for example, improved interaction with the other band members becomes more apparent if the player has time to pay attention to the surrounding environment (to second-guess what's coming, see cues, and so on) instead of only focusing on finding the correct notes. Experienced learners seem to spend less time on recognising scale patterns and more time on purposefully targeting notes that could be chord tones or tensions to shape improvised melodies dictated by their ear and the surrounding environment.

Identifying the patterns quickly is an important first step to becoming a proficient improviser. In itself this ability does not imply a shortcut, nor does this ability provide any guarantees that the improviser will construct meaningful melodies. The ear, experience, feel, phrasing, efficient use of intervals, targeting chord tones and rhythm, to name a few, are additional factors that will influence the outcome of an improvised melodic line.

This thesis will look at ways to identify patterns that make up the appropriate chord scale quickly and accurately (restricted to modes of the major and melodic minor scales) in any area on the guitar fretboard. I will focus on efficiency of the improvisation process applied to various harmonic progressions and economical movement when moving from pattern to pattern.

The morphology of an instrument is explored by Baily (1977, 275), who focuses on the interaction between the human body and the morphology of the instrument that may shape the structure of music, “channelling human creativity in predictable directions”. Baily concludes that certain motor structures underlie musical styles on a given instrument and these motor structures may influence decisions on composition and improvisation. This concept connects to Gibson’s affordance theory and the impact of these affordances on a specific instrument and player.

Emphasis will be placed on the technical aspects of guitar playing to provide a context for the system of reduction that will be tested in Chapter 4. There are many different concepts and approaches in jazz improvisation, and by examining some of these concepts in detail, I will explain where the concept of reduction originates from.

Goodrick (1987, 63) identifies four approaches to applying scale patterns, namely the Derivative, Parallel, Lydian Chromatic, and Common Tone approaches. According to Goodrick, the most common approaches consist of the Parallel and the Derivative.

Applying the Parallel approach when playing the major scale and its modes on the guitar would imply that seven different patterns (one pattern for each mode) would have to be memorised starting from each of the five strings (E string doubles, therefore only five) that contains the root of the applicable mode. For any specific major key, this would imply knowing all seven modes (seven patterns) from each of the scale degrees located respectively on the five strings. This would result in $7 \times 5 = 35$ patterns (i.e. five Ionian, five Dorian, five Phrygian patterns, etc.).

Fortunately, the topology of the guitar fretboard affords the improviser the ability to recycle the 35 patterns assigned to their specific roots located on each the five strings to play the major scales and modes from the remaining eleven keys. Any pattern of any of the seven modes played with a root on the same string will have a similar pattern layout.

By contrast, on piano, the scales/modes have identical intervallic formulas and even similar fingering patterns, but the combination of white and black notes create various pattern layouts on the keyboard in each of the various keys. For example, a major scale would have a different combination of black and white notes for all twelve keys although the scales have the exact same intervallic construction. Although 35 patterns is a lot of information to remember and process, the topology of the guitar has an affordance over the topology of the piano in this regard.

The particular topology of the guitar could also explain why jazz improvisers opt to use major or minor scales, embellishment of the melody or implementing chord tones with various approach tones during improvisation as opposed to using a complex modal approach before other approaches were conceived to chunk the information into smaller, more usable chunks.

The Derivative approach relies on a few master scale patterns that are applied through the use of various intervallic relationships. Applying this concept to the guitar and specifically to the major scale and its seven modes will result in only five patterns (for the twelve major keys) and seven formulas (to imply the seven modes). Goodrick (1987, 64) states that “Derivative is probably the easiest, but you ‘jump around’ some.” This approach could also be used for other applications, such as chords and arpeggios. The Derivative approach simplifies the problem of processing the large amounts of information found in the Parallel approach.

Chunking of 35 patterns required to perform the major scale modes in all keys in the Parallel approach, to only five patterns and seven formulas by implementing the Derivative approach could afford an improviser the ability to quickly and accurately call on or execute more options on the spot during the improvisation process. Miller (1956) discusses chunking and the capacity of short-term (working) memory. Miller’s concept is also explored by Bor (2012) with regard to the brain’s ravenous appetite for information and its constant search for patterns. The benefits of the Derivative approach and chunking will be noticeable if an improviser were to add more scales like the seven Melodic or Harmonic minor modes in all keys, that would result collectively in an additional 70 (35x2) patterns which would be added to the 35 major scale patterns that the improviser has to memorise with the Parallel approach.

Goodrick also mentions the Lydian chromatic approach. Russell introduced the Lydian Chromatic Concept of Tonal Organisation in 1953 and this “was the first theoretical contribution to come from jazz, and was responsible for introducing modal improvisation” (Russell, accessed February 16, 2016). The Derivative approach borrows from Russell’s original concept.

Russell’s book, *Lydian Chromatic Concept of Tonal Organization* (1953), had an immense impact on jazz musicians, writers, and scholars. The following quotations from Russell’s (1953, 253) book, highlight the significance of Russell’s concept. Significant improvisers such as Coleman said that the concept “surpasses any musical knowledge I’ve been exposed to”. Dolphy commented that the concept “gives you so much to work with”. Baker feels that it is “the foremost theoretical contribution of our time – destined to become the most influential philosophy of the future”. Garbarek commented, “The past, the present, the future, all in one. A must-have for the serious musician.” Farmer commented that “George enlightened me about a different way of playing music, an analytical way which enabled me to go on learning about music on my own.”

Maggin (1996, 257), writes that “Miles Davis became the first major jazz musician to be influenced by Russell’s ideas, and in 1958 he composed *Milestones*, which was based on two modes. He recorded *Milestones* with Coltrane on April 3, 1958, and both men felt liberated by the new harmonic philosophy. Davis continued to work on Russell’s concepts, and he created five selections for the first all-modal album, *Kind of Blue*.”

Russell (1953) created a root scale that was built up in perfect fifths from any given starting point resulting in a Lydian scale. This root scale is moved around intervallically and altered in

a number of ways to imply additional modes from various root scale sources during improvisation. The overtone series starts out with an interval of a fifth followed by the initial octave. If six consecutive intervals of a fifth are stacked on any chosen root note, a Lydian scale will be constructed. For example, a C root note will generate the following layout: C G D A E B F# to construct a C Lydian scale. This C Lydian scale creates a unified tonal gravity field where the C Lydian tonic is the centre of tonal gravity for the entire scale (see Figure 2.1).

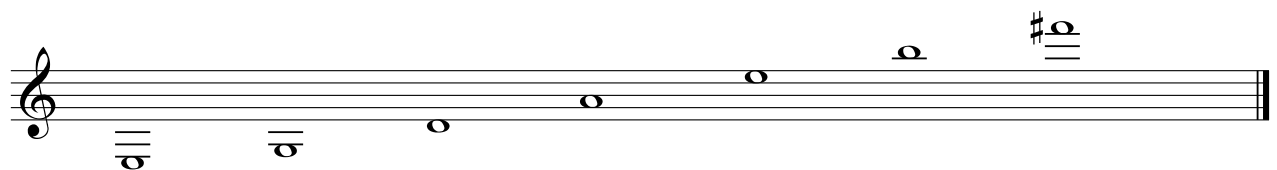


Figure 2.1: C Lydian scale constructed in fifths

The interval of a fifth is the foundation interval lying at the base of the overtone series. Therefore, this interval is the strongest harmonic or the first tonically biased interval and establishes itself as the basic unit of tonal gravity (i.e. all tones gravitate towards C as the tonic). Within a stack of intervals of fifths, the tonal gravity or ‘magnetism’ flows in a downward direction. In the C Lydian scale built up in fifths, this would imply that the tone F# yields to B as its tonic, B to E as its tonic and so on down the ladder of fifths until the tonical centre of gravity is reached on the lowermost tone, in this case C (Russell 1953, 2–3). The C Lydian scale built up in fifths could be re-written in linear order as C D E F# G A B C, as demonstrated in Figure 2.2.



Figure 2.2: C Lydian scale built up in fifths, re-written in linear order

Russell (1953) constructed a 12 note Lydian chromatic scale by implementing the 7 note Lydian scale as the foundation and adding to this foundation augmented and diminished chord colours to accommodate the remaining 5 notes, as illustrated in Figure 2.3.

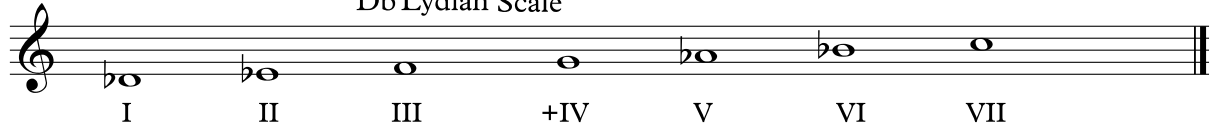
The image shows a musical staff with two systems. The first system is labeled 'C Lydian scale' and contains the notes C, D, E, F#, G, A, B, C. Below these notes are the chord symbols: I, V, II, VI, III, VII, +IV. The second system is labeled 'Additional chord colours' and contains the notes F# and G, with symbols bIII and bVII above them. Below these notes are the symbols IV and bII.

Figure 2.3: C Lydian chromatic scale

There are twelve Lydian chromatic scales available from each tone of the chromatic scale. Each of these Lydian chromatic scales consists of the seven principal (chord-producing) scales: Lydian, Lydian augmented, Lydian diminished, Lydian b7, auxiliary augmented, auxiliary diminished and Auxiliary diminished blues and four additional (non-chord producing) scales: the major, major b7, major #5 and African-American blues scales. The principal seven scales are referred to as vertical scales and the four additional scales as horizontal scales because they all include scale degree four (Russell 1953, 80-81).

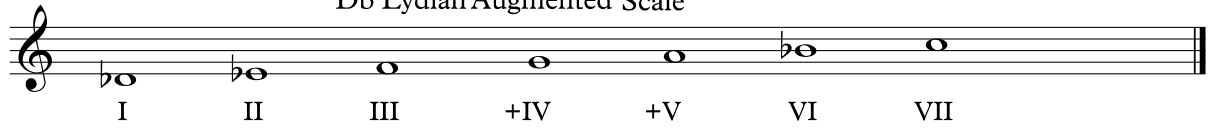
The application possibilities allow the improviser to choose any of the options as explained in Figure 2.4 (for example over an Eb7 chord, 5th of Ab major scale). The options are the Db Lydian (parent scale), Db Lydian augmented, Db Lydian diminished, Db Lydian b7, Db auxiliary augmented, Db auxiliary diminished, and Db Auxiliary diminished blues, Db major, Db major sharp 5th, Db major flat 7th, and the Db African-American blues scales. Collectively all of these scales make up the Lydian chromatic scale (Russell 1953, 82).

Db Lydian Scale



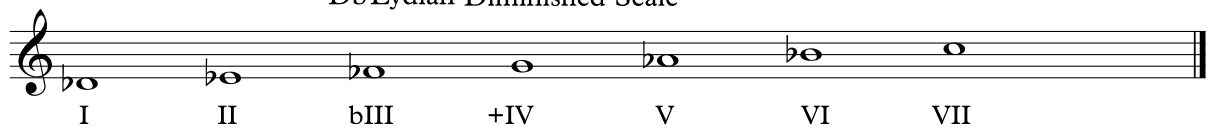
Musical notation for the Db Lydian Scale in treble clef. The scale consists of seven notes: Db, Eb, F, G, Ab, Bb, and C. The notes are labeled with Roman numerals I through VII below them.

Db Lydian Augmented Scale



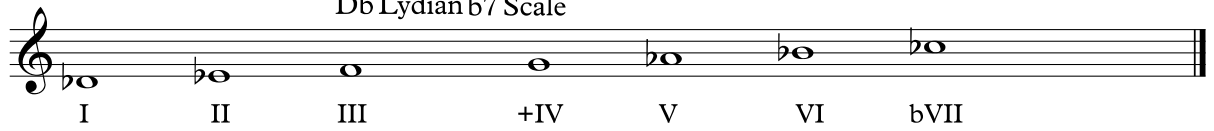
Musical notation for the Db Lydian Augmented Scale in treble clef. The scale consists of seven notes: Db, Eb, F, G, A, Bb, and C. The notes are labeled with Roman numerals I through VII below them.

Db Lydian Diminished Scale



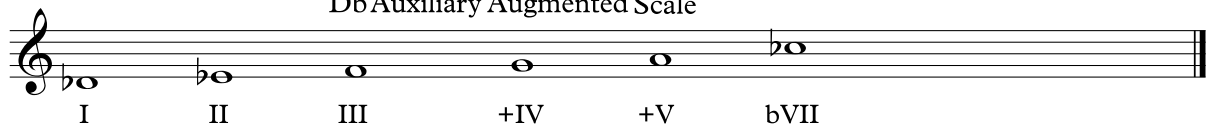
Musical notation for the Db Lydian Diminished Scale in treble clef. The scale consists of seven notes: Db, Eb, Fb, G, Ab, Bb, and C. The notes are labeled with Roman numerals I through VII below them.

Db Lydian b7 Scale




Musical notation for the Db Lydian b7 Scale in treble clef. The scale consists of seven notes: Db, Eb, F, G, Ab, Bb, and Cb. The notes are labeled with Roman numerals I through bVII below them.

Db Auxiliary Augmented Scale



Musical notation for the Db Auxiliary Augmented Scale in treble clef. The scale consists of seven notes: Db, Eb, F, G, A, B, and Cb. The notes are labeled with Roman numerals I through bVII below them.

Db Auxiliary Diminished Scale



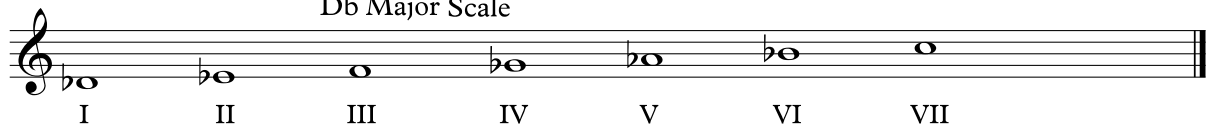
Musical notation for the Db Auxiliary Diminished Scale in treble clef. The scale consists of seven notes: Db, Eb, Fb, G, Ab, Bb, and C. The notes are labeled with Roman numerals I through VII below them.

Db Auxiliary Diminished Blues Scale



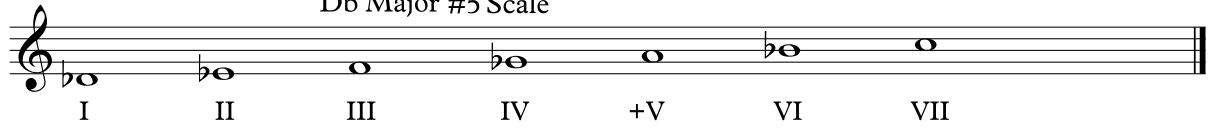
Musical notation for the Db Auxiliary Diminished Blues Scale in treble clef. The scale consists of seven notes: Db, Eb, Fb, G, Ab, Bb, and C. The notes are labeled with Roman numerals I through bVII below them.

Db Major Scale



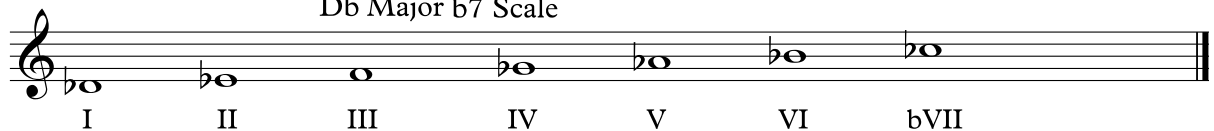
Musical notation for the Db Major Scale in treble clef. The scale consists of seven notes: Db, Eb, F, G, Ab, Bb, and C. The notes are labeled with Roman numerals I through VII below them.

Db Major #5 Scale



Musical notation for the Db Major #5 Scale in treble clef. The scale consists of seven notes: Db, Eb, F, G, A, Bb, and C. The notes are labeled with Roman numerals I through VII below them.

Db Major b7 Scale



Musical notation for the Db Major b7 Scale in treble clef. The scale consists of seven notes: Db, Eb, F, G, Ab, Bb, and Cb. The notes are labeled with Roman numerals I through bVII below them.

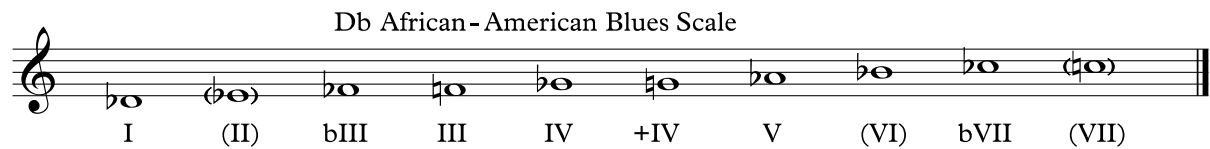


Figure 2.4: The seven principal vertical and the four additional horizontal scales that collectively form the Db Lydian chromatic scale.

The application of the parent Db Lydian scale to an Eb7 chord in Figure 2.4, would imply that the Db Lydian scale (Ab major scale) is applied on a b7th interval from the Eb7 chord's root. Db Lydian is the 4th mode in Ab major and therefore has the same notes as the 5th mode Eb Mixolydian, that is the orthodox mode played on an Eb7 chord, but has a different starting note. The Mixolydian scale makes up only one of the Russell applications that is available on the Eb7 chord during improvisation.

If the remaining available scales (see Figure 2.4) in the system are analysed, the following comparisons can be linked to a more conventional theoretical point of view: The Db Lydian augmented scale is the third mode of the Bb melodic minor scale, this would imply the Eb Lydian b7 scale. The Db Lydian diminished scale is the fourth mode of the Ab Harmonic major scale. The Db Lydian b7 scale is the fourth mode of the Ab Melodic minor scale. This would imply the Eb Mixolydian b13 scale. The Db Auxiliary augmented scale has exactly the same notes as the Eb Whole tone scale. The Db Auxiliary diminished scale has the exact same notes as the Eb Diminished scale (whole-half). The Db Auxiliary diminished blues scale has the exact same notes as the Eb Dominant diminished scale (half-whole). The Db major scale shares the same notes as the Eb Dorian scale. The Db major #5 scale is the third mode of the Bb Harmonic minor scale. This would imply the Eb Dorian #4 scale. The Db major b7 scale has the same notes as the Db Mixolydian mode from the Gb major scale. The Db major b7 would imply the

Eb Aeolian scale on the Eb7 chord. The Db African-American blues scale contains 10 notes, but from this template, the Eb minor pentatonic and Eb major pentatonic can be obtained.

