Efficiency and Economy: A Study of James Macaulay's Improvisations through Idiomatic Analysis on the Trombone

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A Thesis submitted in fulfilment

of requirements for the degree of

Bachelor of Music (Performance) (Honours)

Sydney Conservatorium of Music (Jazz)

University of Sydney

2019

Declaration

I, Jack Aarron Lincoln, hereby declare that this submission is my own work and that it contains no material previously published or written by another person except for the co-authored publication submitted and where acknowledged in the text. This thesis contains no material that has been accepted for the award of a higher degree.

Signed: Jack Aarron Lincoln

Date: 21/10/19

Acknowledgments

I would like to thank my supervisor Phillip Slater for his knowledge and guidance throughout the project and my time at the Conservatorium.

I would also like to thank my family and partner Cassandra for their support of my musical endeavours over the years, without which I would never be at this point.

Finally I would like to thank James Macaulay for creating beautiful music with his unique voice on the trombone.

Abstract

James Macaulay is a virtuosic improvising trombonist from Melbourne, Australia. He has a unique voice on the trombone that appears effortless in performance, yet able to navigate difficult passages on the instrument with ease. This thesis investigates how Macaulay achieves efficiency on the trombone, through the paradigm of embodied cognition. Three solos from a 2014 performance at Bennetts Lane, Melbourne have been analysed with strong reference to idiomatic concepts. These include research into the trombone interface itself and the affordances it contains, entailing slide movements, alternate positions and movements of the overtone series. The result is an understanding of Macaulay's playing, based on physical movement and embodiment to achieve efficient outcomes on the trombone.

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1 Introduction and Lit Review

1.1 Introduction

James Macaulay is an improvising trombonist from Melbourne, Australia renowned for his virtuosity, creativity and unique voice on the trombone. Macaulay's playing appears effortless in performance, with difficult passages played with ease throughout the trombone. In particular, a 2014 performance at 'Bennetts Lane' has been highlighted as an early example of Macaulay's improvising prowess, covering the range of the instrument with a broad array of rhythms, harmony and creativity. A question that emerges from this performance is: How does James Macaulay physically play the trombone with efficiency and ease whilst improvising? When analysing specific artists, improvised research has centred on concepts relating to chord-scale theory, compositional traits, social settings and other general observations which relate to Western music traditions. These methods focus on clear theoretical models that leave out the role of the body and instrument in practice, thereby unable to explain Macaulay's physical abilities. To understand Macaulay's playing this way, an embodied paradigm must be used. This view refers to how the mind, brain and body are all one cohesive system, with the brain simply enabling efficient motor reactions to sensory stimuli (Iyer, 2014, p.3). Likewise musical embodiment refers to the understanding of musical performance through this lens, with contemporary Australian researchers creating works that better understand the relationships between the instrument and body in performance (Barker, 2015; McLean, 2018). These embodiment trends aim to fill gaps in the overall understanding of jazz and improvised music in relation to the body itself, providing an insight into how the relationship between player, instrument and environment create musical outcomes. This study will explore the embodied concepts of idiomaticity, instrumental workspaces and

their given affordances; as well exploring the issues with other forms of analyses in this context. A framework of the instrument's interface and affordances have been created in regards to movement of the handslide and partial series of the trombone to directly apply to Macaulay's improvised solos. My own knowledge and experience as a trombonist has guided the analytical process, with the concepts remaining relevant in trombone playing and pedagogy. From this embodied view of Macaulay's playing, greater insights can be gained into how he is able to physically navigate the trombone with efficiency and ease. It is worth mentioning however that Macaulay's playing and artistry is not defined solely by the concepts within, as other concepts such as harmonic, rhythmical and compositional have been left out. Instead, the scope of this study is focused on addressing the use of the trombone interface and affordances in relation to Macaulay's solos, analysing the solos aurally and visually post-fact. This is in order to focus on how Macaulay's link with the instrument may create virtuosic outcomes, rather than attempting to discover the initial processes he may have been thinking at the time. As Huron & Berec state: "It is indeed possible to characterize idiomaticism quantitatively in ways that independently corroborate and refine common musical intuitions…performance modeling may prove useful in analytic, historical, ethnomusicological, cognitive, and pedagogical applications." (Huron & Berec, 2009, pg. 119). To understand Macaulay's playing on a physical level, understandings of efficiency, the trombone itself and idiomatic affordances unique to it must first be addressed.

1.2 Instrumental Efficiency

Efficiency refers to the human action of completing a task in the most seemingly easy manner, with less energy expenditure and technical reliability throughout the task at hand. Newell (1986) explores the development of motor skill development stating that "the optimal pattern of coordination and control for a given individual is specified by the

interaction of organismic, environmental and task constraints" (pg. 354). In simpler terms one could say an individual learns how to self-organize their body in order to adhere or bypass the environmental constraints surrounding them, thereby completing the intended task. In an improvised setting organismic constraints refer to the individual's body, task constraints refer to the task necessary to procure an outcome and the environmental constraints may refer to a variety of factors including the instrument itself, the musical construct and surrounding musicians. Mooney (2011) calls these constraints 'Frameworks' stating that "A framework is any entity, construct, system or paradigm – conceptual or physical – that contributes in some way to the composition or performance of music" (pg. 155). This 'frameworks' model can be applied to any aspect of a musical performance or composition. For example, an instrument contains frameworks within its interface and physical makeup, a musical genre contains frameworks through form and tradition, the human body has frameworks which provide movement constraints. A few of these frameworks can be addressed within an improvising context including: the body and what is physically possible to execute, the instrument/tool being used to produce sound and the context or genre of music being performed. This follows Newell's theory of motor development as in order to execute and produce musical output, an individual must learn how to self-organize their relationship with the instrument, the surrounding music being played and wider social factors in a performance. This thesis follows the view that improvisers gain an unconscious understanding of how to best use their body and instrument to achieve their musical goals. Understanding the relations between instrument, body and environment therefore encourages further investigations into the trombone itself in order to understand how Macaulay may interact with it and the environment in his improvisations.

Instrumental efficiency has historically been determined by academics as being a result of hours of technical practice, specialising in their musical field. For instance all musicians learn scales, arpeggios and tunes to gain certain techniques and capture specific idioms on their instruments (Gendrich, 2003, pg. 71-74). Actual physical drills and workouts are often left out of this broader overview of jazz practice, with an emphasis remaining in classical pedagogical literature and method (Nero, 2017). This is an issue as all instrumentalists should have the virtuosity required to execute their chosen ideas. The understanding of how to efficiently play an instrument is of importance for all music of a high level, not reserved solely for classical music. To better understand how Macaulay is able to remain efficient in his improvisations, the instrument itself and techniques pertinent to his playing must be investigated.

1.3 Chromatic and Social Discourse in Analysis

Despite this apparent need to study physical relationships a performer has with their instrument, a larger portion of improvisational analysis has centred around different forms. Artists have historically been analysed from a greater theoretical standpoint rooted in Western music theory. This includes a strong emphasis on chord-scale relationships, wherein each chord has a corresponding scale. This theory was first introduced in George Russell's *Lydian Chromatic Concept of Tonal Organization (1953)* and has been expanded upon greatly in Jamey Aebersold's '*Jazz Handbook'* (2000) . This handbook is seen as a significant source used throughout conservatoires and improvised learning methods, seemingly containing near comprehensive approaches to the jazz tradition. The focal point in this handbook is an emphasis on practicing chord-scale relationships in conjuncture with ear training methods and exercises to better aurally understand the music. However, as this handbook targets a beginner and broad audience it lacks instrumental nuance. "The mind is the originator of ALL musical thoughts…By using

your ear, and knowledge of the needed scales and chords, you will feel much more comfortable with beginning improvisation…You are training your inner ear to direct your fingers to the notes it hears, instantly" (Aebersold, 2000, p.3). Although these statements may be of value as a starting point or somewhat universal overview of jazz improvisation, from an analytic approach a few issues occur. The central theme of this handbook is that through practicing scales and listening to the music itself, one can achieve fluency within 'hearing' jazz language; thereby being able to play it instantly. The problem with this approach is it creates a separation of the mind and body in the process. This emphasis on the mind and auditory systems alone represent a dualist system- wherein the brain is the dominating software that sends information and the body is simply hardware that the brain controls (Iyer 2014)- the issues of this view will be explained in greater detail below. However it is somewhat expected by Aebersold's system that through the knowledge and practice of this specific theoretical model, a performer will automatically develop the technical skills required to enact these musical skills. Although this may be representative of how specific constraints can create the self-organizing embodiment Newell discussed earlier, I argue this is not a holistic approach to understanding improvisation. Not all instruments have the same physical interface and a reliance upon this system alone may lead to very different musical choices being made within an improvised setting. Ignoring what may be less comfortable on an instrument and expecting all pitches to be of equal value throughout every interface can potentially create a less efficient outcome, with greater energy expenditure and a misalignment of an instrument's affordances. For example, on a standard Bb trombone the pitch of B2 is located in 7^{th} position at the end of the slide. In order to play a major triad, large slide jumps must be made from 7^{th} (B) 3^{rd} (D#) and 5^{th} (F#)- this creates large and difficult movement which may not be feasible at a faster tempo. Aebersold's handbook covers a great range of universal topic areas in

terms of harmonic understanding, rhythm and links to the jazz tradition- but ultimately does not provide a holistic understanding of improvisational practice beyond this setting. If we attempted to understand Macaulay's playing from this view, it may reveal what is happening harmonically in relation to chord-scale theory; but does not ultimately address how he is able to physically create an efficient link between his ideas and the instrument. Further analytical discourses can be seen in jazz research, with focus remaining on theoretical paradigms such as compositional and harmonic elements. Studies of jazz trombonists contain similar themes. For example, Wilkinson's (2013) study of L.A. Trombonist Andy Martin focuses on the compositional concepts prevalent within Martin's improvised solos. Likewise within Lancaster's (2009) study of bebop trombonist J.J. Johnson, harmonic and compositional devices are analysed with only passing remarks on his virtuosic abilities and physical execution. Both of these studies focus on chord-scale relationships and 'compositional elements' to describe the artistry of these musicians, with an overall lack of evidence they were able to use the affordances of the trombone to efficiently enact these devices within their improvisations. Although these studies are valid in understanding an artist's manipulation of the chromatic workspace through chord-scale theory and relation to the jazz tradition through shared language and musical idiom; they lack the connection between an artist's body, instrument and skills needed to efficiently perform such tasks in their musical contexts. Therefore in order to understand Macaulay's efficiency within playing, traditional social and chord-scale analysis may not be of use. Instead specific embodied analysis, drawing from the trombone and its given affordances must be used instead.