The same concept could be applied to an Eb7(#5b9) chord for example where the G Lydian augmented (E melodic minor) takes on the role of the parent scale with an intervallic application of a minor third away from the root of the chord. The possible scale choices would be G Lydian, G Lydian augmented (parent scale), G Lydian diminished, G Lydian b7, G auxiliary augmented, G Auxiliary diminished and G Auxiliary diminished blues, G major, G major #5, G major b7 and the G African-American blues scales (Russell 1953, 84).

If we analyse the previous paragraph and only focus on the parent scale, we can conclude that Eb7(#5b9) is an altered chord, with Eb Altered scale as the appropriate chord scale. The G Lydian augmented scale is applied on a major third interval from the Eb7(#5#9) chord root. G Lydian augmented is the third mode in E Melodic minor, and therefore has the same notes as the Eb Altered scale (seventh mode in E melodic minor), but has a different starting note.

Russell (1953, 85) uses interval adjustments from the roots of various chord qualities to determine the degree of the chord on which the parent Lydian resides, for example on a minor 7(b5) chord the root of the parent Lydian tonic will be up a perfect 4th to imply the Locrian mode, on a Dom7 chord the root of the parent Lydian will be on the flattened seventh degree of the root of the dominant chord to and this will imply the Mixolydian mode.

Here is an analysed example of how Barry Galbraith has applied this concept to the first nine bars of *But Not for Me*, composed by George and Ira Gershwin (Russell 1953, 91).

The musical score consists of three staves of music in 4/4 time, E-flat major. The first staff (bars 1-4) features chords F⁹, E⁹, and Eb. The second staff (bars 5-6) features chords Eb Lyd Augmented, Db Lyd Augmented, Bb7(#5), and D Lyd Augmented. The third staff (bars 7-9) features chords Eb7, Db Lydian, Bbm7, G Lydian, Ab Lydian, and A⁹. Scale applications are indicated above the notes: Eb Lydian (bars 1-2), D Lyd Augmented (bars 3-4), Eb Lydian (bars 5-6), Eb Lyd Augmented (bar 7), Db Lyd Augmented (bar 8), Db Lydian (bar 9), G Lydian (bar 10), and Ab Lydian (bar 11).

Figure 2.5: Barry Galbraith's approach to applying the Lydian chromatic concept on the first 9 bars of *But Not for Me*

Instead of applying a scale based on the root of each chord over the first six bars, for example: F Mixolydian, E Lydian b7, Eb Lydian, F Lydian b7 and Bb Altered scales, Galbraith only deploys one of the available master Lydian or Lydian augmented scales (demonstrated in Figure 2.5) to construct his improvised melodies. These Lydian and Lydian augmented scale patterns have the exact same modal implication on each chord as described in the example above where a different scale is applied from the root of each chord.

On the first F9 chord Galbraith used Eb Lydian as the master scale that implies F Mixolydian (mode of the Ab major scale), on the E9 chord a D Lydian augmented scale implies E Lydian b7 (mode of the B melodic minor scale), on the Eb major chord Eb Lydian implies Eb Lydian (mode of the Bb major scale) on the F9 chord Eb Lydian augmented implies F Lydian b7 (mode of the C melodic minor scale), and in bar 6 the D Lydian augmented implies the Bb Altered scale on the Bb7(#5) chord (mode of the Cb melodic minor scale). This concept could be summarised as a system of reduction where quantities of random information are funnelled into more structured and usable chunks that can be called upon at a moment's notice.

Therefore, through chunking, an improviser could benefit from knowing the various intervallic applications from the roots of the chords that are being improvised on. From the above example: a Mixolydian scale implies that a Lydian scale root is a flattened seventh interval away from the root of a Dominant 7th chord, a Lydian b7 scale implies that a Lydian augmented scale root is a flattened seventh interval away from the root of a Dominant 7th chord, a Lydian scale implies a Lydian scale on the same root as the major chord that it is applied to and an Altered scale implies that a Lydian augmented scale root is a major third interval away from the root of a Dominant 7th chord. Therefore, the player has to identify the appropriate parent scale on each chord and be able to execute this parent scale fluently to utilise the Lydian chromatic concept to its fullest extent (Russell 1953, 91).

Pat Martino (1994a, 18) applied aspects of Russell's Lydian chromatic concept to the guitar and formulated a unique concept where minor activity in various areas on the fretboard takes on the role of the master scale instead of the Lydian scale. Martino prefers to improvise around minor positions and chord shapes, as opposed to using specialised scales or modes over each individual chord change. This minorisation process is unique to the Martino concept and is relatively guitar-specific. Martino could just as well have decided that Mixolydian, Phrygian or any of the other modes of the major scale could have been the parent scale, but there is definitely a logical explanation why Martino chose the minor option. Most guitar players start out by learning the minor pentatonic and Blues scales that they apply over various major and minor chord progressions and styles during improvisation as opposed to saxophone and piano players who usually start by learning the major scales. Therefore, this minorisation concept is not foreign to guitar players in general.

I studied from 1998 to 2007 with renowned local jazz guitarist John Fourie. Fourie was well-informed about the Lydian chromatic concept and applied the Russell concept during improvisation for many years by converting all scale applications to one of the parent Lydian scale patterns. During the 1990s Fourie discovered the Martino concept via *Linear Expressions* (1983) and converted all scale applications to Martino's system with Dorian as the master scale pattern. Fourie introduced me to a concept of reduction through chunking of the scale pattern layout on the guitar fretboard by applying the Dorian concept to all seven modes of the major scale in all twelve major keys with only five parent Dorian master patterns and seven formulas.

The minorisation concept could provide further chunking affordances to the guitar player if the melodic and harmonic minor scales and their modes are also added to the Dorian based major scale modes. Both the melodic and harmonic minor scales are minor. By altering the major scale to a minor Dorian scale point of view, the player will only apply minor scale patterns from the various master scales during improvisation. The Dorian scale forms the basic template from which the melodic and harmonic minor scales could then be constructed. One note is altered in each of the five Dorian patterns to achieve five melodic minor patterns. Following the same method, one note is altered in each of the five melodic minor patterns to obtain the five harmonic minor patterns laid out across the guitar fretboard. Therefore, Fourie's Dorian concept has powerful chunking affordances by standardising all of the patterns to one of the three parent minor scales that have closely related pattern layouts across the guitar fretboard. The intervallic applications of the twenty-one modes from the major, melodic and harmonic minor scales are also very similar because of this standardisation.

Martino often substitutes a related minor chord during improvisation for whatever chord quality he is playing over at the time. For example: In Figure 2.6 on an F7 chord (in Bb major),

Martino would substitute C minor patterns or more specific the C Dorian scale (C D Eb F G A Bb) for the conventional F Mixolydian scale (F G A Bb C D Eb G) (Martino 1994a, 18).



Figure 2.6: C Dorian scale substituted over an F7 chord with two additional passing tones (circled) for melodic interest

The F Mixolydian and C Dorian scales share the exact same notes, but the notes are in a different order and have a different starting note. Martino maintains in his book, *Linear Expressions* (1983, 8), that the scale patterns do not necessarily start and end on the root but rather display all possible scale tones in a specific area on the fretboard. Fourie conceptualised Martino's minor approach as a Dorian master scale template as follows: The C Dorian scale is a fifth away from the root of the F7 chord. This is a similar approach to the Russell concept, playing a pattern over a chord quality with a different reference note that the root note of the chord. Similarly to Russell, Martino applies intervallic formulas from the roots of different chord qualities to locate the correct master Dorian pattern. For example: on a minor7(b5) the root of the parent Dorian tonic will be up a minor third (Dm7(b5) = F Dorian scale = D Locrian scale) (Martino 1994b, 12). Martino uses the master Dorian scale patterns as a foundation, and from years of experience, impeccable phrasing and by using his ear adds selected chromatic passing tones to make up his unique style.

In Martino's *Linear Expressions* (1983, 9), the Bb major scale is represented as five master vertical C Dorian patterns across the fretboard. There are five patterns because each Dorian pattern is assigned to a specific root on the E, A, D, G and B strings.

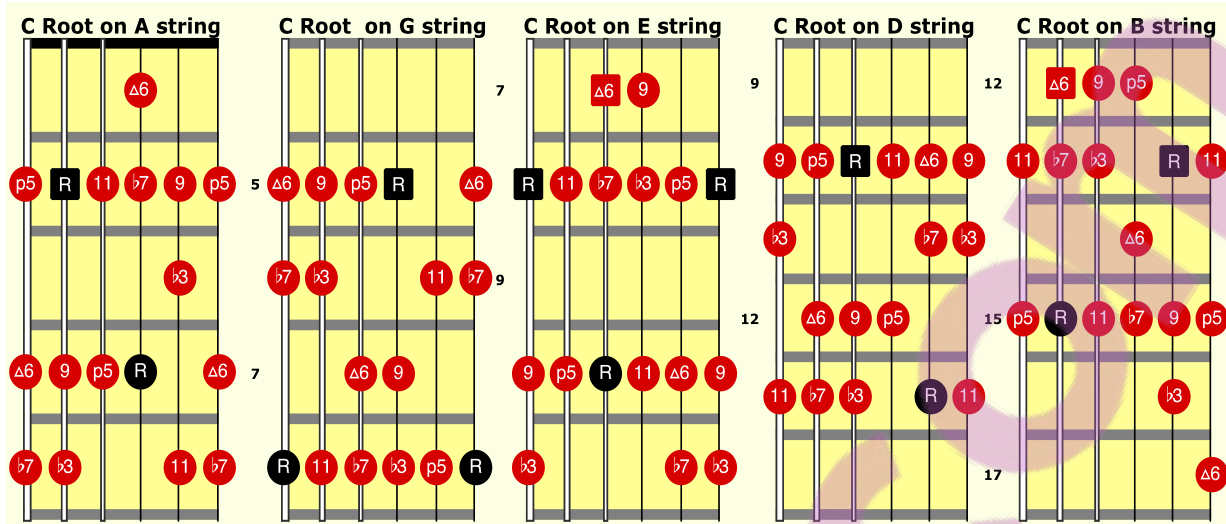


Figure 2.7: Five master vertical C Dorian shapes

Martino opted for a ‘closed’ pattern layout as indicated in Figure 2.7, where the scale tones are grouped together within a 4–5 fret span on the fretboard to map out the master Dorian scales. Each of these five closed patterns can be linked to ascending or descending neighbouring patterns to obtain the horizontal pattern indicated in Figure 2.8.

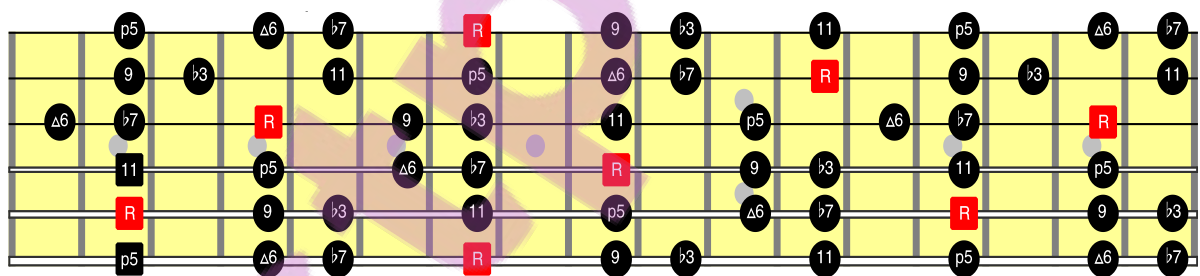


Figure 2.8: C Dorian horizontal shape

The closed pattern approach is not the only solution to obtain scale pattern layouts on the guitar fretboard. For example, Frank Gambale prefers to use a more symmetrical layout of three notes per string (open system) and seven parent scale patterns as opposed to the five master scale patterns implemented by Martino in the closed system. In his book, *Improvisation made easier*

(1997, 22), Gambale uses this approach for all scale patterns: for example, a C Dorian scale would have the following layout as indicated in Figure 2.9. These open patterns can also be linked together to obtain the same layout as Figure 2.8 horizontally across the fretboard.

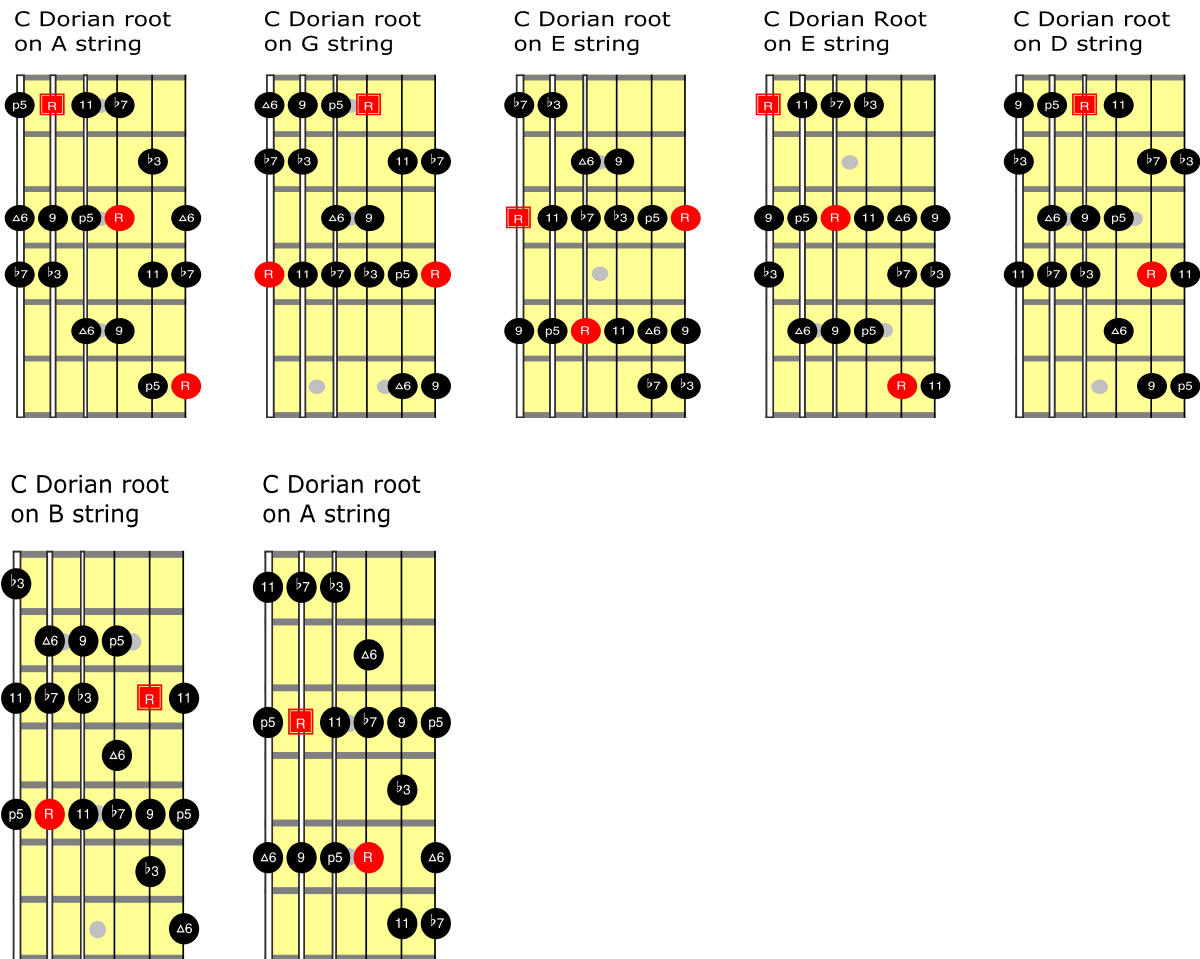


Figure 2.9: C Dorian three note per string shapes

The closed system produces ‘box’ patterns that usually have a span of four to five frets as opposed to the open system with a standard span of six frets. Notice that the open system is made up of an overlap of notes from two adjacent closed patterns. A mixture of two and three notes per string combinations occur in the closed layout, versus the more symmetrical three notes per string layout in the open system. The inquiring improviser could even consider using four notes per string patterns to construct scales on the fretboard. Any or all of the various

approaches for constructing pattern layouts on the guitar fretboard could be applied in the Martino concept. It is really up to each individual player to decide what works for them. All of the research participants in Chapter 4 first memorised the closed patterns and then later a few of the participants altered some closed patterns to open patterns to meet their own playing requirements, especially when streamlining between the Dorian and melodic minor pattern layouts.

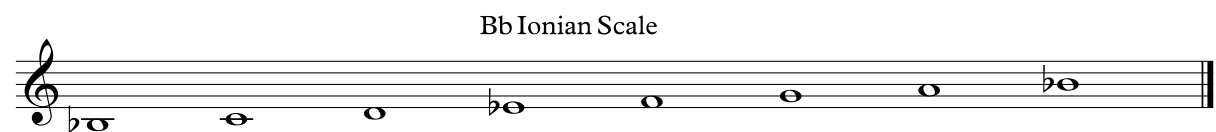
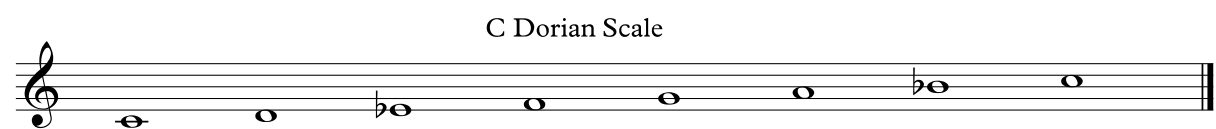
It is evident that playing the guitar requires the use of both the left and right hands. Both the closed and open pattern approaches have the potential to produce the notes of a parent Dorian or melodic minor pattern in the left hand. The right hand activates the corresponding string or strings, that the left-hand presses down, to play in any specific note or notes within a pattern on the fretboard. According to Bruno (2004), alternate picking (where a downstroke is always followed by an upstroke or vice versa), as the only method implemented by the right hand, does not always afford the most efficient way to move a pick across various strings. Bruno discovered that the pick movements as a result of alternate picking are uneconomic when changing between two strings. A downstroke on the first string would imply that the tip of the pick has to move over the next target string to allow for an upstroke.