1.4 Embodiment Theories

As can be seen whilst analysing the prior sources, there remains a large disconnect of harmonic content to the body itself. As this content is drawing from Western theoretical

concepts rather than the idioms they remain in, they abstract the brain from the body. This sets a precedent that adhering to a set structure intellectually and socially is of more value than the physical and cognitive acts needed to perform such tasks. Iyer refers to this as dualist theory in his article *Improvisation, Action Understanding, and Music Cognition with and without Bodies* (2014). This theory previously introduced in the critique of Aebersold, depicts the brain and body as separate components- the brain acts as the controlling agent with the body simply obeying the complex task demands (p.76). Iyer argues that analysing improvised music this way overlooks other important features such as instrumental demands, micro-rhythmical fluctuations and the dynamic context that the artist is functioning in. Iyer then details the "sensory-motor loop" (p.76) as a process occurring within human cognition. Source material is initially sensed, with information sent to the brain and back to the body to produce a reaction. From this view, an improviser in a dynamic environment first senses and processes the stimuli surrounding them, then sends messages back to the instrument as a response. For an instrumentalist to adapt to the dynamic and ever-changing improvising environment efficiently, the performer must be aware or biased towards pathways that can be executed on the instrument at will. The understanding of these pathways in an instrument's individual workspace can provide greater insights into how a performer may manipulate affordances to create a musical outcome. This view of embodiment and improvisation can thus create a link between Macaulay's instrumental technique, efficiency and the surrounding environment. It is worth noting this study is not aiming to disprove the Western tonal system, social analysis or analytical traditions. Instead it is aiming to be part of a grounding framework (Mahon & Camerazza, 2008 as cited by Iyer, 2014, pg. 4) that allows 'abstract' and symbolic cultural ideas to remain a large part of the contextual playing environment. The emphasis

on cognitive embodiment and the idiomaticity involved in improvising provides an extra level of understanding between Macaulay's music, the body and wider social traditions.

1.5 Idiomaticity

As part of these embodiment theories, the concept of instrumental idioms have emerged. Idiomaticity or idiomaticism is defined by Huron & Berec (2009) as the "degree to which a given means of achieving a certain musical goal is significantly easier than other hypothetical means" (p. 119). This means that regardless of the difficulty of a particular phrase, it may be easier to perform on specific instruments than others. For example, it is much easier/possible to play chords on a piano than a single pitch trumpet. Huron & Berec further argue that "certain composers display idiomatic tendencies in their writing that purportedly arise from their skills as performers on a given instrument" (2009, p. 105). As an extension of this statement it could be said that whilst improvising, Macaulay may display similar tendencies on the trombone.

To understand idiomaticity in real time improvisations, models of instrumental interfaces and their provided affordances must be understood. Affordances refer to what an object or environment may offer or provide a person (Gibson, 1979/2015). In a musical sense, affordances can refer to what qualities an instrument may offer the performer. Gibson further states that: "The observer may or may not perceive or attend to the affordance…but is always there to be perceived. An affordance is not bestowed upon an object by a need of an observer and his act of perceiving it. The object offers what it does because it is what it is." (p. 130). This shows that affordances are always present in an instrument and therefore remains useful in analysing improvised performance. Mooney (2011) describes affordances through an idiomatic lens, stating that "every tool has a range of things it allows us to do, and some of those things can be done more easily than others." (p.145) meaning that although phrases may remain difficult, specific affordances

may assist in efficiency. Further investigation into these instrument specific affordances may provide insight into how Macaulay could find efficient pathways afforded by the trombone.

1.6 Instrumental Interfaces

The physical link between a performer's aural skills and the interface of their instrument remains important in researching how a performer behaves within a musical setting. De Souza (2017) shows how Beethoven's physical connection to the piano may have stimulated the auditory connection in his mind upon losing his hearing and through practice earlier in life, maintained aural memory of gestures, harmony and tradition (Chapter 1, p. 6). De Souza states from this case study that "musical capabilities emerge through interactions of body and world, technique and tool" (pg.11), further showing how the physical relationship of the instrument and body can correlate with aural memory and the surrounding environment. Understanding this link also shows how analysing the keyboard interface itself creates a greater understanding of Beethoven's music both aurally and physically. When looking at other instrumental workspaces such as a trombone or violin, one can see the physical setup and manipulations required to create sound vary greatly from each other. To play a melody on different instruments, varied physical processes take place- a pianist uses fingers to press down keys, a violinist uses a bow to move across strings, a trombonist uses manipulations of air, lips and slide. This shows that an instrument's workspace is of importance in analysing embodiment and each interface is different. An analysis of other instruments from a pianocentric (or chromatic) standpoint may not be as useful due to these differences in physicality.

De Souza further dissects workspaces and how expert instrumentalists are influenced sonically and kinaesthetically by their instrument (2017, Chapter 3). For instance a pianist can sense movement on any keyboard instrument (pg. 1). This is due to the instrumental

interface being the same on every keyboard, with a one-to-one mapping (meaning it is physically setup similarly and each note is in only one location) (p.8). Contrary to this, the trombone interface contains what De Souza calls many-to-one mapping (p.8) meaning the same pitch may be found in different places such as alternate positioning. De Souza states that "Mapping an instrumental space only begins to reveal how players inhabit it, for the enactive landscapes that an instrument supports appear most fully in performance" (p.13). This suggests mapping an instrumental space and analysing it within a performance setting may be useful to gaining a deeper understanding of how an artist such as Macaulay may navigate their instrument whilst improvising. De Souza then talks about how idiomatic playing may engage 'sweet spots'- "A place where the object's affordances converge with the agent's abilities in a particularly strong way" (p. 22). These sweet spots show how idiomatic playing may provide greater ease for the player, demonstrating technique and musical poise in tandem with the instrument's interface. (p. 24). De Souza does not state that technology and tools dominate musical performance. Instead an expert instrumentalist knows how to work with their tools in order to best produce music in the environment they are playing in, explaining that the "Theory of Idiomaticity helps explain how instruments shape player's actions, coordinated affordances and habits give rise to distinctive dialects made of seemingly prefabricated patterns" (pg.26). This does not mean that the instrument itself dominates a musician's decisions, but contains constraints and affordances that shape choices a performer may enact whilst reacting to other things occurring in the environment.