Bruno (2004), conceptualised an economic approach to ensure the least amount of pick movement when changing between two strings. Movement to a higher string uses a downstroke, movement to a lower string uses an upstroke. Any movement on the same string uses alternate picking. The concept of economy picking could be applied to both closed or open shapes to afford the player more economic movement when changing between strings.

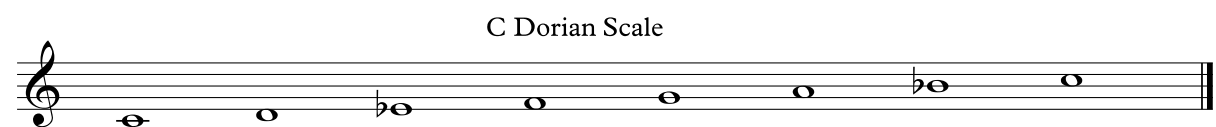
Quick recognition of the appropriate intervallic applications of the Dorian or melodic minor patterns during improvisation is a key component in obtaining efficiency. The intervallic applications link the knowledge of the scale pattern layouts assigned to specific roots to exact locations on the fretboard. This allows the improviser to effectively apply the master scale patterns in different areas on the fretboard.

Martino's *Creative force part 2* (1994b) introduces intervallic formulas to locate the roots of the correct parent Dorian shapes to imply the seven modes of a major scale:

On Major 7 chords apply Dorian on the **major second** to imply Ionian. For example: Bbmaj7

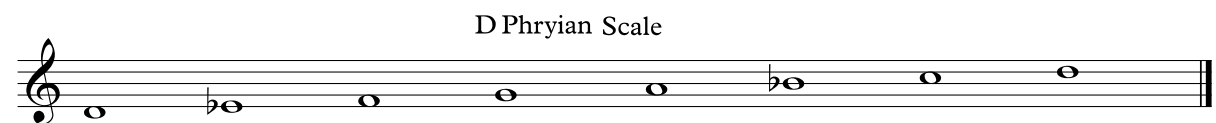
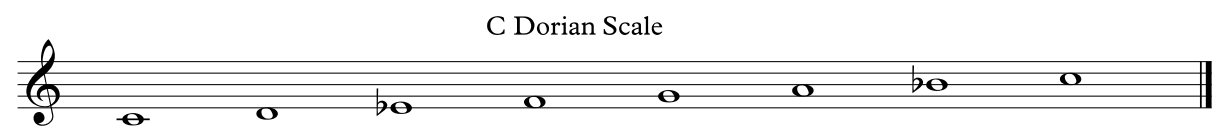


On Minor 7 chords apply Dorian on the **root** to imply Dorian. For example: Cm7



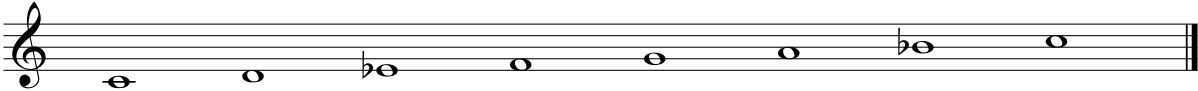
On Minor 7 chords apply Dorian on the **flattened seventh** to imply Phrygian. For example:

Dm7




On Major 7 chords apply Dorian on the **major sixth** to imply Lydian. For example: Bbmaj7

C Dorian Scale

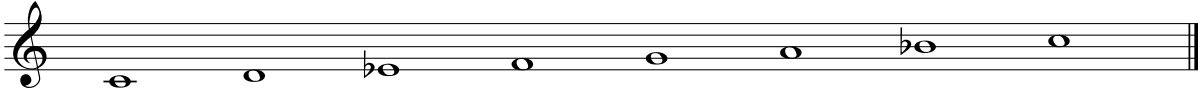


Eb Lydian Scale




On Dominant 7 chords apply Dorian on the **fifth** to imply Mixolydian. For example: F7

C Dorian Scale

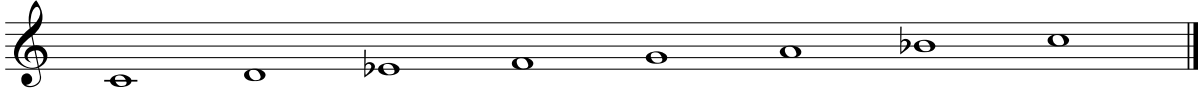


F Mixolydian Scale

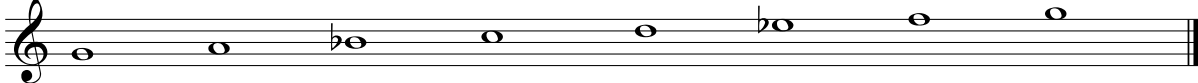


On Minor 7 chords apply Dorian on the **fourth** to imply Aeolian. For example: Gm7

C Dorian Scale



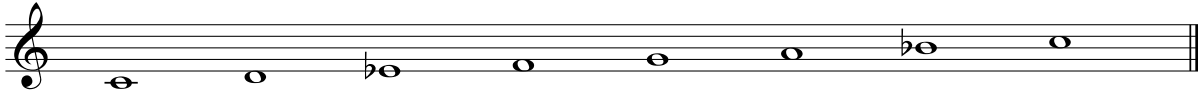
G Aeolian Scale



On Minor 7(b5) chords apply Dorian on the **flattened third** to imply Locrian. For example:

Amin7(b5)

C Dorian Scale



A Locrian Scale




Figure 2.10: Intervallic formulas applied to the Dorian master scale

Martino (1994b, 7-12) focuses on the Dorian, Lydian, Mixolydian, and Locrian modes. Through further exploration of the concept, John Fourie and I discovered the applicable parent Dorian patterns for the Ionian, Phrygian and Aeolian modes (included in Figure 2.10).

Martino (1994b, 22) also introduces two extra applications of the parent Dorian shapes on altered dominant 7 chords. On a D7(#5b9) a Dorian shape can be applied on the flattened seventh. This application is exactly the same as Phrygian on a minor chord, and therefore could be seen as a Phrygian mode used over an altered dominant 7 chord. For example:

C Dorian Scale over D7(#5b9)

b7
Root
b9
#9
4
5
b13
b7

On an Alt Dom 7 chord a Dorian shape can be applied on the b2 (42). For example: B7(#5#9) can use C Dorian to imply the altered tensions.

C Dorian Scale over B7(#5#9)

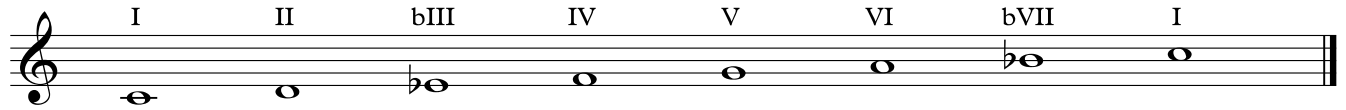
b9
#9
3
b5
b13
b7
7
b9

The major seventh note is a passing tone, coincidentally also found in the bebop dominant scale, and as such should not be emphasised, but these two additional applications extend the use of the master Dorian shapes into altered dominant territory.

Further explorations of the Martino concept resulted in discovering that if the flat seven note in the Dorian scale is raised to the major 7, a melodic minor master root scale becomes available. In similar fashion, if the sixth of the melodic minor is lowered to the flattened sixth

a Harmonic minor parent scale is obtained. This opens up a lot of melodic possibilities when improvising over chord progressions.

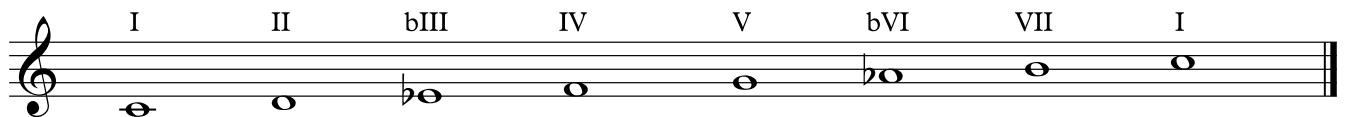
C Dorian Scale



C Melodic Minor Scale



C Harmonic Minor Scale



Martino's minor conversion concept applied to the melodic minor in Figure 2.10 will result in the following master shapes and formulas:

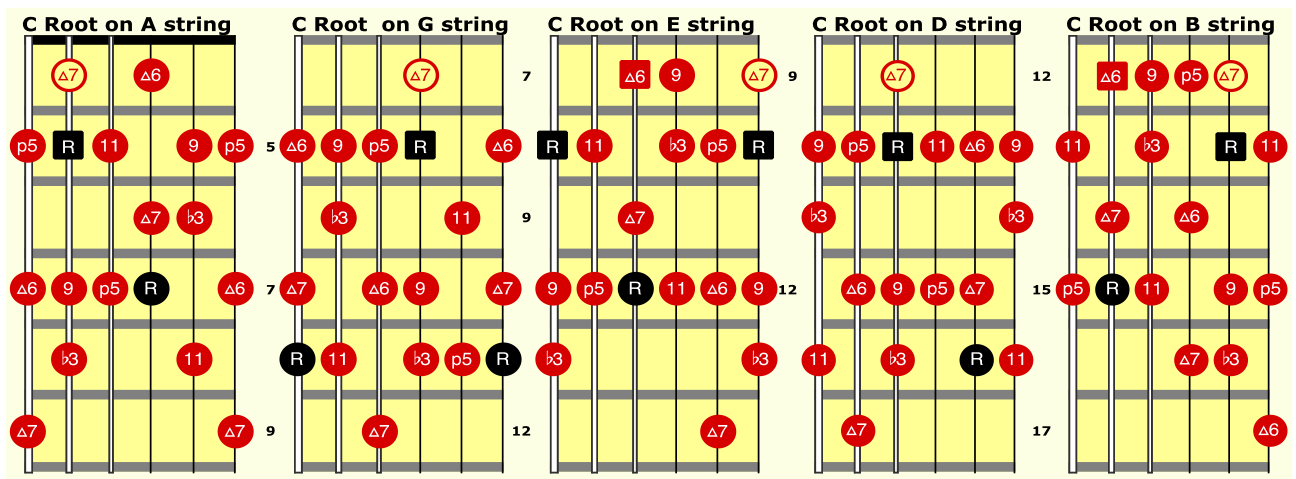


Figure 2.11: Five master vertical C melodic minor shapes

If the five vertical C melodic minor parent shapes are linked together in Figure 2.11, the following layout obtains horizontally across the fretboard.

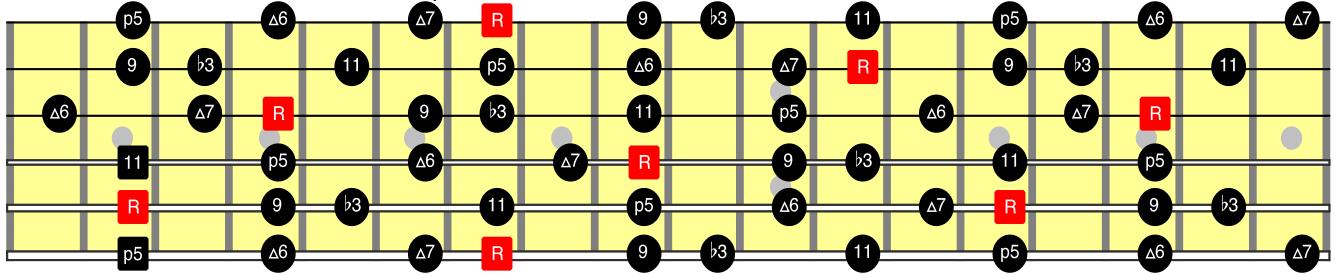
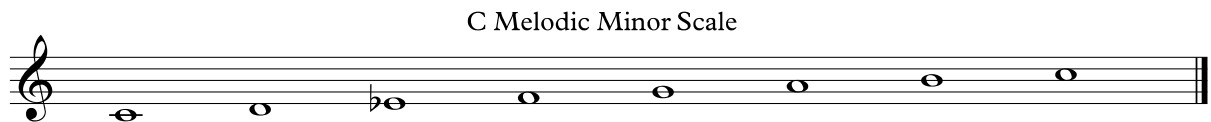


Figure 2.12: C melodic minor horizontal shapes

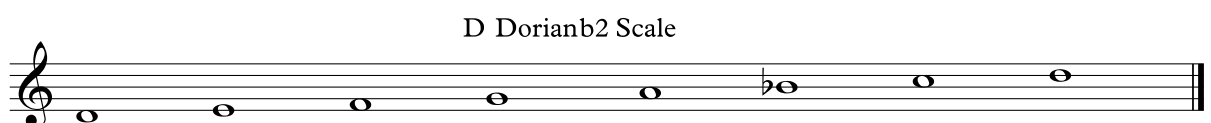
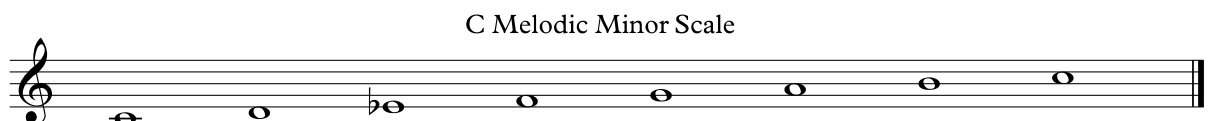
Intervallic formulas to locate the roots of the correct parent melodic minor shapes to imply the seven modes of a melodic minor scale are as follows:

On Minor(maj)7 or Minor6 chords apply melodic minor on the **root** to imply melodic minor.

For example: Cmin(maj)7



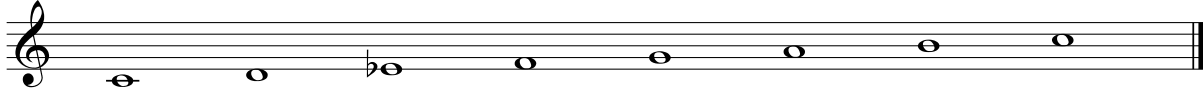
On Minor7 chords apply melodic minor on the **flattened seventh** to imply Dorianb2. For example: Dm7



On Major7(#5) chords apply melodic minor on the **major sixth** to imply Lydian Augmented.


For example: Ebmaj7(#5)

C Melodic Minor Scale



A musical staff in treble clef showing the C Melodic Minor Scale. The notes are C4, D4, E4, F4, G4, A4, B4, and C5. The F4 note has a flat sign.

Eb Lydian Augmented Scale



A musical staff in treble clef with one flat in the key signature (Bb). The notes are Eb4, F4, G4, A4, B4, C5, and Eb5. The Eb4 and Eb5 notes have flat signs.

On Dominant7(#11) chords apply melodic minor on the **fifth** to imply Lydian b7. For example:


F7(#11)

C Melodic Minor Scale



A musical staff in treble clef showing the C Melodic Minor Scale. The notes are C4, D4, E4, F4, G4, A4, B4, and C5. The F4 note has a flat sign.

F Lydian b7 Scale

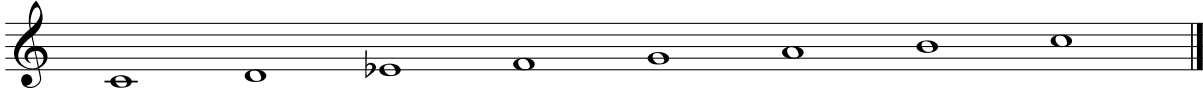


A musical staff in treble clef with one flat in the key signature (Bb). The notes are F4, G4, A4, B4, C5, Bb4, and F5. The Bb4 note has a flat sign.

On Dominant7(b13) chords apply melodic minor on the **fourth** to imply Mixolydianb13. For

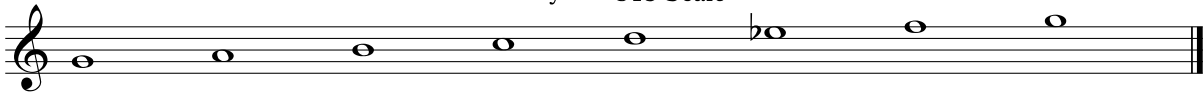
example: G7(#5)

C Melodic Minor Scale



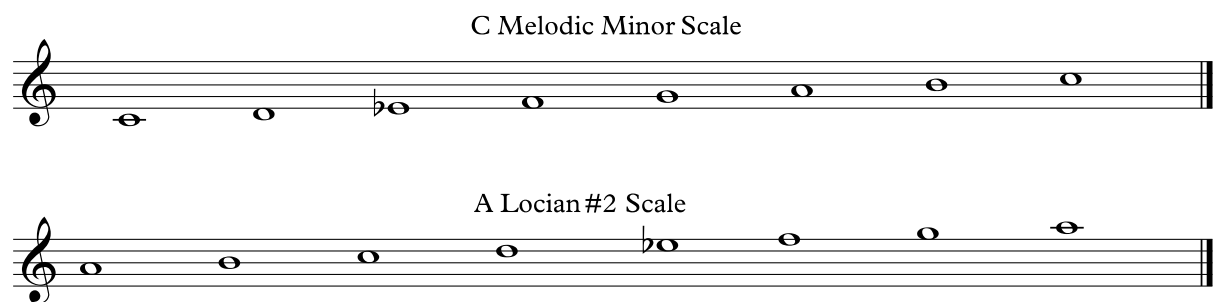
A musical staff in treble clef showing the C Melodic Minor Scale. The notes are C4, D4, E4, F4, G4, A4, B4, and C5. The F4 note has a flat sign.

G Mixolydian b13 Scale



A musical staff in treble clef with one sharp in the key signature (F#). The notes are G4, A4, B4, C5, B4, A4, G4, and F#4. The F#4 note has a sharp sign.