Many improvisers have modelled their instrumental interface's affordances to inform their improvisational practice. These include Barker's (2015) study of applying traditional Korean rhythms to a Western Drumset and McLean's (2018) creation of vocabulary through cognitively informed practice on the drum kit. These practice based

studies look in depth at the drum kit interface and various applications aesthetically within an improvised context, with the outcome being language that is efficient and unique to the researcher and their instrument. There is currently no studies to this extent applied to the trombone. Therefore there is a need to investigate the trombone interface and its given affordances so that Macaulay's improvisational style and relationship to the instrument can be better understood.

Nero (2017) provides one of the closest studies to this, entailing the legato double and triple tonguing technique within an improvised jazz setting. Highlighted in this dissertation are methods of practicing this technique and post-applications of it to transcriptions of trombone greats J.J. Johnson and Curtis Fuller. Accompanying this is interviews with current recognised trombonists talking about various exercises and approaches they use to practice. Although this resource is valuable to understanding and learning this specific technique, it does not show in real time how performers may be using it- instead discussing how one may apply this to their practice or superimpose upon pre-made solos and compositions. Admittingly this would be difficult to do in real-time as one cannot see the tongue whilst a trombonist is playing, however there are other affordances which can be observed in a post-fact analysis which may in turn reveal how Macaulay navigates the instrument.

Berrett & Bourgois III (2001) make a passing remark in their study of J.J. Johnson stating: "his melodic style is virtually inseparable from his approach to his instrument, whereby he was able to transcend its limitations by developing efficient slide movements." (p. 72). This small example suggests a greater depth of understanding Johnson's improvisational practice, acknowledging the precedent that the instrument as a tool remains just as important in musical output as the artist's own harmonic and compositional ideas. A critique of this statement is that only small examples are described in relation to this

approach, thereby appearing less definitive. Furthermore, the emphasis on Johnson 'transcending the limitations of the instrument' is contradicting as he is harnessing the affordances of the instrument to execute his ideas. Nonetheless this statement remains useful as it highlights how a virtuosic player like Johnson uses the affordances of the instrument itself in his practice. The slide and corresponding movements are used as examples of trombones affordances, providing impetus that similar movements may be prevalent in Macaulay's playing and contribute to his apparent ease on the instrument.

From this literature, it is shown that the concepts of embodied cognition, idiomaticity, affordances and connections to the instrumental interface itself may create a greater understanding of physicality in James Macaulay's playing. As they are fairly new concepts in improvised research, there still remains a discord between traditional harmonic/compositional analysis and studies of the body itself; thus highlighting a need for further research to be undertaken into the affordances of individual instruments and how they are used in improvised practice.

2 Analysis and Descriptions of Trombone Affordances

This chapter will explore the specific trombone affordances of partials in the overtone series, the hand-slide and alternate positions. As previously stated, affordances can lead to greater efficiency on the instrument and will thus be used as the focus for analysing Macaulay's solos. These affordances may reveal how Macaulay finds physical solutions in his playing to create ease and efficiency.

2.1 Overtone Series and Partials

All brass instruments share a common physical characteristic in that they are built around the overtone series. Early brass instruments such as the bugle were designed this way with pitches organised into a set of partials- notes ascending in the harmonic series which are manipulated by the lips and airstream (Faske, 2013 pg. 9). On a Bb trombone the partials are as following: Bb1, Bb2, F3, Bb3, D4, F4, Ab4, Bb4, C5, D5 (Wick, 1971 pg.48). Although a skilled player may be able reach higher notes indefinitely, this is the most commonly used pitch range. As moving around these partials are used by trombonists of all genres to change notes, it is safe to assume that partials are one of the key affordances of the trombone. Because of this, it is worth investigating in depth how a performer will use these partials in an improvised setting. Multiple studies show how trombonists such as J.J. Johnson, Frank Rosolino, Jack Teagarden and Bill Watrous use these partials in order to play efficiently within a bebop context; because pitches are drawn closer together as the partials are raised higher there is less of a need to move slide positions, enabling them to instead use partial movements to create fast melodic stimuli (Berrett & Bourgois III, 2001; Lambert, 2005; Steed, 2018). These studies gain an understanding of partial movements from interviews and sources of the players, which are then applied to transcriptions of the artists where the movement can be visually assumed in the data. In

most texts these are called “Lip-breaks” or lip slurs (Watrous & Raph, 1983)- typically defined as lip and air movement with no tongue usage. However it is near impossible to measure when the tongue is used from studying a transcription. Unless specific scientific equipment or internal cameras located in the mouth are used, it is too difficult to measure the tongue for a mid-level analysis- thus making the term ‘lip slur’ less useful in describing partial movement. Instead, the act of moving across partials can be called inter-partiality (P. Slater, Personal Communication, 2019**)**. This does not provide the predisposition of tongue use thereby serving as a general term for when a performer changes pitch with their lips and airstream. This can easily be applied to a transcription where one can visually identify groups of notes changing around the partial series and will thus serve as the description for such movement in this study.

2.2 Handslide

If the trombone was only able to perform partials in one position, it would greatly limit the pitch range the instrument is able to produce. Modern brass instruments have found the solution of covering a greater pitch range through the extension of tube length (Faske, 2013, pg. 11) and in the trombones case, the handslide. Easily the most prominent and unique feature of the trombone, the handslide allows a complete pitch descent from a closed position for seven descending semitones and a full microtonal range in between (Wick, 1971, p. 15-16). These semitones are then grouped into seven slide positions, the pitches of which change as the partials are raised (to see how these pitches are organised in each partial, refer to the Partial and Position Key, Appendix A). As the handslide increases the musical potential of the trombone through a greater pitch range, it can be seen as another key affordance to be studied.

2.2.1 Slide Motions

The design of the trombone slide can define it as a 'motion-based instrument' rather than finger-based like a piano or guitar. Two key studies relating to the slide and movements involved to change pitch include: Gitte Ekdahl's '*Simple Model of the Mechanics of Trombone Playing'* (2001) and Brubeck's '*Trombone Slide Motion: An Alternate Position (Relaxation and Resonance Part II)'* (2011). Ekdahl (2001) presents a model of the trombone showing how slide motions are conducted on the instrument, with one degree of freedom meaning the slide can only move backwards or forwards (p.2).

In this study, a key finding is how slide motions are optimised for professional trombonists; a brief metaphor Ekdahl provides is of a pendulum, moving the slide back and forth with energy and gravity to save energy. A trombonist must initially provide energy to move the slide, this energy is then carried by gravity and continuous motion when moving forward. Likewise when moving the slide backwards in one linear motion, it consists of one larger energy impulse followed by continuous movement. Ekdahl states that "Moving between the trombone positions may be seen as a transportation between different energy levels. Sometimes the energy needs to be added, sometimes the existing potential energy is sufficient" (p. 39). This shows that moving to different positions on the trombone may require more or less energy besides the initial impulse. For example moving from 1st to 2nd position requires less energy as they are in close proximity, 1st and 7th position however requires greater energy due to the large distance between them. Brubeck (2011) expands on this claiming that linear slide movement relates strongly to Newton's Law of Inertia- when the slide is in motion it naturally wants to stay in motion (2011, pg. 12). For instance, if a fast passage is being played with the slide positions of 1st, 2nd and 4th, constant movement may be more economical than stopping at each position as the slide does not require energy to stop;

instead carrying through non-stop. Ekdahl expands further on slide motions stating that: "More complex motions are often harder to do and more energy consuming before we have learned them…..A skilled player will know, by experience, the exact amount of initial force needed…It can be done without conscious control" (2001, p. 47). These findings show that a skilled trombonist, conscious or not can achieve greater efficiency within their slide motions through practice. This can be classed as self-organisation as the ideal energies required for each position change and the use of continued movement is self-taught over time. The importance of an effortless slide technique with ideal energy expenditure is further highlighted by Brubeck (2011), asserting that when one moves the slide "as fast as possible" (p. 12) tension can be created in the arm. This can create 'jerky' movements that affect the embouchure and airstream, thereby reducing resonance and sound quality. Similarly Wick (1971) states that "movement of the slide should be made very gently, never too fast, too jerkily or with more force than is necessary." (pg. 15). We can gather from this that motion of the handslide has the ability to destabilise the embouchure and air stream if performed in a jerky and overall inefficient manner, which negatively affects playing output.

The understanding of these slide motion concepts presents a hypothesis to the initial question of 'How does James Macaulay physically play the trombone with efficiency and ease whilst improvising?'. In accordance to these theories, Macaulay may use clear slide motions back and forth in his improvisations, with occasional rapid smaller position jumps to adhere to the 'inertia law of movement'. In remaining efficient and economical, larger 'randomised' positions and 'jerky' slide movements may not occur due to the difficulty and energy expenditure involved; likewise there may be less larger position movements at speed such as 1st to 6th or 7th positions.

2.3 Alternate Positions

As the trombone's pitch is raised a performer can choose multiple positions for a single note, this is known as pitch degeneracy**.** Broadly speaking, "Degeneracy describes how functionally equivalent actions in sport can be achieved by structurally different movement system components" (Davids, Araujo, Vilar, Renshaw & Pinder, 2013, p.24). In this setting, pitch degeneracy means that a pitch is able to be played in more than one position. On a trombone, as the pitch ascends through the partial series the slide positions are grouped closer together; allowing some notes to be accessed through multiple positions. As these pitches are typically played as close to first position as possible, when played in others they are called alternate positions. For example in the lower two partials there are no alternate positions, however F in the third partial (iii) can be played in 6th position in the fourth partial (iv) (A list of all positions, both 'regular' and alternate can be seen in the attached slide chart and partial key, Appendix A). These alternate positions are essential for a trombonist to gain further control of their instrument, with prominent pedagogues arguing that they can "minimize movement for efficiency and economy" (Nero 2018, p.35) and that "every player should have complete command of all the alternative positions" (Wick, 1971, pg. 47). This shows how valuable the knowledge and proficiency of these alternate positions are for a trombonist and how in use they may create greater economy.

As there are multiple choices to execute the same note, in order to pick which position to use it is worth understanding methods which may afford specific choices. Brubeck (2011) refers to position selection being based on either proximity or continuity (p. 15). The former meaning that closer slide positions are grouped together as there is a lesser need for movement and thus energy expenditure. Figure 1 below shows a musical passage featuring repetition between C and D (typically played in positions 3rd and 1st,

in the v partial respectively). D in 4th position (partial vi) allows less energy expenditure as the slide can simply move back and forth between two adjacent positions. As another example, Figure 2 shows movement from F (typically played in 1st position) to C (6th position), if both are played in 6th position it requires no movement of the slide instead changing partials alone.