On Minor7(b5) chords apply melodic minor on the **flattened third** to imply Locrian#2. For example: Amin7(b5)



On Dominant7(alt) chords apply melodic minor on the **minor second** to imply the Altered scale. For example: B7(alt)

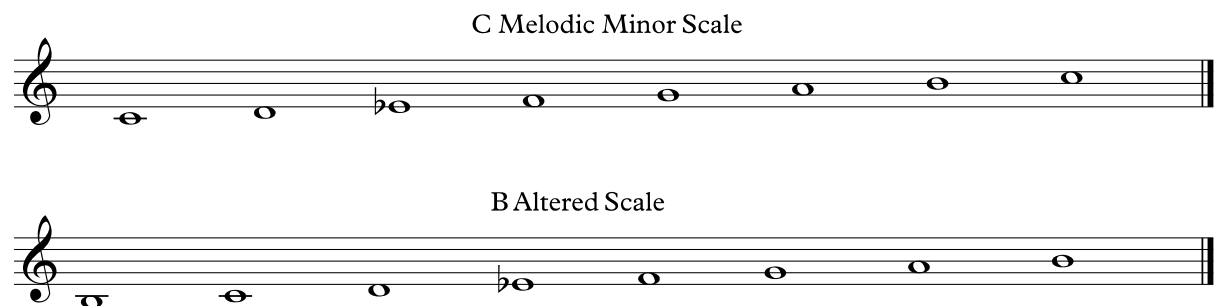


Figure 2.12: Intervallic formulas applied to the melodic minor master scale

Fluent execution of this concept during improvising entails that the player has to analyse and apply the formulas to various chord qualities to identify the correct parent Dorian or melodic minor patterns. Proficient knowledge of the fretboard layout is crucial to quickly identify possible root notes of master Dorian or melodic minor patterns on the various strings. Once a root has been allocated to a specific string, the correct pattern has to be assigned. Quick recollection of the correct master shape associated with various roots on the five strings is a vital component in the improvisation process. After a master shape has been identified and allocated to a specific area, the player can move vertically up or down within that specific shape

or move horizontally left or right to other adjacent shapes. Application of fourteen formulas and ten patterns enables a player to implement the seven modes of the major and Melodic minor scales in all twelve keys. Therefore, this system of reduction implies $7 \times 24 = 168$ (7 modes x 12 major keys plus 12 melodic minor keys) modes in total.

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Chapter 3

3 Methodology

This study is guided by the following research questions:

- 1) How do kinetically efficient actions and patterns interact to enable an improvising guitarist to navigate the fretboard most effectively?
- 2) What is the most efficient way to structure patterns from the major scale and jazz melodic minor on the guitar by considering the layout of the instrument?
- 3) How can the benefits of chunking be applied to achieve cognitive efficiency, so that the economic patterns become part of motor memory?
- 4) What are the affordances that the guitar provides to the player's musical environment and how do these affordances relate to dynamic touch and effectivities?
- 5) How would economy of movement be achieved from one pattern to the next?
- 6) How to test these on TUT guitar learners who have all completed a four-year guitar practical module?
- 7) How will evidence be collected and data be processed?

3.1 Research Design

Cresswell (2014, 32) identifies three approaches to research. Quantitative research is framed in terms of using numbers or using closed-ended questions (quantitative hypotheses), as opposed to qualitative research that is framed in words rather than numbers and open-ended questions (qualitative interview questions). Mixed methods research can draw from both qualitative and quantitative data where the combination of approaches provides a complete understanding of a research problem.

In this research undertaking, data was collected from the perceptions and actions of each individual test subject and from active observations of these subjects in their natural environment during application of various reduction concepts on the guitar. As researcher, I actively participated by asking open-ended interview questions and accompanied the participants during their application of specific scale patterns in improvisation. The individual methodologies that the participants applied to the concept of reduction and the point of view of each participant had to be examined. The participants' input was essential to the project as a whole and a simple 'yes' or 'no' answer provided by a closed-ended enquiry used in the quantitative approach, would not have provided adequate data to answer all of the research questions. The mixed-methods approach, which integrates both quantitative and qualitative components in research methodology, was therefore also ruled out

Therefore, a qualitative approach was best matched to answer the particular research questions in this thesis. To support this argument, Ely et al. (1991, 4) argue that Sherman and Webb (1988, 2-8) analysed what leading qualitative researchers had to say about their work in various areas including philosophy of education, biography, history, ethnography, life history,

grounded theory, phenomenography, curriculum criticism, uses of literature in qualitative research and critical theory.

The following characteristics of qualitative research were identified by Ely's analysis:

- 1) Events can be understood effectively only if they are seen in context, and therefore a qualitative researcher engages in the setting
- 2) The contexts of inquiry are natural and not manufactured. Nothing is taken for granted or pre-defined
- 3) The participants should speak for themselves to provide their perspectives in words and other actions
- 4) Focus is placed on the experience as a whole, not as separate variables.

According to Ely et al. (1991, 4–5), Sherman and Webb (1988, 7) formulated the following summary: "...Qualitative implies a direct concern with experience as it is 'lived' or 'felt' or 'undergone'.... Qualitative research, then, has the aim of understanding experience as nearly as possible as its participants feel or live it".

Creswell (2013), Hatch (2002), and Marshall and Rossman (2011) agree that the characteristics of qualitative research include: Collection of data in the field, talking directly to people and observing their behaviour within their context. Data are collected through observations, documents, and audio-visual information. The data is then reviewed and organised. The researcher focuses on the participant's perspective on the problem or issue. Some or all phases of the research process may change as the researcher enters the field. The researcher's personal background and experience may shape the direction of the study, and the researcher has to

reflect on this effect. A complex picture of the issue or problem under study is developed by the researcher (Cresswell 2014, 234).

The philosophical worldview underpinning this research was based on constructivism (as in Chapter 2) and approached with a qualitative research method. Emphasis was placed on interpretative phenomenological analysis (IPA) as a strategy of inquiry and semi-structured interviews and action research as data collection methods.

A constructivist worldview relates to my research where the participants' interpretation, behaviour and perspective were observed during active engagement in application and performance of specific tasks on the guitar. A set of patterns and formulas had been presented to participating subjects including all modes from the major and melodic minor scales, taught over a four-year time frame at TUT. All participants had adequate time to memorise/internalise and understand the material on scales or add some of their own contributions to the material. Application and execution of specific patterns (Figure 2.7 and 2.11) and formulas were tested in real-time situations under active observation. This worldview also links into applications of Gibson's affordance theory (1977), where chunking and the morphology of the guitar combined with knowledge of patterns, their applications and imagination afford the subject to make immediate decisions and yield direct action in the research. Through observation of these actions in their natural environment, theories, patterns and generalisations were recognised by the researcher.

Interpretative phenomenological analysis (IPA) links in with the qualitative constructivist's worldview since IPA also implements active participation and detailed observation of participants by the researcher. IPA studies are usually focused on purposive sampling of a small

group of subjects. Through purposive sampling, a closely defined group that will be more significant to the research question can be identified (Smith 2007, 55–56). According to Gentles et al. (2015, 1781), the general aim of sampling in qualitative research is to obtain useful information for understanding the complexity, depth, variation or context that surrounds a phenomenon. The sample size should allow for saturation to take place where any additional data collection has little or no contribution to the study.

In this study, the subject group consisted of five participants, and therefore I have opted to make use of IPA as a strategy of inquiry that is effective on small sample sizes. The participants were specifically selected because of their skilled ability to partake and execute precise tasks that related to this specific concept of reduction and also allowed them to contribute some of their own discoveries to the research. Participants were selected from a pool of willing guitar players that have all completed a four-year guitar course at TUT. Five participants agreed to take part in the research, and these individuals made up the sampling group.

Smith (2007, 54) comments that IPA sense-making by both the researcher and participant can be described as having cognition as a central analytic concern. A potentially fruitful theoretical alliance is implied between IPA and the cognitive paradigm that is dominant in contemporary psychology. Although IPA shares cognitive psychology and social cognition approaches in social and clinical psychology, it differs from mainstream psychology in deciding the appropriate methodology for such questions. IPA employs in-depth qualitative analysis as opposed to mainstream psychology that is strongly committed to quantitative and experimental methodologies.

IPA explores in detail how participants are making sense of their personal and social world with emphasis on the meanings that particular experiences hold for participants. This approach involves detailed examination of the participant's lifeworld (i.e. all the immediate experiences, activities and contacts that make up the world of an individual) on the basis of the individual's personal experience. IPA is a phenomenological approach and focuses on the personal perception or account of an object or event of an individual as opposed to the production of an objective statement or event itself. The researcher takes an active role in this dynamic process and tries to get close to the participant's personal world.

The researcher's own conceptions have an influence on accessing of that other personal world through a process of interpretative activity. A double hermeneutic or a two-stage interpretation process is involved. Smith (2007, 53, emphasis added) points out that "the participants are trying to make sense of their world; the researcher is trying *to make sense of the participants trying to make sense of their world*" (emphasis added).

3.2 Data collection techniques

My investigation explored how the five participants subjectively made sense of the reduction concept through their lifeworld and how they applied such concepts during improvisation. Data was collected through semi-structured interviews where the researcher and participant engaged in dialogue and action research. According to Adelman (1993, 8), Mills (1959) stated that "action research gives credence to the development of powers of reflective thought, discussion, decision and action by ordinary people participating in collective research on 'private troubles'". A qualitative report was written with comments about the narrative that emerged from the IPA analysis of data collected.

A semi-structured approach is more flexible than using a structured interview approach in which the investigator decides in advance exactly what constitutes the required data. In a structured interview, the investigator will use short, specific questions, read the question exactly in a similar way to all test subjects and have pre-coded response categories, where the questioner can match what the participant says against one of those categories. Semi-structured interviews allow the investigator to have a set of questions, but ordering of the questions is less important. This allows the interviewer more freedom in probing areas of interest as they arise. The participant can share more closely in the direction that the interview takes, and can even introduce an issue that the investigator had not thought of (Smith 2007, 57–59).

The strategy in the semi-structured interview process is to get as close as possible to what the participant thinks and feels about the topic without being led too much by the interviewer. The concept of funnelling is efficient when setting up interview questions. The interviewer starts with the most general possible question, and through probing, addresses more specific issues. Questions should be open and neutral rather than value-laden or leading. The interviewer has to be aware of the language and perspective of participants (Smith 2007, 61-63).

In this study, all interviews were video recorded because it was not possible to capture every detail without breaking the flow of the process in an attempt to make notes in real time. The video recordings have been archived and could be made available by request. Each interview was transliterated accurately by referring to the video recordings to capture data. King, Nigel and Horrocks (2010, 46–47) argue that according to Murray (2008), participants should be informed from the start of the interview that they will be filmed and their explicit consent must be obtained. As long as participants have an interesting topic to talk about, they quickly become accustomed to filming.

Participants were actively involved in the research, and their involvement was regarded as essential for two reasons. Firstly, the participants who were being researched have truly been living in the situation that was being researched and have accumulated invaluable insider knowledge of the situation through their own lived experience. Secondly, the participants have directly benefited by the process of research by empowering them to understand and make changes in their own lives with regards to the application of the reduction concept in jazz improvisation.

Specific questions, problems and solutions were identified in the research questions, and by being actively involved in the research process, access and control proved to be pragmatic over the knowledge produced. The validity of the analysis was tested by implementing the changes suggested by the investigation and then evaluating the effects.

David et al. (2011, 15) point out that action research bridges the gap between research and practice because it involves implementing and evaluating solutions to specific local problems. Therefore, action research is different from interviewing or observation-based studies that simply describe and analyse a situation.

According to Gustavsen, Haddon and Qvale (2011, 2), when compared to the production of 'words alone', the mapping of practice is a major advantage found in action research. Forms of practice are reality (embodied knowledge), as opposed to words that often have a slippery relationship to reality. Action research is dependent upon working with specific people in specific contexts, and this often implies working with relatively small groups of people to help construct forms of practice. Gustavsen, et al. (2011, 16) emphasise that a challenge arises out of this: How can action research achieve scope, magnitude, or mass in its impact? One answer

could be that a theory has to be created with a claim to validity beyond the case, or cases out of which it occurs with an assumption that others can learn from the theory and do likewise.

This research was limited to the execution and application of the major and jazz melodic minor scales and all relevant modes. Data was collected from five guitar learners that have all completed the four-year guitar practical module at TUT. The participants were interviewed, and the interviews were documented by making use of video recordings. Evaluations were made according to the efficiency in execution of patterns on the guitar fretboard and by testing efficiency against a fixed tempo. The subjects were tested on identification of the correct master patterns; their ability to apply the patterns on the guitar fretboard both vertically and horizontally; and their ability to recognise the next pattern if the scale pattern or application changes and to move efficiently from one pattern to the next. The purpose of the tests was to access relationships between actions and patterns to enable an improvising guitarist to move around the fretboard most effectively. Another fixed parameter was introduced by testing the efficiency of the application of pattern or patterns at a fixed tempo on static chord and various applications on major and minor II V I progressions that make up the building blocks of the jazz standard repertoire.

The semi-structured interview was designed to consider the following points for data collection to test the technical application of the concept and to investigate how the participants experienced the concept of reduction in their individual approaches to improvisation:

- 1) All of the participants had prior knowledge before they enrolled in the first-year program at TUT. They had all obtained information from various sources about applying scales in jazz improvisation, and it was important to the study to investigate where each

participant came from and how they felt about changing their previous approach to the new reduction concept

- 2) The ability of the participants to execute all 10 Dorian and melodic minor patterns from memory on the fretboard with various reference roots on the various strings had to be tested. Execution of the patterns was tested in both a vertical and horizontal direction on the fretboard
- 3) This concept of reduction relies on both the ability to execute the patterns and to recognise the correct intervallic reference point to provide maximum affordance to the improviser. The participants had to deal with both of these applications and how they perceived to process this information, had to be examined. The ability to quickly recognise the correct intervallic application to apply the correct pattern had to be tested on improvisation on a static chord and on major and minor II V I progressions
- 4) The affordance that the concept of reduction provided to each of the participants had to be tested. Quick pattern recognition and accurate execution of these patterns and the ability to quickly recognise the correct intervallic application, played an important role in terms of the affordance that the reduction concept provided. The perceptions of the participants had to be examined in terms of what the concept afforded to each participant
- 5) The ability to improvise by applying only one specific pattern in various areas on the fretboard and the ability to combine both Dorian and melodic minor patterns during improvisation had to be tested
- 6) Economy of movement and voice leading from one pattern to the next had to be tested
- 7) The participants view on the practicality of the concept, as well as: the process of learning all of the patterns and formulas, moving from the Dorian set of patterns to the melodic minor patterns, seeing the intervallic applications quickly during improvisation

on various chord qualities and any recommendations on improving or changing aspects of the concept, had to be investigated

- 8) The concept also had to be applied to a real-world example to test validity and practicality. Russell (1953, 95-96) analysed an excerpt of John Coltrane's *Giant Steps* solo, and a theoretical application of this reduction concept to the Coltrane solo would have to be investigated

3.3 Ethical considerations

Ethical clearance application form (Annexure A) and a specimen letter of consent from TUT are attached as appendices.

Guiding principles for the ethical conduct of research is as provided by the Helsinki Declaration (Human & Fluss 2001) was taken into consideration in Annexure A. These principals were originally adopted in 1964 and amended in 2004. In the USA the Belmont report was issued by the National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research on 18 April 1979. The Belmont Report also cites the Helsinki Declaration and was developed to address ethical concerns in both social and medical sciences disciplines (Brydon-Miller 2011, 4).

According to (Brydon-Miller 2011, 4) three basic principals were outlined in the Belmont report:

- “*Respect for persons, i.e. ‘that individuals should be treated as autonomous agents’ and ‘that persons with diminished autonomy are entitled to protection’ (198)’*”;

- *“Beneficence, i.e. ‘do not harm’ and ‘maximize possible benefits and minimize possible harm (199)’; and*
- *“Justice, i.e. ‘research should not unduly involve persons from groups unlikely to be among the beneficiaries of subsequent applications’ (201).”*

Specific applications incorporated into human subjects review processes were defined by the Belmont report. These include: (Brydon-Miller 2011, 5)

- *Informed consent - where subjects are informed about the nature of the research and choose to participate in the research based on their understanding of the information without coercion or undue influence.*
- *Assessment of risk and benefits – the potential benefits of the research have to outweigh any possible risks to the immediate research subject.*
- *Selection of subjects – no individual or group should be fairly included or excluded from participation in the research.*

Chapter 4

The purpose of this chapter is to test the application of the major and melodic minor scales and their modes on the guitar fretboard and to test the effectivities in applying the concept of reduction as explained in Chapter 2. Emphasis was placed on execution of the various pattern layouts in Figure 2.7 and 2.10 to create *vertical* movement in a specific area on the fretboard and Figure 2.8 and 2.11 to create *horizontal* movement across the fretboard.

The correct intervallic formulas to identify the correct master pattern/s was tested as well as vertical and horizontal movement on the fretboard during improvisation. Economy of movement was tested during improvisation on a static chord and various applications on major and minor II V I progressions where both Dorian and melodic minor patterns were applied.

The scope of this study was limited to effective application, execution and voice leading of the master scale patterns and quick recognition of the correct intervallic applications to test the effectiveness of the reduction concept specifically as applied by participants on the guitar. The participants were not assessed on the basis of who played the most ‘musical’ or ‘best’ solo, but rather on how *effectively* they could apply the reduction concept during improvisation and if the concept provided affordance to them in any way. To further test the pragmatism of the reduction concept a theoretical analysis of the concept was applied to an excerpt of the first 32 bars of John Coltrane’s *Giant Steps* solo.

4 Testing and Findings

4.1 Question 1

4.1.1 Give me a brief history of your background as a guitar player

The main purpose of this question is to establish where the participants originate from, to identify events or any musical influences that might have contributed to them pursuing a career in music. All participants have completed a four-year guitar practical course at TUT, and share common concepts with regard to improvisation, repertoire and harmony. I noticed that every participant sounded different during application of these concepts. Do the various backgrounds have an influence? The question was also an ice-breaker to get the participants actively involved and comfortable with the interview environment.

4.1.2 Responses

Participant one: Attended lessons with a former TUT graduate. Predominantly played rock and was also introduced to jazz concepts. The learning stream was similar to first year at TUT with regards to scale and chord patterns. Went to study music after matric and had been playing for about four years.

Participant two: Started out as a vocalist. Studied classical guitar at the State Theatre where he also learned to read music. Completed Unisa grade four and this included music theory.

Studied for a year in Indonesia focusing on traditional Indonesian music played on indigenous instruments.

Participant three: Started playing guitar at the age of sixteen. Played classical guitar and later focused more on rock music and playing in bands. Went to study music after school.

Participant four: Played rock at school with no formal music education. Studied at COPA⁴ after school to get access to a university. Found the transition quite difficult from the rock style to the jazz style in terms of the more complex nature of jazz music.

Participant five: Started playing classical guitar at the age of thirteen. Switched to electric guitar at sixteen and was influenced by metal styles. Decided to study music at a university and first went to UP⁵ for a year and then changed over to TUT.

4.1.3 Interpretation of responses

All five participants had some kind of formal musical training prior to studying music at a university. Three had classical training, one studied rock-based music at a music school, and one attended private lessons that focused on rock and jazz. Four participants were largely influenced by rock to pursue a career in music and one by classical and indigenous Indonesian music.

⁴ Campus of Performing Arts.

⁵ University of Pretoria.

The participants have all studied music and have all completed the four-year jazz guitar course at TUT.

4.2 Question 2

4.2.1 Play the five Dorian patterns on the fifth fret, start on the E string and move down to the A, D, G and B strings

Questions 2 to 4 deal with the fundamental tools to apply the major scale modes to jazz improvisation. The perception-action cycle will be evaluated by applying pattern recognition through chunking.

The participants have to complete a task to test their ability to execute the five master Dorian patterns from memory. The root of each pattern occurs on a different string. Practical execution of these patterns is examined on the instrument and the association of each pattern with the appropriate string that contains the orientation note.

This activity will determine the affordance that a concept of reduction or chunking could permit the player in terms of quickly recognising a specific Dorian pattern in a specific area on the guitar fretboard. It could also have an influence on the most economical movement into the next pattern that influences the flow of a melodic line during improvisation.

The outcome of Question 2 will be re-evaluated in future applications of the Dorian patterns to see if the theory holds true that a participant with more skill and understanding in this part will have better effectivities in terms of fluent and economical application of the Dorian patterns.

4.2.2 Responses

Participant one: Played through all of the Dorian patterns fluently. Did make a mistake on pattern four with root on the G string and pattern five with root on the B string.

Participant two: Played through all of the Dorian patterns but slower and with less fluency than some of the other participants. Did make a mistake on pattern two with root on the A string and pattern five with root on the B string.

Participant three: Played through all of the Dorian patterns fluently. Did make a mistake on pattern four with root on the G string.

Participant four: Played through all of the Dorian patterns, a bit slower but no mistakes.

Participant five: Played through all of the Dorian patterns fluently with no mistakes.

4.2.3 Interpretation of responses

Knowledge of the guitar fretboard layout and of the chunking concept of five Dorian patterns with various reference roots grant effectivities to the participants in their musical environment.

All five participants could play the five master Dorian patterns from memory. Patterns with roots on the E, A, and D strings seemed easier to execute because fewer mistakes occurred. Three of the participants made mistakes on patterns with the root on the G and B strings. All participants who made mistakes could execute the correct patterns at a second attempt.

4.3 Question 3

4.3.1 What Dorian pattern will work over an E7 chord? Please demonstrate

There are two key components to apply the Dorian concept of reduction to improvisation. The first component is to execute the five master patterns, as tested in Question 2. The second component is to identify the correct Dorian pattern that fits the chord that the player is improvising over by applying one of the seven intervallic formulas to the root of the specific chord.

The ability to quickly recognise the correct Dorian pattern associated with an E7 chord was tested. During this process, the participant had to identify that the Mixolydian mode will work over a dominant chord and identify the appropriate intervallic formula from the root of the E7 chord to identify the correct Dorian application. In this case, the intervallic formula will be up a perfect fifth that implies B Dorian. The notes of the B Dorian pattern will be the same as the notes of the E Mixolydian mode.

The ability to quickly associate and identify the appropriate Dorian pattern will have a profound impact on the effectiveness that the concept provides to the player during improvisation. I have noticed through teaching that novice players can play the five master patterns from memory, but often write down the Dorian applications on the score that they are using on more complex harmonic progressions. All of the participants have been using the concept for more than four years, and they should be able to apply the intervallic formulas from memory.

The second part of the question links in with Question 2 where the participant has to use any B Dorian pattern in a specific area to improvise over the E7 chord. The vertical upward and downward movement is examined on the guitar fretboard.

Therefore, the player that can identify the correct applications quickly will benefit from efficiency and economy during improvisation, especially at faster tempos or on more complex harmonies.

4.3.2 Responses

Participant one: Quick recognition of the Mixolydian mode and appropriate Dorian pattern. Applied B Dorian pattern with root on the E string and moved horizontally upwards to an adjacent B Dorian pattern with root on the G string. Fluent execution of pattern in a chosen area on the fretboard and utilised the whole range of the pattern.

Participant two: Quick recognition of the appropriate Dorian pattern and Mixolydian application. Used B Dorian pattern with root on D string. Played fluently but only on top four strings of the pattern.

Participant three: Quick recognition of the appropriate Dorian pattern and Mixolydian application. Used B Dorian pattern with root on E string. Fluent execution of pattern in the chosen area on the fretboard and utilised the whole range of the pattern.

Participant four: Quick recognition of the appropriate Dorian pattern and Mixolydian application. Used B Dorian pattern with root on E string. Played fluently but only on top four strings of the pattern.

Participant five: Quick recognition of the appropriate Dorian pattern and Mixolydian application. Used B Dorian pattern with root on E string. Fluent execution of pattern in the chosen area on the fretboard and utilised the whole range of the pattern.

4.3.3 Interpretation of responses

All of the participants could quickly identify that an E Mixolydian mode would be the appropriate choice on the E7 chord given the restriction of only using modes from the major scale. All participants could apply the correct intervallic formula (up a fifth) and quickly recognise the appropriate B Dorian pattern that substitutes for the E Mixolydian mode.

The participants that were more proficient in Question 2 did seem more fluent and utilised the full range of the chosen Dorian pattern in a specific area on the fretboard. Participants two and four only used the top four strings of the chosen Dorian pattern during improvisation.

Only the Mixolydian application was tested in Question 3. This same concept and process hold true for the other six modes of the major scale: The player recognises the appropriate mode for a specific chord quality and applies the correct intervallic application from the root of the chord to recognise the appropriate Dorian pattern. This Dorian pattern can then be applied anywhere on the fretboard at the player's discretion with the knowledge that was tested in Question 2. Some of these applications will be tested and applied in Questions 12 to 15 where the participants play over major and minor II V I chord progressions.

4.4 Question 4

4.4.1 Please demonstrate moving your hand to different areas on the neck and playing a B Dorian (E Mixolydian) pattern in those specific areas

The left hand can move either vertically or horizontally across the fretboard. Vertical movement implies that the hand moves in an upward or downward direction within a specific area on the guitar fretboard. Vertical movement was tested in Questions 2 and 3 where the participants focused predominantly on one specific Dorian pattern.

Horizontal movement to the left or right on the fretboard requires the player to link or play through various adjacent Dorian patterns in either direction. Question 4 tests this horizontal movement on the guitar fretboard.

Therefore, the concept implies that a player identifies the appropriate Dorian pattern by applying the correct intervallic formula, in this case, B Dorian. The left hand could then be placed anywhere on the fretboard, and the closest B note on any of the six strings has to be identified. One of the five master Dorian patterns could be applied to that specific area of the fretboard depending on the string that the B note occurs on. The player can either stay in that specific area and use vertical movement or move left or right to adjacent Dorian patterns moving horizontally across the fretboard.

The freedom to move the left hand in any direction on the guitar neck is an affordance to the player that allows the use of the whole range of the instrument during improvisation.

4.4.2 Responses

Participant one: Applied the B Dorian pattern with root on the A string as a starting point. Progressed to B Dorian pattern with root on G string, E string, D string and B string horizontally in an upwards movement across the neck followed by a horizontal downward movement back to root on A string. Fluent execution in linking and playing through all five patterns horizontally in an upwards and downwards direction.

Participant two: Applied the B Dorian pattern with root on the A string as a starting point. Progressed horizontally up the neck to B Dorian pattern with root on G string, jumped to root on D string and B string, followed by a downward movement back to root on D string. The participant did move horizontally through the various patterns in an upward and downward direction but did not always link the adjacent patterns economically and seemed less comfortable in the horizontal movement than the vertical movement of the Dorian patterns.

Participant three: Applied B Dorian pattern with root on the E string as a starting point. Progressed horizontally up the neck to B Dorian pattern with root on B string, then downwards to roots on D, E and G strings. This was followed by an upward movement to root on E string and root on B string and finally down to root on E string.

Two mistakes were made while moving horizontally through the patterns where the participant used the correct shape but a semitone below the actual location. These mistakes were quickly corrected.

Participant four: Applied B Dorian pattern with root on the A string as a starting point. Progressed horizontally up the neck to B Dorian pattern with root on G string but was a

semitone above on a C root pattern for a while, jumped to root on E string and ended with root on D string. The participant did move horizontally through the various patterns in an upward direction but did not always link the adjacent patterns economically. The participant seemed less comfortable in the horizontal movement than the vertical movement of the Dorian patterns.

Participant five: Applied B Dorian pattern with root on the A string as a starting point. Progressed to B Dorian pattern with roots on G, E, D and B strings horizontally up the neck followed by a downward movement back to root on A string all the way up to B string and finally down to A string. Fluent and comfortable execution in linking and playing through all five patterns horizontally in an upwards and downwards direction across the fretboard.

4.4.3 Interpretation of responses

All five participants could apply horizontal movement by playing through the adjacent Dorian patterns. Two of the participants were fluent in linking the adjacent patterns in an economical manner, and three had some difficulty in achieving economic movement between adjacent patterns. Participant two and four seemed less comfortable in the horizontal movement than the vertical movement of the Dorian patterns.

Participants that were fluent in execution of the task in Question 2 had more economic movement between adjacent Dorian patterns and seemed more comfortable with the horizontal movement of these patterns across the fretboard. The results of Question 4 prove that it is vital to this concept to know the five master vertical patterns very well before economic movement could be achieved with horizontal movement through adjacent Dorian patterns.

Therefore, knowledge of and fluent execution of the five vertical Dorian patterns could facilitate effectivities to the player such as economic movement between adjacent patterns with the same root note and the ability to move fluently across the fretboard in a horizontal direction.

4.5 Question 5

4.5.1 How did you find the transition from the application of the major scale Dorian-based patterns to the application of melodic minor patterns? Please demonstrate

There is only one difference between the five master Dorian and melodic minor patterns. The Dorian has a flat seven, and the melodic minor has a major seven note in the scale.

Each participant had to deal with the transition from the Dorian to melodic minor patterns. Their input and personal experience during this transition could be valuable to the research in terms of assessing any affordances that they may have or not have encountered within the transition process.

4.5.2 Responses

Participant one: Altered some of the original Dorian patterns to match better with the melodic minor patterns and vice versa. This allowed for more economical movement when changing between Dorian and melodic minor shapes on the fretboard. Played an A Dorian pattern with root on E string and matching A melodic minor pattern from the same root. The A Dorian was the original close position pattern, but the A melodic minor was slightly different to the A Dorian shape in the same area.

Participant two: Was comfortable with the Dorian patterns and took a while to visualise the new melodic minor patterns. Had difficulty to sometimes identify the movement of the flat seven to major seven from Dorian to melodic minor patterns when moving from the lower three strings to the top three strings in a specific area on the fretboard. The melodic minor patterns became easier to visualise after repetition in practice sessions. Played one octave of the original A Dorian pattern with root on the E string and used the same template with a raised seventh degree for the A melodic minor pattern.

Participant three: Was familiar with the Dorian patterns and found the initial transition difficult to the melodic minor patterns. Noticed a lot of similarities between the two patterns and the transition was still easier than learning a completely new set of patterns. The melodic minor started to become easier over time, and currently, the participant feels comfortable switching between the Dorian and melodic minor patterns at will. Played the original A Dorian pattern with root on E string and used the same template with a raised seventh degree for the A melodic minor pattern.

Participant four: Attempted to play B Dorian and B melodic minor with root on E string over an E7 chord exhibiting the difference between the two patterns. Participant understands the theory but only used the B Dorian pattern during the demonstration and hesitated to use the B melodic minor. Used the original Dorian patterns and on the same template, altered the seventh degree to construct the melodic minor patterns.

Participant five: Found the transition from Dorian patterns to melodic minor patterns very easy seeing that there is only one note difference. Played the original B Dorian pattern with

root on E string and used the same template with a raised seventh degree for the B melodic minor pattern.

4.5.3 Interpretation of responses

All participants noticed similarities between the Dorian and melodic minor patterns and acknowledged that there is only one note difference. Four out of five participants used the original Dorian patterns and only altered the seventh degree to construct the melodic minor patterns based on the Dorian template. One participant altered aspects of the original patterns to accommodate more economic movement between the Dorian and melodic minor patterns.

Most participants found the initial transition difficult but after a while became more familiar with the melodic minor patterns. Three of the participants moved fluently between the Dorian and melodic minor patterns in a specific area on the fretboard. Participant 2 seemed a bit uncomfortable with the melodic minor patterns and only played one octave of the larger possible vertical pattern. Participant four seemed to be comfortable with the Dorian patterns and failed to play a melodic minor pattern during the example.

4.6 Question 6

4.6.1 Do you see any similarities or differences in the application of the melodic minor modes as opposed to the major scale modes?

Most of the intervallic applications are also similar between the major scale modes and melodic minor modes on various chord qualities. For example, Dorian pattern on the sixth will result in

a Lydian mode, and melodic minor pattern on the sixth will result in a Lydian Augmented mode that is essentially a Lydian scale with a raised fifth degree.

Input from the participants and their experience or point of view is examined to establish if they find that there are any similarities in the intervallic applications between the major scale modes and melodic minor modes.

Knowledge of the intervallic applications of the Dorian patterns could have an affordance that the improviser could recycle the same applications when applying the melodic minor patterns.

4.6.2 Responses

Participant one: Intervallic applications are very similar between Dorian and melodic minor patterns. Used an E9 chord to demonstrate. Played B melodic minor to imply E Lydian b7. B Dorian would imply E Mixolydian. There is only one note difference between the B Dorian and B melodic minor patterns.

Participant two: Used an example on a dominant seventh chord. Both the Dorian and melodic minor patterns can be played a fifth up from the root of the chord, but the sound is different in the two applications. Played a D7 chord and used A melodic minor and A Dorian pattern to demonstrate the difference in sound. The A melodic minor implies D Lydian b7, and the A Dorian implies D Mixolydian.

Participant three: There are similarities in the intervallic application the Dorian and melodic minor patterns. There are also some differences but not huge differences.

Participant four: Noticed similarities in the application of the Dorian and melodic minor patterns. For example, on an E7 chord, both patterns can be applied a perfect fifth above the root of the chord. B Dorian will imply E Mixolydian and B melodic minor will imply E Lydian b7. Also noticed that on a minor7(b5) chord both applications can be applied to the flattened third to imply Locrian (Dorian on b3) or Locrian #2 (melodic minor on b3). Found it difficult to use the sound of the melodic minor modes in a musical way.

Participant five: Melodic minor gives more tensions and extra colours than the major scale modes. Dorian patterns would be the base modes, and melodic minor modes can be seen as an expansion of the major scale modes. On a minor seven chord the Dorian pattern on the root would work well, and on a minor, major seventh chord melodic minor on the root would imply the raised seventh degree.

4.6.3 Interpretation of responses

All of the participants recognised similarities in the intervallic applications between the Dorian and melodic minor patterns. Three of the participants stated that there is a difference in the way that the major scale modes and melodic minor modes sound. Participant five described the melodic minor as an expansion of colours on the major scale modes or Dorian-based patterns.

4.7 Question 7

4.7.1 Play the five melodic minor patterns on the fifth fret, start on the E string and move down to the A, D, G and B strings

Questions 7 to 9 deal with the fundamental implements to apply the melodic minor scale modes to jazz improvisation.

The participants have to complete a task to test their ability to execute the five master melodic minor patterns from memory. The root of each pattern occurs on a different string. Practical execution of these patterns is examined on the instrument and the association of each pattern with the appropriate string that contains the orientation note.

This activity will determine the affordance that a concept of reduction could permit the player in terms of quickly recognising a specific melodic minor pattern in a specific area on the guitar fretboard. It could also have an influence on the most economical movement into the next pattern that influences the flow of a melodic line during improvisation.

The outcome of Question 7 will be re-evaluated in future applications of the melodic minor patterns to see if the theory holds true that a participant with more skill and understanding in this part will have better effectivities in terms of fluent and economical application of the melodic minor patterns.

4.7.2 Responses

Participant one: Played through all of the melodic minor patterns. Did make a mistake on pattern four with root on the G string and pattern five with root on the B string. Made alterations on patterns with root on E, A and B strings that vary from the original template.

Participant two: Played through all of the melodic minor patterns with no mistakes. Used the original shapes with no alterations.

Participant three: Played through all of the melodic minor patterns. Did make a mistake on pattern one with root on the E string and pattern two with root on A string. Used the original shapes with no alterations.

Participant four: Played through all of the melodic minor patterns. Did make a mistake on pattern four with root on the G string and pattern five with root on B string. Made alterations on patterns with root on E and A strings that vary from the original template.

Participant five: Played through all of the melodic minor patterns fluently. Did hesitate on pattern four with root on G string. Made alteration on the pattern with root on E string that varies from the original template.

4.7.3 Interpretation of responses

All five participants could play the five master melodic minor patterns from memory. Patterns with roots on the E, A, and D strings seemed more comfortable and fewer mistakes occurred during execution. Three of the participants made mistakes on patterns with the root on the G string, two made mistakes with root on B string, and one made mistakes with root on E and A strings. All participants who made mistakes could execute the correct patterns with a second attempt.

4.8 Question 8

4.8.1 What melodic minor pattern will work over an E7(#11) chord? Please demonstrate

There are two key components to apply the melodic minor concept of reduction to improvisation. The first component is to execute the five master patterns (tested in Question 7). The second component is to identify the correct melodic minor pattern that fits the chord that the player is improvising over by applying one of the seven intervallic formulas to the root of the specific chord.

The ability to quickly recognise the correct melodic minor pattern associated with an E7(#11) chord is tested. During this process, the participant has to identify that the Lydianb7 mode will work over a dominant chord with a raised fourth degree and identify the appropriate intervallic formula from the root of the E7(#11) chord to identify the correct melodic minor application. In this case, the intervallic formula will be up a perfect fifth that implies B melodic minor. The notes of the B melodic minor pattern will be the same as the notes of the E Lydianb7 mode.

The ability to quickly associate and identify the appropriate melodic minor pattern will have a profound impact on the effectivities that the concept provides to the player during improvisation. All of the participants have been using the concept for more than three years, and they should be able to apply the intervallic formulas from memory.

The second part of the question links in with Question 7 where the participant has to use any B melodic minor pattern in a specific area to improvise over the E7(#11) chord. The vertical upward and downward movement is examined.

Therefore, the player that can identify the correct applications quickly will have the benefit of effectivities during improvisation especially at faster tempos or on more progressive harmonies.