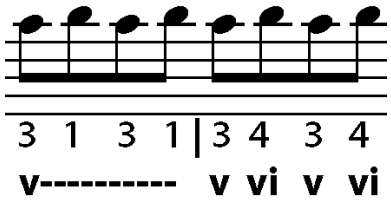


Figure 1: Proximity-Based Alternate Positions, C-D

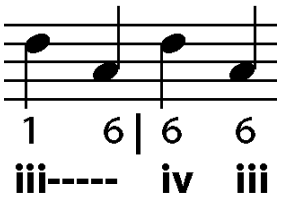


Figure 2: Proximity-Based Alternate Positions, F-C

Continuity refers to motion based movement and can be of great use for efficiency as well allowing the aforementioned inertia law and motions to be used. Figure 3 shows a continuous passage alternating between F and D, if regular positions are used from 1st to 4th consistently at a fast speed it can be exhausting for a trombonist. However if the performer switches between F in 1st and 6th (1,4,6,4,1,4,6,4) they are able to move in more streamlined back and forth motions between 1st and 6th position with continuous movement and minimal effort.

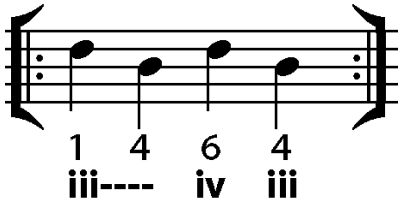


Figure 3: Continuity-Based Alternate Positions, F-D

Alternate positions ultimately enhance choices a trombonist has whilst performing, with proximity and continuity based choices able to provide greater efficiency with minimal or linear movement; hence the value of searching for alternate positions within Macaulay's solos.

2.4 Summary and Combinations of Trombone Affordances

It's established between the two parameters of partial and slide movement that there is ultimately six directions a trombonist can move in. Vertically (or inter-partially) a trombonist can move between partials, Figure 4 shows the 1st position partial range which a trombonist can move up or down which can then be applied to all other slide positions.

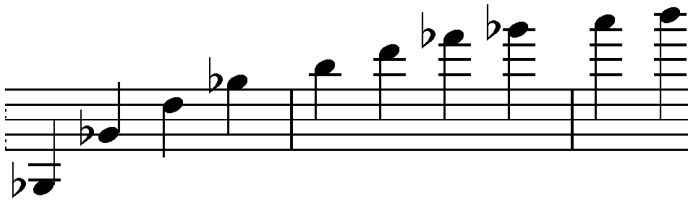


Figure 4: Partials in 1st Position

Horizontally a trombonist can stay on a sole partial, moving the slide back and forth with the arm into seven chromatic pitch positions. This can be called intra-partial (P. Slater, Personal Communication, 2019) as the focus is manipulating pitch options in one partial. Finally a diagonal direction can be established by a combination of moving both the slide and partials simultaneously. A common term for this in trombone pedagogy is "against the grain playing" (Baker, 1974, pg. 40). Engaging both parameters simultaneously allows linear slide motions to occur in continuity, whilst creating greater options in expressing the notes of the partial series with economy. Figure 5 below is an example of against the grain playing, as the slide moves in one linear motion across the first 4

positions whilst concurrently travelling up each adjacent partial. This creates a F major 6 arpeggio in a way which can be performed at speed with ease and efficiency on the trombone.

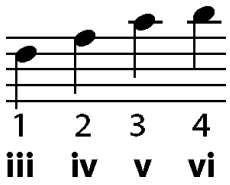


Figure 5: Against the Grain Playing, F Major 6 Arpeggio

Between these 'axis' of trombone playing, it can be said that staying on a particular slide position or partial may be more energy efficient at times. For example, if a passage uses no slide motions and only moves through partials then the only coordination involved is the embouchure and airstream. Likewise staying on a single partial and moving slide positions only allows the embouchure and airstream remain stable. Prolonged use may be exhausting for the player, but in short bursts can be use economically as less co-ordination is required.

As the slide and partials ultimately control chromatic pitch on the trombone, they remain the main technical affordances of the instrument. It is assumed that expert performers on the trombone such as Macaulay have a strong connection to affordances and knowledge of techniques which they may utilise in order to execute their ideas. As mentioned previously, this study acknowledges that improvisation is ultimately dynamic with many factors at play and what a performer may be thinking of in the moment is unknown. Interviewing Macaulay of these processes may not be ultimately useful as the self-organizing principles and embodied process involved may not correlate or could instead be biased towards specific techniques, rather than showing what is occurring physically in real-time. However regardless of self-awareness, the link between the performer,

improvisation and the interface of their instrument is symbiotic. To execute an energy efficient output in an improvisation, Macaulay must use the affordances of the trombone to some degree and the analysis of this occurring in performance will provide a broader wealth of knowledge.

3 James Macaulay and Study

3.1 Biography

James Macaulay is a revered improvising trombonist from Melbourne, Australia. Macaulay began playing trombone at the age of 12 (Fokatis, 2017) later studying as a Jazz undergraduate at Monash University (Melbourne) graduating with honours in 2013. In this time Macaulay studied with the likes of Australian Jazz luminaries Scott Tinkler, Jordan Murray, Paul Williamson and Julien Wilson. He was awarded the 'Sir Zelman Cowan School of Music Jazz Prize' in Composition 2012 and completed an honours study of Melbourne band the 'Hoodangers' in 2013 ('About James Macaulay', n.d., para 4 ; Curl, 2018).

Macaulay has released two albums under his own name with "Three Minute Blitz" released on 18th December 2014 with the James Macaulay Quintet (Macaulay, 2014) and his most recent release "Today will be Another Day" on 4th May 2018 with the 'Happy Hoppy Orchestra' (Macaulay, 2018). He was the winner of the prestigious Wangaratta National Jazz Awards in 2017 (Curl, 2018) and has been featured in many prominent Australian ensembles including the Australian Art Orchestra, Eugene Ball 4tet, Monash Art Ensemble, Bennetts Lane Big Band and the Aaron Cholaui Quintet ('Info, from Macaulay's website', n.d., accessed 2019).