4.8.2 Responses

Participant one: Quick recognition of the E Lydian (b7) mode and appropriate B melodic minor pattern. Applied B melodic minor pattern with root on the E string. Fluent execution of the B melodic minor pattern in the chosen area on the fretboard and applied the top four strings of the pattern.

Participant two: Quick recognition of the appropriate B melodic minor pattern. Applied B melodic minor pattern with root on D string. Only used the top four strings of the pattern.

Participant three: Quick recognition of the E Lydianb7 mode and appropriate B melodic minor pattern. Applied the B melodic minor pattern with root on D string and moved to adjacent patterns with roots on E and B strings. Fluent execution of patterns in the chosen area on the fretboard and applied the whole range of the patterns.

Participant four: Quick recognition of the E Lydianb7 mode and appropriate B melodic minor pattern. Used the B melodic minor pattern with root on the E string. Applied the top four strings of the pattern. The participant played the correct notes but seemed a bit unsure of the sound of the Lydianb7 mode.

Participant five: Quick recognition of the E Lydianb7 mode and appropriate B melodic minor pattern. Used the B melodic minor pattern with root on E string and adjacent patterns on the D

and B strings. Fluent execution of patterns in the chosen area on the fretboard and applied the top four strings of the pattern.

4.8.3 Interpretation of responses

All of the participants could quickly identify that an E Lydianb7 mode would be the appropriate choice on the E7(#11) chord given the restriction of only using modes from the melodic minor scale. All participants could apply the correct intervallic formula (up a fifth) and quickly recognise the appropriate B melodic minor pattern that substitutes for the E Lydianb7 mode.

The participants who were more proficient in Question 7 did seem more fluent and utilised the full range of the chosen melodic pattern in a specific area on the fretboard. Three of the participants were very comfortable with the sound of the Lydianb7 mode, and two seemed less comfortable. Participant two mostly applied the top three strings of the chosen B melodic minor pattern and seemed uncomfortable to use notes on the lower strings.

The participants that were fluent in playing the Dorian patterns in Question 2 and the melodic minor patterns in Question 7 did have an advantage in terms of not focusing on where the 'correct' notes are but rather focusing on the sound of the notes that they were using.

Only the Lydianb7 application was tested in Question 3. This same concept and process hold true for the other six modes of the melodic minor scale: The player recognises the appropriate mode for a specific chord quality and applies the correct intervallic application from the root of the chord to recognise the appropriate melodic minor pattern. This melodic minor pattern can then be applied anywhere on the fretboard at the player's discretion with the knowledge

that was tested in Question 7. Some of these applications will be tested and applied in Questions 12 to 15 where the participants play over major and minor II V I chord progressions.

4.9 Question 9

4.9.1 Please demonstrate moving your hand to different areas on the neck and playing a B melodic minor (E Lydian^b7) pattern in those specific areas

The left hand can move either vertically or horizontally across the fretboard. Vertical movement implies that the hand moves in an upward or downward direction within a specific area on the guitar fretboard. Vertical movement was tested in Questions 7 and 8 where the participants focused predominantly on one specific melodic pattern.

Horizontal movement to the left or right on the fretboard requires the player to link or play through various adjacent melodic patterns in either direction. Question 9 tests this ability.

Therefore, the concept implies that a player identifies the appropriate melodic pattern by applying the correct intervallic formula, in this case, B melodic minor. The left hand could then be placed anywhere on the fretboard, and the closest B note on any of the six strings has to be identified. One of the five master melodic minor patterns could be applied to that specific area of the fretboard depending on the string that the B note occurs on. The player can either stay in that specific area and use vertical movement or move left or right to adjacent melodic minor patterns moving horizontally across the fretboard.

The freedom to move the left hand in any direction on the guitar neck is an affordance to the player that allows the use of the whole range of the instrument during improvisation.

4.9.2 Responses

Participant one: Used pattern with root on A string as a starting point. Progressed to pattern with root on E string, G string, A string, E string and finally D string horizontally up and down the neck. Made two mistakes along the way and the melodic minor patterns seemed to be less fluent than the horizontal movement of the Dorian patterns in Question 4. The participant was more fluent in the vertical movement of the melodic minor patterns as tested in Questions 7 and 8.

Participant two: Used pattern with root on A string as a starting point. Progressed horizontally up the neck to pattern with root on G string, jumped to root on D string and moved upwards to root on B string. The participant did move horizontally through the various patterns in an upward and downward direction but did not always link the adjacent patterns economically. There were pauses every now and then to first think about where to find the notes of the next pattern while moving between adjacent patterns on the fretboard. No wrong notes were played.

Participant three: Used pattern with root on E string as a starting point. Progressed horizontally up the neck to pattern with root on D string, then upwards to root on B string where the full vertical range was applied on the last pattern. Fluent execution of patterns in both vertical and horizontal directions with no mistakes.

Participant four: Used pattern with root on E string as a starting point. Progressed horizontally up the neck to pattern with root on D string and ended with root on A string. The participant did move horizontally through the various patterns in an upward direction but did not always link the adjacent patterns economically. Three mistakes were made, and the participant seemed unsure when moving to various strings or when moving from one area to the next on the fretboard. The participant seemed less comfortable in the horizontal movement than the vertical movement of the melodic minor patterns. Although the ‘correct’ notes were used the sound of the Lydianb7 mode did not really come out in the improvisation.

Participant five: Used pattern with root on A string as a starting point. Progressed to all other patterns with root on G string, E string, D string and B string horizontally up and down the neck. Fluent and comfortable execution in linking and playing through all five patterns horizontally in an upwards and downwards direction. The participant was equally proficient in the horizontal and vertical movement of the melodic minor patterns in any direction.

4.9.3 Interpretation of responses

All five participants could apply horizontal movement by playing through the adjacent melodic minor patterns. Two of the participants were fluent in linking the adjacent patterns in an economical manner, and three had some difficulty in achieving economic movement between adjacent patterns. This is exactly the same result as in Question 4 where the horizontal movement of the Dorian patterns was tested.

The Lydianb7 sound was more apparent with participants who could visualise the melodic minor patterns across the fretboard. The participants who were unsure sounded more like the

scale tones moving in an upward or downward direction dictated by the notes or fragment of the patterns that they could visualise, with less melodic content than the participants who could move fluently through the patterns.

The outcome of Question 9 proves that it is vital to this concept to know the five master vertical patterns very well before economic movement could be achieved with horizontal movement through adjacent melodic minor patterns. The sound of a specific mode will also be more apparent in melodic content if fluency is achieved in vertical and horizontal execution of the patterns.

4.10 Question 10

4.10.1 What did you learn from the Dorian and melodic minor patterns and how has this concept enhanced your approach to jazz improvisation or otherwise?

One common attribute among the participants is that they were introduced to the Dorian concept in their first year and melodic minor in their second year of music studies at TUT. The concept was new to all of them at first, and they did spend at least four years exploring the application of the Dorian patterns and three years exploring the melodic minor patterns. This question aims to examine the experiences of each participant along this journey and their findings of the practicality of this concept of reduction in jazz improvisation.

4.10.2 Responses

Participant one: The participant stated that shortcuts only help to build a foundation, but an improviser still has to think about the whole picture in terms of improvising over a chord and

how the various notes will relate to the chord sound. Instead of memorising many patterns (see Chapter 2), this system does provide a template that the fingers are used to with less memorised patterns. These templates can help with voice leading when moving from one pattern to the next. The system provides a good foundation especially in the first two years where the player can quickly find the notes that could work on a specific chord and economically voice lead to the next pattern, especially on progressive harmonic structures. After two years of using the system, chord tones within the patterns become more visible, and the chord sound can then be highlighted more efficiently.

Participant two: The participant stated that once a player becomes used to the patterns and intervallic applications, it does make the improvisation process easier because only one template is used over various chord qualities. A disadvantage could be that the patterns could dictate what notes a player chooses to use and this could make the improvisation sound more scalar and disconnects from what the player is really hearing. This mostly occurs during the early stages of using this concept. After applying the patterns for a while, the player can focus more on individual notes and melodies rather than the pattern itself.

Participant three: The participant stated that this system provides one template that is a lot less information to memorise instead of having various patterns dedicated to the roots of each chord during improvisation. At first, it was difficult to identify the intervallic applications and the correct patterns, but once the ear connected with the patterns, it became very easy to apply the concept. This concept can be used in other genres than jazz as well. It reduces the thinking process and enhances the active playing process. It is also very useful during improvising in a reading situation. Voice leading between patterns is very logical.

Participant four: Comes from a rock background where one tonal centre was used frequently. The Dorian system helped to find the tonal centres and different modes in the first year when playing over more progressive harmonic progressions. At first, the participant wrote down the intervallic applications on the score and found it easier to just focus on playing the correct patterns. After about two years the intervallic applications also became more instinctive and easier to identify in a playing situation. The thinking process was quicker and more reactive in identifying patterns that could work over a grouping of chords in a tonal centre, instead of having various patterns dedicated to the roots of each chord during improvisation. Later the melodic minor modes and more modern sounds also became available in improvisation based on the same process that the participant followed as in the application of the Dorian patterns.

Participant five: Started out with a system where a scale or mode with a different pattern would be applied to the root of each individual chord. This approach was overwhelming, and it was a lot of information to memorise and recall. The patterns and concept of application with the Dorian and melodic minor patterns is less information to memorise and made the improvisation process easier. At first, it was harder to voice lead patterns, but in time the player visualised the patterns more clearly, and the voice leading process became more efficient. The concept is also applicable to other musical styles.

4.10.3 Interpretation of responses

All five participants stated that the Dorian and melodic minor concept of reduction did enhance their improvisation process in some way.

At first, it was difficult to think of the intervallic applications where the reference root of the scale pattern differed from the root of the actual chord. Participant four even had to write out the intervallic applications on the score in the early stages. In time the intervallic applications became second nature and a pattern template. Everyone agreed that a fixed pattern template used over various chord qualities did result in quicker reaction time during improvisation versus using a different pattern on each individual chord. Participants three and five explained this as an immediate, instinctive reaction during improvisation.

A negative aspect of the fixed template system was highlighted by participant two, that an improviser could be more concerned about playing the correct pattern than playing what the ear is hearing. This makes the improvisation sound more scalar and unmusical because the fingers are used to practising the patterns in a linear manner versus a more musical approach where the note choices are dictated by the ear of the player. All of the participants stated that only after about two years of using the concept did they find more musical freedom and economy within the fixed template system.

Voice leading was made easier when moving from one pattern to the next. As the participants became more familiar with the pattern template voice leading became very logical in linking melodic ideas between different or adjacent patterns.

4.11 Question 11

4.11.1 Is there any aspect of this approach that you would change in any way or any improvements that you would like to suggest?

The participants have hands-on experience exploring and applying the patterns to jazz improvisation. If they did make any changes to the original approach or have any additional improvements in the application of the concept, it would be invaluable to this study.

4.11.2 Responses

Participant one: Every player should find their own layout of the shapes to economise, especially when moving between the melodic minor and Dorian patterns. It is important to understand where the system comes from and that the concept is approached also with linking to the chord tones and available tensions. In other words, the player should be more aware of the function of each note within the various patterns.

Participant two: This is a good starting point for learning jazz improvisation. The participant feels that the concept works well to initially play the scales during improvisation and after using the system for a while the player could then focus more on melodies and connecting the patterns to the ear. The same process is followed in dance where the patterns are compared to learning the basic steps and then later the dancer can add feeling and expression in the execution of the steps.

Participant three: Would not change anything. The concept works and reduces the reaction and thinking process during improvisation and economical voice leading of patterns.

Participant four: Would not change any aspects of the concept. It is well thought out, practical and useful. The participant did change a few of the original patterns to the three notes per string layout to produce more comfortable fingering options.

Participant five: Would not make any changes to the concept. It is a logical system that works. Every player could customise the layout of their master patterns to produce more comfortable fingerings, and this is a matter of personal preference.

4.11.3 Interpretation of responses

The predominant variant from the original concept seems to be the customisation of the layout of the pattern templates. Almost all of the players did customise patterns to produce more comfortable fingerings or to make the shift between the Dorian and melodic minor patterns more usable. This seems to be a personal preference from player to player.

All of the participants acknowledged that the initial concept was well thought out and is useful as is without any changes to the system as a whole. Participant one stated the importance of identifying the relationship of each note within any pattern to the chord that it is used over, i.e. the chord tones and tensions. At first, the patterns are used with more random note choices, and as the player becomes more familiar with the standardised template layout, the function becomes more obvious of each note within the patterns.

Participant three stated that the concept reduces the reaction and thinking process and allows for economical voice leading.

4.12 Question 12

4.12.1 Demonstrate how you would play over a major II V I progression in G major with the major scale modes

In the previous questions, the basic layout of the Dorian and melodic minor patterns was performed and applied over one static chord by means of a vertical and horizontal movement on the fretboard. The next phase will examine the application of the various patterns over a major II V I progression.

A II V I progression in the key of G major would result in Am7, D7 and Gmaj7 chords. Traditionally A Dorian, D Mixolydian and G Ionian would be the obvious chord scale choices, for this specific progression, if these choices are limited to only the application of the major scale modes. Another possible resolution to the Gmaj7 chord would be to use the G Lydian scale by applying an E Dorian pattern on the maj6th.

Application of the Dorian concept will result in a root pattern for the IIm7 chord (A Dorian), pattern up a perfect fifth (A Dorian) for the V7 chord and pattern up a major second (A Dorian) for the Imaj7 chord. Therefore, the participant could choose any A root note on the guitar fretboard and apply the corresponding pattern in that specific area as a starting point. Both vertical and horizontal movement of the A Dorian pattern would then be possible for the duration of the II V I progression.

4.12.2 Responses

Participant one: Understood and executed the task well. Improvised applying A Dorian with root on E string and stayed in one vertical area. The participant highlighted chord tones from the various chords in the II V I progression by targeting notes within the pattern to emphasise the movement from one chord to the next. On a second cycle, a horizontal movement was applied to start A Dorian pattern with the root on the E string and moving up through adjacent patterns with roots on the D and B strings.

Participant two: Recognised the A Dorian pattern quickly and grasped the just of the application. Improvised melodically applying the A Dorian with root on the D string and moved to a pattern with root on the E string. On a second and third cycle, the participant moved through patterns with the roots on the D, E and B strings. Some wrong notes were played, and voice leading seemed to be more comfortable when using a horizontal, rather than a vertical movement on the fretboard.

Participant three: Understood and executed the task well. Improvised fluently applying A Dorian pattern with roots on E and D strings. On a second cycle a horizontal movement was applied starting on A Dorian pattern with the root on the E string and moving up through adjacent patterns with roots on the D and B strings then leaping to the 17th fret applying an A Dorian pattern with root on the E string one octave higher than the initial starting area. Economic voice leading took place linking the adjacent patterns in a horizontal upwards direction.

Participant four: Understood the application and quickly recognised the A Dorian pattern. Improvised using a vertical area on the A Dorian pattern with root on E string. The participant ended off the first phrase by landing on the fourth (c note) that clashed with the third (b note)

of the Gmaj7 chord. The participant placed stress on some tension notes on strong beats that did not always resolve to more stable chord tones.

Participant five: Understood and executed the task well. Improvised fluently applying A Dorian pattern with roots on D and E strings. On a second cycle, a horizontal movement was applied to start on A Dorian pattern with the root on the D string and moving down through adjacent patterns with roots on the E and G strings. Economic voice leading took place linking the adjacent patterns in a horizontal upwards direction creating melodic motives.

4.12.3 Interpretation of responses

All of the participants quickly recognised that an A Dorian pattern would produce the correct modes of the major scale over the II V I progression in G major.

Three of the participants were fluent in both the horizontal and vertical application. Participant two was more comfortable in the vertical application than the horizontal movement across the fretboard. Participant four played the correct notes within the parameters of the pattern but seemed to place emphasis on tensions and avoid notes on strong stress points.

The participants that could implement horizontal movement fluently in Question 4 were also more fluent when using the patterns over an II V I chord progression. This finding suggests that if an improviser can clearly visualise the patterns across the fretboard and has the ability to move fluently between adjacent patterns, more time could be assigned to purposefully target or pick out specific notes within the patterns. The ear can then connect with the fingers to produce melodies that are dictated by the ear rather than by the patterns themselves. The

participants that were fluent in Question 4 also had more control over voice leading melodies from one pattern or chord to the next.

4.13 Question 13

4.13.1 Demonstrate how you would play over a major II V I progression in G major by using Lydianb7 and the Altered scale on the V chord from the melodic minor modes

This task examines the use of both Dorian and melodic minor patterns over an II V I progression and economic movement when changing between the different patterns.

Instead of using only one pattern over the whole progression as in Question 12, the participant will have to start on a Dorian pattern, move to a melodic minor pattern and then move back to a Dorian pattern. Economic movement could be slightly trickier and the resolution of the more abstract unstable sound of the melodic minor modes to the I chord.

A Dorian pattern could be used on the root of the Am7 chord (A Dorian), melodic minor pattern on the 5th (A melodic minor) for the D7 chord or melodic minor pattern on the b2 (Eb melodic minor) to imply the D Altered scale. On the Gmaj7 chord either Dorian pattern on the major second (G Ionian) or Dorian pattern on the sixth (G Lydian) could be used.

In the case of applying Lydian b7, the melodic minor pattern will have the same root as the Dorian pattern used on the II chord that implies only one different note. The Lydianb7 mode adds tension #11 to the dominant 7 chord. If the altered scale is applied, a movement from the A Dorian pattern to an Eb melodic minor pattern will imply less common notes between the

two patterns. The use of the Altered scale adds tensions b9, #9, b5 and b13. These tensions will have to be resolved to the more stable I chord.

4.13.2 Responses

Participant one: The application of Lydian b7: Improvised applying A Dorian with root on the E string, moved to A melodic minor (D Lydian b7) with root on E string and resolved back to A Dorian in the same vertical area (root on E string). On a second cycle, improvised by applying horizontal movement starting with A Dorian (root on G string) then moved up to the A melodic minor (D Lydian b7) with root on D string and ended off with A Dorian (G Ionian) moving through patterns with roots on B and A strings. The participant moved economically between the various patterns in both vertical and horizontal movement on the fretboard and applied good voice leading.

The application of the Altered scale: Improvised applying A Dorian with root on E string, moved to Eb melodic minor (D Altered) with root on B string and resolved back to A Dorian with root on the G string in the same vertical area. On a second cycle, improvised by moving from A Dorian with root on the B string to adjacent Eb melodic minor with root on E string and back to A Dorian with root on B string. Economic movement between the various patterns with good voice leading was achieved and quickly recognised of the intervallic applications.

Participant two: The application of Lydian b7: Improvised applying A Dorian with root on the D string, moved to A melodic minor (D Lydian b7) with root on D string and resolved back to A Dorian in the same vertical area. On a second cycle, improvised by applying A Dorian (root on G string) then moved to the A melodic minor (D Lydian b7) with root on G string and

ended off with A Dorian, root on G string (G Ionian). There was voice leading and economic movement between the various patterns.

The application of the Altered scale: Improvised applying A Dorian with root on D string, moved to Eb melodic minor (D Altered) with root on G string and resolved back to A Dorian with root on the B string. Economic movement between the various patterns with voice leading. The participant was asked to apply horizontal movement across the fretboard but seemed more comfortable by staying within one specific area on the fretboard. The participant did recognise the intervallic applications quickly.

Participant three: The application of Lydian b7: Improvised applying A Dorian pattern with root on the B string, moved to A melodic minor (D Lydian b7) with root on B string and resolved back to A Dorian in the same vertical area (Root on B string). On a second cycle, improvised by applying horizontal movement starting with A Dorian pattern (root on E string) then moved horizontally upwards to the A melodic minor (D Lydian b7) with root on A string and ended off with A Dorian (G Ionian) root on B string. The participant moved economically between the various patterns in both vertical and horizontal movement on the fretboard and applied good voice leading.

The application of the Altered scale: Improvised applying A Dorian with root on E string, moved horizontally upwards to Eb melodic minor (D Altered) with root on A string and resolved upwards to A Dorian with root on the B string. Economic movement between the various patterns with good voice leading was achieved. The participant seemed comfortable in both vertical and horizontal movement across the fretboard and quickly recognised of the intervallic applications.

Participant four: The application of Lydian b7: Improvised applying A Dorian with root on the E string, attempted to move to A melodic minor (D Lydian b7) with root on E string but stayed on the A Dorian pattern over the D7 chord, attempted to resolve back to A Dorian to imply Ionian on the Gmaj7 chord but moved to the A melodic minor instead in the same vertical area (Root on E string). The participant seemed uncomfortable and a bit unsure when moving between the Dorian and melodic minor patterns. On a second cycle, improvised applying A Dorian with root on the E, string moved to A melodic minor (D Lydian b7) with root on E string and resolved back to A Dorian in the same vertical area (root on E string). Although the participant was hesitant in moving between the Dorian and melodic minor patterns voice leading did still take place.

The application of the Altered scale: Improvised applying A Dorian with root on E string, attempted to move to Eb melodic minor (D Altered) with root on A string but landed on the E melodic minor pattern instead on the D7 chord. Resolved back to A Dorian with root on the E string. On a second attempt, the participant duplicated the same mistake by moving to the E melodic minor (root on A string) instead of the Eb melodic minor pattern. Although a wrong pattern was used voice leading did still take place between when moving between the various patterns. The participant did recognise the intervallic applications quickly.

Participant five: The application of Lydian b7: Improvised applying A Dorian pattern with root on the D string, moved to A melodic minor (D Lydian b7) with roots on D and E strings, then resolved back to A Dorian with root on the G string. On a second cycle, improvised by applying horizontal movement starting with A Dorian (root E string) then moved up to the A melodic minor (D Lydianb7) with roots on A and B strings. The participant ended off with E Dorian (G Lydian) moving through patterns with roots on E and A strings. The participant

moved economically between the different patterns in both vertical and horizontal movement on the fretboard and applied good voice leading.

The application of the Altered scale: Improvised applying A Dorian with root on D string, moved to Eb melodic minor (D Altered) with root on A string and resolved back to E Dorian (G Lydian) with root on the B string. On a second cycle, improvised by moving horizontally upwards from A Dorian with root on the D string to adjacent Eb melodic minor with root on G string and back to A Dorian with root on B string. Economic movement between the various patterns with good voice leading was achieved and quickly recognised all of the intervallic applications.

4.13.3 Interpretation of responses

All of the participants quickly recognised the applicable Dorian and melodic minor patterns that would produce the correct modes of the major scale and melodic minor scale over the II V I progression in G major.

Similar results were observed as in Question 12. Three of the participants were fluent in both the horizontal and vertical application, and two participants were more comfortable staying in one vertical area and seemed unsure of moving horizontally across the fretboard. Economic voice leading was achieved by all the participants even when playing a wrong pattern application in the case of participant four on the dominant 7 chord.

Although participant two was not able to produce a horizontal movement across the fretboard, good voice leading was applied with musical sounding phrases. Participant four seemed very

uncomfortable when moving between the Dorian and melodic minor patterns and applied a melodic minor pattern that was a semitone above (E melodic minor) the applicable pattern (Eb melodic minor) on two consecutive attempts.

Results so far indicate that all of the participants understand the theory behind the reduction concepts. They can all quickly recognise the applicable patterns from both the major scale and melodic minor modes by applying the correct intervallic formulas. However, there is a big difference in execution of these various patterns between the participants who performed well in Questions 2 and 7, and those that could not visualise the patterns all over the fretboard in both a vertical and horizontal movement.

In Question 12, two new parameters were introduced namely playing over a chord progression with three different chord qualities and improvisation over a fixed tempo where each chord has an exact duration. In Question 13, another parameter was added by adding a melodic minor pattern to the previous Dorian-based patterns.

The affordance of application of the various patterns during the improvisation process is directly related to the ability of each participant to clearly visualise the distinctive patterns across the fretboard. Economic voice leading is an extra effectivity that this concept offers to the player and is directly related to the visualisation activity.

4.14 Question 14

4.14.1 Demonstrate how you would play over a minor II V I progression in G minor with the major scale modes

This task is very similar in principal than Question 12 but based another common progression in the jazz vocabulary namely the minor II V I.

In the key of G minor, the progression would be Am7(b5), D7(b9) resolving to Gm7. The participant will have to recognise that the C Dorian pattern could be used over the whole progression when restricted to applying only the major scale modes.

On the Am7(b5) the intervallic application would result in C Dorian pattern on the b3 to imply the A Locrian mode. D Phrygian dominant sound will result in application of a C Dorian pattern on the flat seventh over the D7(b9) and the same C Dorian pattern will imply G Aeolian on the Gm7 chord (Dorian on the fourth to get Aeolian). A resolution to G Dorian would also be possible on the Gm7 chord, and this would imply moving from the C Dorian to the G Dorian pattern.

Economic movement and voice leading will be examined when playing over the chord progression in a vertical and horizontal application.

4.14.2 Responses

Participant one: Improvised by applying C Dorian with root on the A string in the same vertical area. On a second cycle, improvised by applying C Dorian with root on the A string over the II m7(b5) and V7(b9) chords then resolved to the G Dorian pattern with root on the E string in the same vertical area on the Gm7 chord.

A horizontal movement of the patterns was applied across the fretboard by starting with a downwards movement from C Dorian with root on G string to C Dorian with root on A string. This was followed by an upward movement of the C Dorian pattern with roots on the G, E and D strings followed by a G Dorian pattern with root on the A string on the Gmim7 chord. The participant recognised the intervallic applications quickly and moved economically between the various patterns in both vertical and horizontal movement on the fretboard. Good voice leading was applied when moving between the various patterns.

Participant two: The participant was unsure of the intervallic application on the minor II V I progression, and this did influence the execution of the task. Improvised by applying C Dorian with root on the D string on the Am7(b5) chord then moved to an A Dorian pattern with root on the D string, implying D Mixolydian on the D7(b9) chord and G Ionian on the Gm7 chord. On a second cycle, improvised by applying C Dorian with root on the D string over the IIm7(b5) and V7(b9) chords then resolved by jumping down to a G Dorian pattern with root on the D string on the Gm7 chord.

The participant seems to favour the Dorian pattern with root on the D string in many of the applications thus far and seemed a bit unsure of moving to some of the other pattern layouts in a playing situation. This uncertainty had two outcomes: economic voice leading was not taking place when moving from one pattern to the next, and horizontal movement across the fretboard was not fluent or an option.

Participant three: Improvised by applying G Dorian with root on the B string over the whole progression in the same vertical area. This implied A Phrygian on the Am7(b5) chord, D Aeolian over the D7(b9) chord and finally G Dorian over the Gm7 chord. The participant did

not recognise the correct application on the minor II V I progression and did mention that some wrong notes had been played.

On a second cycle, improvised by applying C Dorian (implying A Locrian and D Phrygian Dominant) with root on the E string over the IIm7(b5) and V7(b9) chords then resolved to the G Dorian pattern with root on the D on the Gm7 chord (implying G Dorian).

The participant moved economically between the various patterns in a vertical direction on the fretboard. Good voice leading was applied when moving between the various patterns. Although this participant did not apply a horizontal movement between patterns, it has been clear that the participant has the ability to fluently move both vertically and horizontally across the fretboard through some of the other tasks.

Participant four: The participant quickly recognised the intervallic Dorian application on the minor II V I progression. Improvised by applying C Dorian with root on the A string over the whole progression implying A Locrian on the Am7(b5) chord, D Phrygian dominant on the D7(b9) cord and G Aeolian on the Gm7 chord.

The participant seemed a bit unsure of the sound of these implied modes over the minor II V I progression and emphasised the b6 note on the Gm7 chord by ending a phrase on that note that did not enable resolution of the prior improvised melodic phrase.

On a second cycle, improvised by applying C Dorian with root on the A string over the IIm7(b5) and V7(b9) chords then resolved by leaping higher up the fretboard to the C Dorian pattern with root on the A string.

Although the participant seemed a bit hesitant during execution of the improvisation voice leading was achieved in moving between the various chords and Dorian patterns.

Participant five: Improvised by applying C Dorian with root on the E string (implying A Locrian) on the Am7(b5) chord. Proceeded to apply Eb melodic minor pattern with root on the G string (implying the D Altered scale) on the D7(b9) chord and ended off with a G Dorian pattern over the Gm7 chord (implying G Dorian).

On a second cycle, improvised by applying C Dorian with root on the G string over the IIm7(b5) chord then moved downwards to Eb melodic minor with root on the B string followed by an upward movement to Eb melodic minor pattern with root on the A string. The phrase was resolved to the G Dorian pattern with root on the B string.

Economic voice leading was achieved by moving in a vertical or horizontal direction between various patterns. The participant seemed comfortable with the sound and pattern layouts and also resolved phrases in a musical way. Although the question only required the use of the major scale modes, the participant also utilised a melodic minor mode in the improvisation.

4.14.3 Interpretation of responses

Three of the participants quickly recognised the applicable Dorian patterns that would produce the correct modes of the major scale over the minor II V I progression in G minor. Two participants were unsure of the correct application but after they were reminded could execute the task at hand. This highlights the importance of the affordance that the correct and quick recognition of patterns will provide to the player during the improvisation process.

Some of the participants seem to favour certain patterns and don't always visualise the less used patterns clearly in a playing situation. This result of favouritism of certain patterns is poor voice leading as observed with player two that leapt down to a familiar area further down the neck rather than resolving economically to a Dorian pattern that is closer to the area of current activity. These participants also seemed a bit unsure when resolving or ending improvised phrases by landing on more unstable rather than stable scale tones.

The participants who could quickly recognise the intervallic applications and that were fluent in Questions 2 and 7 seemed more in control of both the horizontal and vertical movements across the fretboard versus participants not proficient in the application aspects of these questions. It was also noticeable that the participants who were more proficient in pattern application and the visual recognition of patterns seemed more relaxed and in control of the melodic phrases that they were improvising, especially during resolution of these phrases on the final Gm7 chord.

4.15 Question 15

4.15.1 Demonstrate how you would play over a minor II V I progression in G minor by using Locrian#2 and the Altered scale on the V chord from the melodic minor modes

This task is very similar in principal than Question 13 and examines the use of both Dorian and melodic minor patterns applied to a minor II V I progression in G minor and economic movement when changing between the various patterns.

A Locrian#2 mode would be implied by applying a C melodic minor (on b3) pattern over the Am7(b5) chord. D Altered mode would be implied by applying an Eb melodic minor (on b2) pattern over the D7(b9) chord. Resolution to the Gm7 chord could be achieved by using either the G Dorian pattern implying G Dorian or the C Dorian pattern implying G Aeolian.

The task is quite challenging because two different melodic minor patterns and one Dorian pattern will be applied during improvisation. Voice leading might be a bit more challenging between the more abstract-sounding Locrian#2 and Altered modes of the melodic minor, and final resolution of these more tension-based patterns will be examined towards the Im7 chord.

4.15.2 Responses

Participant one: Quickly recognised the correct intervallic applications. Improvised applying the C melodic minor (A Locrian#2) pattern with root on the G string on the Am7(b5) chord, moved to Eb melodic minor (D Altered) with root on A string in the same vertical area on the D7(b9) chord and resolved by moving horizontally down to the G Dorian pattern (G Dorian) with root on E string on the Gm7 chord. On a second cycle, improvised by applying an upward horizontal movement starting with C melodic minor root on A string, moving through adjacent patterns with roots on the G and E strings over the Am7(b5) chord. This was followed by voice leading vertically to the Eb melodic minor pattern with root on G string and then moving upwards to an Eb melodic minor pattern with root on the E string. Resolution to the Gm7 chord took place by voice leading to the G Dorian pattern with root on the A string.

The participant moved economically between the various patterns in both vertical and horizontal movement on the fretboard and applied good voice leading.

Participant two: Seemed a bit unsure of the applications of the melodic minor modes on the minor II V I progression. Had to be reminded of the correct intervallic applications. Improvised by applying the C melodic minor with root on the D string then moved to Eb melodic minor with root on the G string in the same vertical area and aimed resolve to G Dorian with root on the A string but was a semitone out and ended up on an F# Dorian pattern. On a second attempt, the same melodic minor patterns were utilised, and resolution took place to the correct G Dorian pattern with root on the A string.

The participant did move economically between the patterns in a vertical direction but did not attempt moving in a horizontal direction.

Participant three: Quickly recognised the correct intervallic applications. The participant applied the C melodic minor with root on the E string on the Am7(b5) chord (A Locrian#2), moved to C Dorian with root on the E string (D Phrygian Dominant) in the same vertical area and resolved to the Gm7 chord by voice leading down to the G Dorian pattern with root on the D string. On a second attempt improvised applying the C melodic minor (A Locrian#2) pattern with root on the E string on the Am7(b5) chord, moved to Eb melodic minor (D Altered) with root on G string on the D7(b9) chord and resolved by moving to the G Dorian pattern (G Dorian) with root on B string on the Gm7 chord in the same vertical area.

The participant moved economically between the various patterns using predominantly vertical movement on the fretboard.

Participant four: Quickly recognised the correct intervallic applications. The participant applied the C melodic minor with root on the E string on the Am7(b5) chord (A Locrian#2),

moved to Eb melodic minor with root on the A string (D Altered) in the same vertical area and resolved to the Gm7 chord by voice leading horizontally upwards to the G Dorian pattern with root on the A string. On a second attempt improvised applying the C melodic minor (A Locrian#2) pattern with root on the D string and E strings on the Am7(b5) chord, moved to Eb melodic minor (D Altered) with root on A string on the D7(b9) chord and resolved by moving to the G Dorian pattern (G Dorian) with root on A string on the Gm7 chord in the same vertical area but ended up landing on a the major third (B) note that was out by a semitone.

The participant moved economically between the various patterns, but only utilised the top two strings on the Locrian#2 application, only used one string in both attempts on the D Altered application and seemed most comfortable on the G Dorian application, but only used the top three strings and was a semitone away from the correct pattern in the last attempt.

Participant five: Quickly recognised the correct intervallic applications. Improvised applying the C melodic minor (A Locrian#2) horizontally upwards through patterns with roots on the E and D strings on the Am7(b5) chord, moved horizontally upwards to Eb melodic minor (D Altered) with root on E and D strings on the D7(b9) chord and resolved by moving to the G Dorian pattern (G Dorian) with root on G string on the Gm7 chord in the same vertical area. On a second cycle, improvised by applying the C melodic minor with root on B string, over the Am7(b5) chord followed by voice leading vertically to the Eb melodic minor pattern with root on E string over the D7(b9) chord and finally resolving to the Gm7 chord by voice leading to the G Dorian pattern with root on the A string in the same vertical area.

The participant moved economically between the various patterns in both vertical and horizontal movement on the fretboard and applied good voice leading.

4.15.3 Interpretation of responses

All of the participants quickly recognised the applicable Dorian and melodic minor patterns that would produce the correct modes of the major scale and melodic minor scale over the II V I progression in G major.

The participants that spent more time in mastering the patterns and fretboard layout could benefit more from the efficiency of the affordance that the chunking concept potentially has to offer. This seemed to hold true throughout the study. The participants with expert knowledge could benefit by moving freely around the fretboard in any direction and were able to move more economically when changing between various patterns. They also had efficiency in utilising the whole range of any pattern versus applying only two or three strings in a pattern by novice participants. The participants with expert knowledge could also play beyond the boundaries of the shape and sound that a specific pattern produces versus the more scalar sound and restrictions or absence of hearing or shaping the sound of a specific mode by the novice participants.

To further test the theoretical application and validity of the reduction concept to a real-world application, I made use of Russell's (1959, 95–96) analyses of the first 32 bars of John Coltrane's *Giant Steps* solo, demonstrating the way that Coltrane applied the Lydian chromatic concept during his improvisation. I used this analysed model by Russell in Figure 4.1 and applied the concept of reduction by substituting the relevant Lydian master patterns (indicated above), with Dorian and melodic minor patterns (indicated below in grey).