Macaulay has been praised by many on the Australian improvised scene with reviews including: "James is an outstanding trombone player, one of the best in the country. Considering the strength of the brass scene here this puts him in the 'world class' category." (Peter Knight- 'Info, from Macaulay's website', n.d., para 3, accessed 2019). Likewise Eugene Ball has said "James is considered by many to be the most significant and innovative young trombone players in Australia…. James' approach is rare in that it

boldly displays intelligence and ferocious command of the instrument whilst remaining warm and lyrical." (Kee, 2017).

With his high esteem within the Australian jazz community and unique, virtuosic voice on the trombone there is merit into researching and analysing his playing which has not yet been conducted.

3.2 Project Significance

This study expands on current trends of musical embodiment in improvisational research conducted by performer/researchers, focusing on the role of the body itself in terms of cognition and connections to their instrumental interfaces. The study investigates how James Macaulay harnesses the affordances of the trombone to enable efficient musical outcomes pertinent to the trombone. This is significant as there is yet to be similar research undertaken to the trombone or Macaulay himself. This approach has been taken rather than analyses of chord-scale relationships, social studies or compositional approaches as these already contain a broad range of literature that are pertinent to the trombone and may not be relevant to the understanding of Macaulay's physical prowess. In addition, the study provides a framework to analyse the trombone this way in performance; thus contributing to a greater understanding of the trombone and the embodied paradigm itself.

3.3 Aims

The primary aim will be to show how James Macaulay may be using the affordances of the hand-slide and partial series to efficiently navigate through the trombone interface. These idiomatic concepts will be presented as how they occur in real-time solos as a post-fact analysis; the hypothesis being that they occur naturally within the solos due to the apparent ease one can visually see in Macaulay's playing. A secondary aim will be to

research and implement an analytical tool that satisfies a visual representation of these physical concepts, the harmonic and basic rhythmic context and a link to traditional understandings through transcription.

I would like to reiterate the point that James Macaulay is a versatile trombonist, able to play in many idioms fluently with unique style and flair. This study is not aiming to categorize and define his artistry as whole, doing so would be to disregard the complexity and everchanging nature of his improvising and creative process. Instead this study explores the trombone interface and his use of affordances, regardless of whether he was conscious or not. This is in order to gain a further understanding of the link required between body, instrument and music to ultimately create a physically efficient approach to improvising.

3.4 Method

As discussed previously, investigating instrumental frameworks and their affordances enable greater understandings of efficiency. In order to create analysis at a mid-level understanding, physical parameters in this study must be adhered to alongside traditional transcription methods. Upon selecting pieces to analyse, a few factors had to be taken into account: video availability, an uninterrupted view of the trombone's slide and enough variation between pieces without creating too many unnecessary parameters.

Although there is video of Macaulay performing in multiple settings, a quartet performance at Bennetts Lane, Melbourne has been chosen. This has been selected as these solos showcase Macaulay's improvisational style at the time and the videos provide a clear, uninterrupted view of the slide as he is playing. The pieces 'Christmas Day Love Song', 'Lingering Notes' and 'Dreams of Paper Roses' (Aaron Cholaui) (PoundRecordings, 2014, via Youtube, 2015) have been selected as they are varying

styles of the improvising jazz idiom which showcase all the aforementioned criteria. As these videos have been uploaded to YouTube at the time of study and thus in the public domain, it is accessible for public use and remains viable for use in the study.

The transcription method involved in this project is as follows. Firstly the audio of the solos were transcribed as per traditional transcribing models with pitch, basic rhythmic notation and underlying chordal information being presented on a single stave. Secondly using the video, the slide positions were transcribed and written below the stave underneath each note with Arabic numbers between 1-7 representing each slide position. Thirdly using a combination of slide position knowledge and comparison to the attached partial and slide position key (see Appendix A), the partials were recorded underneath the slide positions. Roman Numerals have been utilised to prevent any confusion with the slide positions, with i being the fundamental Bb1 and ranging up to D5 as x. When the same partial has been utilised over multiple notes, an extended line has been created to enable greater clarity in reading. To allow further reading clarity, bracketed rhythms such as triplets or quintuplets have been placed atop each phrase rather than below. During the transcribing process the speed of the music and video were changed utilising Youtube's built in playback speeds. This was dependent on the complexity and clarity being presented in each phrase during the transcription process. This transcription model works to great effect within a mid-level analysis as it presents a link between traditional transcription and physical representations of the trombone interface as it includes melody, rhythm, underlying harmonic structures , slide positions and partial information.

Following the transcription process, data has been analysed with a focus on the concepts of inter and intra-partiality, slide motions and the use of alternate positions. Initially data from these transcriptions were collected visually by actively seeking out patterns and reoccurrences. This includes identifying alternate positions and their function in a phrase,

movements across partials both large and small, slide motions across both intra- and inter-partiality and any other common occurrences that might take place. This data has then been compared to the prior discussed literary concepts to compare whether they correspond, or present new information. The transcriptions have been played numerous times by myself on the trombone at fast and slow speeds, matching my own playing experience to the data whilst focusing on the concepts to affirm their place within the solos. There were however a few shortcomings of this transcription and analysis method worth mentioning. As referenced by De Souza (2017) affordances and options to interpret them are practically endless, due to this stylistic expressions such as turns and vibrato have been left out with focus remaining on pitch comparisons to partial and slide movements. Likewise there isn't an emphasis on harmonic or rhythmic analysis post-transcription in this study as there numerous studies similar in trombone research and cannot sufficiently explain Macaulay's virtuosity on the trombone. Through this methodology and analysis, concepts related to trombone affordances in Macaulay's playing are revealed to ultimately show how he can create virtuosic phrases in his improvising whilst remaining energy efficient.