C# Dor A Dor A Dor F Dor F Dor A Dor \ G Harm maj
 (B maj) (C Lyd) (G maj) (Ab Lyd) (Eb maj) (C Lyd \ Lyd Dim)

Bmaj7 D7 Gmaj7 Bb7 Ebmaj7 Am7 D7

A Dor F Dor F Dor C# Dor C# Dor F Dor
 (G maj) (Ab Lyd) (Eb maj) (E Lyd) (B maj) (Ab Lyd)

5 Gmaj7 Bb7 Ebmaj7 F#7 Bmaj7 Fm7 Bb7

F Dor A Dor \ G Harm maj A Dor C# Dor
 (Eb maj) (CLyd/Lyd Dim) (G maj) (E Lyd)

9 Ebmaj7 Am7 D7 Gmaj7 C#m7 F#7

C# Dor F Dor F Dor C# Dor
 (B maj) (Ab Lyd) (Eb maj) (E Lyd)

13 Bmaj7 Fm7 Bb7 Ebmaj7 C#m7 F#7

A Dor F Dor F Dor G Melodic
 (G maj) (Ab Lyd) (Eb maj) (C Lydb7)

17 Bmaj7 D7 Gmaj7 Bb7 Ebmaj7 Am7 D7

A Dor F Dor F Dor C# Dor C# Dor F Dor

(G maj) (Ab Lyd) (Eb maj) (E Lyd) (B maj) (Ab Lyd)

21 Gmaj7 Bb7 Ebmaj7 F#7 Bmaj7 Fm7 Bb7

F Dor A Dor A Dor C# Dor

(Eb maj) (C Lyd) (G maj) (B maj7)

25 Ebmaj7 Am7 D7 Gmaj7 C#m7 F#7

C# Dor F Dor F Dor C# Dor

(Bmaj) (Ab Lyd) (Eb maj) (E Lyd)

29 Bmaj7 Fm7 Bb7 Ebmaj7 C#m7 F#7

Figure 4.1: John Coltrane's *Giant Steps* solo

Figure 4.1 illustrates the first 32 bars of John Coltrane's *Giant Steps* solo. The original Lydian Chromatic approach is indicated in green and the guitar concept of reduction equivalent above the original Lydian Chromatic applications.

There was only one application that occurred twice in Coltrane's 32 bar solo except that does not fall within the scope of this study namely the application of the Lydian diminished scale that would originate from a Harmonic major scale as its parent source (reference Chapter 2). Coltrane used the Lydian diminished scale in both applications to add harmonic tensions to a dominant 7 chord, and he applied the scale on the D7 chord that was part of a II V I (Am7 D7

Gmaj7) pattern in bar 4 and 10 of his improvisation. The C Lydian diminished would use a G Harmonic major scale as the master pattern as indicated in Figure 4.2. On the D7 chord, these notes would imply an altered D13(b9) sound, or Mixolydian b9 scale, see Figure 4.3.

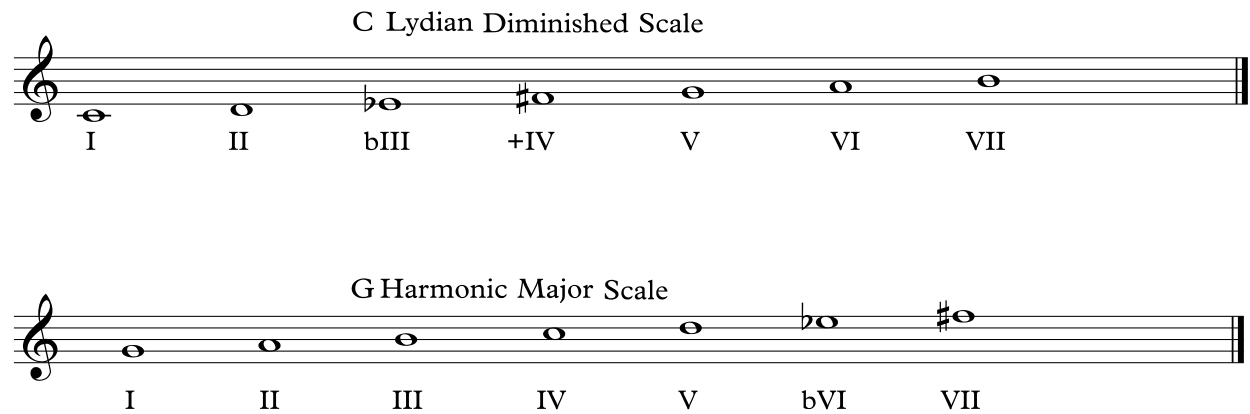


Figure 4.2: Similarity between the C Lydian diminished scale and the G Harmonic major scale

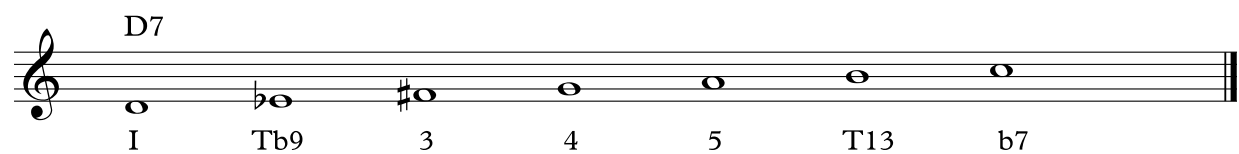


Figure 4.3: D Mixolydian b9 scale that has the exact same notes as the C Lydian diminished scale

There was one application in bar 17 where Coltrane made use of Horizontal Tonal Gravity (HTC) where a G major scale was played over the B maj7 chord but then proceeded to imply D Mixolydian over the next D7 chord and resolving to the target G major chord in bar 18.

According to Russell (1959, 98), horizontal melodic movement can occur where a melody could be constructed over chords of the major and minor genre by implementing the parent Lydian scale of an approaching target chord over these chords. Russell defines this as Horizontal Tonal Gravity (HTC), and the vertical process where every chord is matched up to an applicable scale gets replaced with the idea of rather playing horizontally towards a target chord. This implies that although some notes will be avoided or ‘wrong’ notes on some of the chords, the horizontal melody will eventually resolve to a specific target chord. This HTC concept could also be approached with the reduction concept where an A Dorian master pattern would have the same implications as the G major master pattern that Coltrane applied in bar 17 and 18 (see Figure 4.1).

An analysis of Figure 4.1 shows that Coltrane used several master-scale patterns, during the improvisation (some were repeated). The master scale applications used included B major, C Lydian, G major, Ab Lydian, Eb major, C Lydian, C Lydian diminished and E Lydian scales. John Coltrane could apply all of these master scales fluently with immaculate voice leading. A novice player would have to spend a lot of time to quickly recognise and execute the master patterns fluently before voice leading could take place when moving from one pattern to the next.

As a contrast, the reduction concept on guitar only required three master Dorian patterns and one Harmonic major master pattern. These master patterns would include the C# Dorian, A Dorian, F Dorian and the G Harmonic major scales. The four master patterns in the reduction concept versus the eight master-scale patterns in the Lydian Chromatic concept clearly implies the efficiency affordance that the reduction concept offers to the improviser by applying less

master-scale patterns on the same chord progression to imply the exact same harmonic implications as illustrated in Figure 4.4.

B major	D Mixo	G Major	F Mixo	Eb Major	A Dorian	D Mixo b9
B major	D Mixo	G Major	F Mixo	Eb Major	A Dorian	D Mixo b9

Bmaj7 D7 Gmaj7 Bb7 Ebmaj7 Am7 D7

G Major	Bb Mixo	Eb Major	F# Mixo	B Major	F Dorian	Bb Mixo
G Major	Bb Mixo	Eb Major	F# Mixo	B Major	F Dorian	Bb Mixo

5 Gmaj7 Bb7 Ebmaj7 F#7 Bmaj7 Fm7 Bb7

Eb Major	A Dorian \ D Mixo b9	G Major	C# Dorian	F# Mixo
Eb Major	A Dorian \ D Mixo b9	G Major	C# Dorian	F# Mixo

9 Ebmaj7 Am7 D7 Gmaj7 C#m7 F#7

B Major	F Dorian	Bb Mixo	Eb Major	C# Dorian	F# Mixo
B Major	F Dorian	Bb Mixo	Eb Major	C# Dorian	F# Mixo

13 Bmaj7 Fm7 Bb7 Ebmaj7 C#m7 F#7

G Major	D Mixo	G Major	Bb mixo	Eb Major	A Dorian b2	D Mixo b13
G Major	D Mixo	G Major	Bb mixo	Eb Major	A Dorian b2	D Mixo b13

17 *Bmaj7* *D7* *Gmaj7* *Bb7* *Ebmaj7* *Am7* *D7*

G Major	Bb Mixo	Eb Major	F# mixo	B Major	F Dorian	Bb Mixo
G Major	Bb Mixo	Eb Major	F# mixo	B Major	F Dorian	Bb Mixo

21 *Gmaj7* *Bb7* *Ebmaj7* *F#7* *Bmaj7* *Fm7* *Bb7*

Eb Major	A Dorian	D Mixo	G Major	C# Dorian	F# Mixo
Eb Major	A Dorian	D Mixo	G Major	C# Dorian	F# Mixo

25 *Ebmaj7* *Am7* *D7* *Gmaj7* *C#m7* *F#7*

B Major	F Dorian	Bb Mixo	Eb Major	C# Dorian	F# Mixo
B Major	F Dorian	Bb Mixo	Eb Major	C# Dorian	F# Mixo

29 *Bmaj7* *Fm7* *Bb7* *Ebmaj7* *C#m7* *F#7*

Figure 4.4: The conventional chord scale implications of both the Lydian Chromatic concept (indicated above) and guitar reduction concept equivalent indicated (indicated below in grey).

Although the reduction concept does prove to be more efficient than the Lydian Chromatic approach in this example, it, however, does not imply that if applied, the improviser will instantly sound like John Coltrane. It takes years of consistent practice and extension of the ear to connect the technical approach of the reduction concept to a musical journey during improvisation. Many master improvisers (see Chapter 2) agreed that they did benefit by using aspects of the Lydian Chromatic concept in their approach and all of these musicians have their own voice during improvisation, and that is exactly what set them apart from other improvisers. The same results were also obtained with application of the reduction concept in the improvisation of the five participants in that they all sounded different to each other although they all referred to a similar pattern layout template and intervallic applications. To quote Pat Martino (2018):

Take the experience of enjoying a good meal - there are certain implements that are necessary to do so. Of course, you can do it with your hands directly, as some do, but here we have forks and knives. Even though we use them every time we eat, we don't think of them when we are at dinner. With no thought whatsoever, it becomes a part of the experience of tasting the food. it's the same thing with the exposure to the guitar over several years playing - just another material that helps you express yourself as a musician.

Chapter 5

5 Conclusions and recommendations

5.1 Recapitulation of purpose and findings

The aim of this thesis was to explore what the relationships are between kinetically efficient actions and patterns to enable an improvising guitarist to navigate the fretboard most effectively. A reduction concept was implemented that focused on the modes of the major and melodic minor scales. The idea behind this reduction concept was to allow economy and fluency to the improviser with regard to movement on the guitar fretboard. The improviser's hand could be placed anywhere on the fretboard as a starting point and then effectively and efficiently be moved in any vertical or horizontal direction from that chosen starting position taking into consideration the harmonic structure/s of the moment.

Jazz improvisation is a very complicated process, and any concept that can simplify this process is an affordance to the improviser. This reduction concept is by no means a shortcut. Although there are only a few master patterns and intervallic formulas, the improviser still has to put in an enormous amount of practice time to benefit from the haptic environment provided by the guitar fretboard and the effectiveness of the affordance provided by the reduction concept of chunking of the master patterns. This goes hand in hand with extending the ear to hear melodies that can promote storytelling during improvisation.

The reduction concept has proved to afford efficiency during improvisation in application, execution and voice leading of melodic ideas on the guitar in applying modes of the major and melodic minor scales. Complicated harmonic progressions similar to *Giant Steps* (Chapter 4)

can be streamlined by applying fewer master-scale patterns than with other approaches. Fewer master scale patterns allow the improviser more time to focus on playing and focus can be placed on the direct musical environment rather than focusing on what scale pattern to play next.

The effectiveness of the reduction concept was tested by exploring the research questions. Participants used both closed as well as three note per string patterns to construct the five master Dorian and melodic minor patterns. Each participant had the option to customise the master patterns to suit their own individual playing styles. Customisation of patterns was often implemented as a need to achieve economical movement and uniformity between the Dorian and melodic minor master patterns.

The reduction concept was new to all of the participants. They all agreed that practising and repetition of the master patterns were required before the benefits of chunking promoted fluency and efficiency in their playing. Application of the intervallic formulas was also a new concept to them and it required repetition and practical application before efficiency could be achieved in the application of the reduction concept.

All of the participants could quickly and effectively identify the correct intervallic applications but the efficiency and fluency (effectivities) in the execution of the master patterns varied between various participants. The participants who were fluent in execution of the master patterns were consistently more efficient than those who were less fluent in this regard.

Practice methods and time allocated to repetition and practical application of the master patterns played a key part in the benefits of chunking to each participant. Participants who

practiced more effectively could focus less on the master patterns and more on what they were hearing because the master patterns were integrated in their motor memory, so promoting cognitive efficiency during improvisation.

The affordances that the guitar provides to the player's musical environment were the same for each participant. The effectivities of each participant, however, were variable and directly related to effective practice methods. The affordance is understood as 'where the fingers meet the strings.'

Participants who were fluent in executing the five vertical Dorian and melodic minor master patterns proved to be more efficient in visualising and linking adjacent patterns during improvisation. These participants also made use of the whole range of the master patterns as opposed to participants who were hesitant and unsure of the master scale pattern layouts.

Participants who proved to be fluent could apply economy to both vertical and horizontal movement between various patterns of the Dorian and melodic minor scales. The participants who proved to be less fluent in this regard were more efficient in the vertical movement than the horizontal movement between various master scale patterns on the fretboard. Accurate visualisation of the master scale patterns and intervallic applications proved to be the key components to achieving economy of movement from one pattern to the next. All of the participants in this research agreed that they did benefit by implementing the concept of reduction to their individual improvisation approaches.

Because of the small specialised test group IPA, action research and the semi-structured interviews allowed for valuable data capturing methods whereby focus could be placed on the

perceptions and feelings of each individual participant about the learning process as well as their individual approaches in applying the reduction concept. Active observation of the exact master patterns as applied by the participants in various practical applications and efficiency of movement on the fretboard could be accurately evaluated.

5.2 Relationship with previous research

Although there are many publications of various books based on scale/mode fingerings using 5 basic scale “forms” in positions available, few researchers have focused on the concept of affordances as defined by Gibson (1977) in jazz guitar improvisation per se. Concepts of findings in my study such as chunking and cognitive offload are broadly in line with the research and findings of Stein Helge Solstad on the Strategies in jazz guitar improvisation.

Solstad (2015) interviewed five New York City based jazz guitar players to investigate strategies that are used in professional jazz guitar improvisation. Through a practice-led research strategy, participant observation and interviews, Solstad found that the strategies were crucially based on context, style and the type of interplay. Solstad concludes that improvisation is based on listening to what is happening in interplay and the available flexible actions to match the given input.

5.3 Limitations of this research

The scope of this study was focused on the effective application of the major and melodic minor scales and their modes in jazz improvisation on a very small skilled participant group. Because of the vast application possibilities on harmonic structures, the scope was further

narrowed in this regard, to obtain insight into the effectivities of the basic fundamental building blocks of the reduction concept. These included the practical execution of the major scales and intervallic applications from memory on static chords and II V I progressions. The limitations of the scope ensured that the fluency and economy of movement between different patterns could accurately be observed during vertical and horizontal applications on the fretboard by the participants.

A criticism could be that the findings of this study may not be relevant to all environments and may be specific to the music students at TUT who engaged with this particular concept of reduction. A drawback of IPA is the small specialised study focus group; generalisations should be made with great caution. The aim of the study however was to determine if this reduction concept enables a learner to navigate the fretboard effectively and efficiently with economy of hand movement on the fretboard.

5.4 Problems arising during the research

At TUT the first year guitar learners are introduced to the Major scale modes and the second year learners to the melodic minor modes. The initial idea in 2017 was to document the learning process of these learners over a six month timeframe with regular interviews and observation of their progress in the practical guitar lessons to test the effectivities of the reduction concept.

This approach did not work because the learners had to perform specific tasks within a specific timeframe and they could not always cope with a workload on top of their busy study schedule. Another problem was that, especially at first year level, the participant's skill level was variable. Some participants were not able to execute tasks as quickly as others and this put more pressure on the less skilled participants.

The second year participants had problems with hearing the abstract sound of the melodic minor modes. Their execution was dictated by a mechanical sounding scale pattern as opposed to a meaningful melody and economy and fluency could not be tested accurately.

These findings paved the way forward to select a more specialised and skilled study group who could contribute to the study and deliver their own insights about their experience with the reduction system over a four-year period.

5.5 Recommendations

The idea of affordances is just beginning to gain a foothold in musicological circles and not much research has been done in this particular field. I do believe that further exploration and study of how affordance theory relates to various aspects of musicology could be most rewarding to the researcher and beneficial to the available literature.

In Chapter 4 the results indicated that effective practice methods developed the ability to think on the fly during application on the fretboard. The participants who spent more time practising the master patterns and intervallic applications effectively, were able to execute the tasks accurately, instinctively and effortlessly. These participants were also able to move freely around the guitar fretboard in any direction and could accurately execute voice leading from one pattern to the next. They were also more comfortable with the sound that the various modes produced over the different harmonic structures, especially with the melodic minor applications as opposed to those participants who did not spend as much time on effectively practising the material.

The practice habits of participants also had a direct implication on their haptic perception that impacted directly on dynamic touch during improvisation. The participants who practised effectively could clearly visualise the patterns by matching the reference 'root notes' of the various patterns to the correct strings. They could also visualise multiple patterns that have roots on various strings in the same fretboard area, overlapping each other, and therefore could benefit from the affordance of efficient movement between the various patterns or voice leading effectively from one pattern to the next.

I would like to recommend including the practice habits of participants for future studies by focusing on the impact that the practice habits could have on the overall efficiency affordance of this reduction concept. How to practice effectively could be directly related to the ability to execute patterns on the fly during improvisation.

Another recommendation could be to give the participants a task to improvise over specific jazz standards that will require specific master-scale applications and then transcribing their solos to accurately evaluate their note choices and ability to voice lead with a more scientific result.

The inquisitive learner could also explore the Harmonic minor and Harmonic major scales as master scales to obtain their modes. This will add an additional fourteen options to the available scale choices. The Whole tone, Diminished scale, Auxiliary Diminished Blues scale, Augmented scale and the Pentatonic and Hexatonic scale system, could also be added to the reduction concept to extend the scale application possibilities over harmonic environments.

This study is specific to the guitar but could also just as effectively have been applied to other instruments (such as the examples of Barry Galbraith (guitar, Figure 2.5) and John Coltrane

(tenor saxophone, Figure 4.1) in their applications of the Lydian Chromatic approach). On Guitar Pat Martino's Dorian concept has proved to work well but other instruments could find it more useful to use a different master scale template due to various pragmatic and logical approaches of various instruments.

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