4 Results and Discussion

Before analysing embodied concepts in the solos, it is worth noting a few onset observations. Macaulay's pitch range extends from A2 to Eb5, however most commonly the radius used is between D3-C5. This may occur so Macaulay can negate larger slide motions in the lower range and only use the extreme high range in specific circumstances to save endurance. Macaulay employs a broad array of rhythms with strong syncopation, odd rhythms such as quintuplets and fluency at faster speeds including semiquaver-sextuplets and demisemiquavers. An advanced connection to diatonic harmony and strong melodic statements typically expected from a player at a high calibre can also be seen in the solos. Although these traits may not be analysed in depth; through analysis of the idiomatic concepts, the outcome should be show how Macaulay has the efficiency to execute these virtuosic passages in his improvising.

4.1 Alternate Positions

Macaulay utilises many alternate positions in these solos including D (vi) and F (vii) in 4th position, Bb (v) in 5th and A (v) in 6th, F (iv) in 6th and C (x) in 3rd position.

D in 4th position (partial vi) is the most used of these in the solos, predominantly utilised in proximity to other notes in 3rd and 4th positions. This can be seen in the figure below:

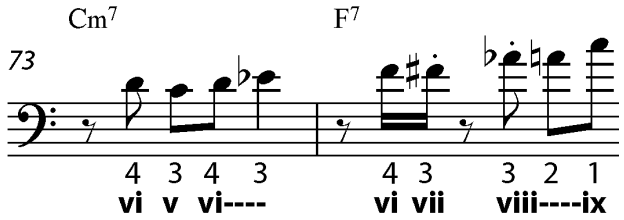


Figure 6: Bar 73 Christmas Day Love Song, D and F in 4th

This example shows both D (vi) and F (vii) being used alternately in 4th position amongst C (v) Eb (vi) and F# (vii) in 3rd position. This allows far greater efficiency in speed and

motion as there is a small distance to travel with the slide, allowing faster phrases to be played with ease between 3rd and 4th position.

This is seen again in Figure 7 in a fast, extended passage wherein Macaulay uses D in 4th position when in close proximity with B in 4th and C in 3rd. Following this Macaulay uses D in 1st position despite using it previously in the phrase in 4th. This is occurring as part of a larger slide motion as the phrase travels in one direction position-wise towards the performer with positions 4th, 3rd and 1st (G-C-D). Macaulay then returns to D in 1st position, executing another linear motion to C and B (1-3-4) . Despite starting this phrase on D in 1st, he again plays D in 4th. This is due to D in 4th remaining part of the linear motion (1-3-4-4) and proximity to B in 4th. This allows Macaulay to execute these pitches at speed without creating any 'jerky' movements, instead following the interface of the instrument. Even when sharing the same pitch within a phrase, the most economical choice is made.

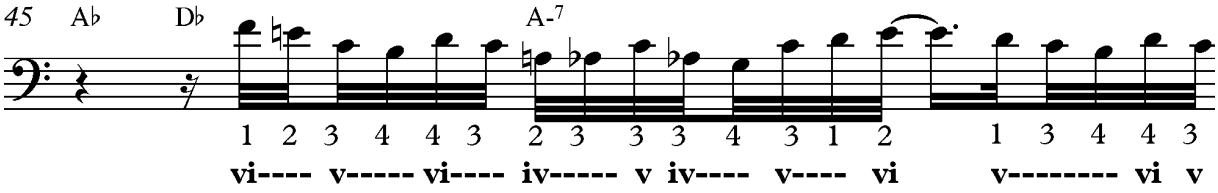


Figure 7: Dreams of Paper Roses, D in 1st and 4th Positions

Figure 8 contains an example of continuity as the slide moves between 1st, 2nd and 4th position in a triplet (F, Eb and D). As there is one motion occurring it removes the need for the jerky motion of 1-3-1, instead embracing one slide direction on the instrument. This allows ease both in terms of slide technique and on the lips and airstream as the triplet remains on one partial.

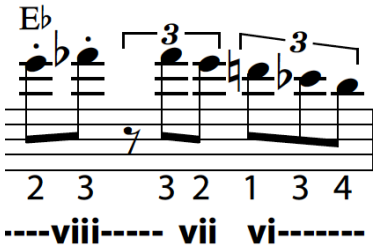


Figure 8: Christmas Day Love Song, Bar 83 D in 4th

Alternate positions are also used to create larger interval jumps across partials. Figure 9 links D and G together in 4th position. Usually F-D would be played in the same position (1st) however as there is more time to move from F-D than D-G, Macaulay instead moves F-D (1st-4th). This allows the larger jump of D-G to be performed solely as an inter-partial jump, providing less energy expenditure as the slide does not need to move at speed. Similarly Figure 10 features F (iv) in alternate position 6th. As the next note is C in 6th position this means Macaulay does not need to move the slide fast from 1st to 6th and can instead make a small inter-partial leap , also allowing him to prepare to play B in the hard to reach 7th position.

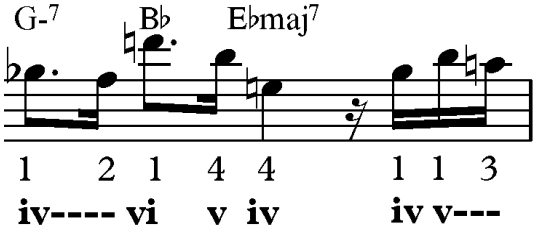


Figure 9: Bar 48 Dreams of Paper Roses, Inter-Partiality on Alternate D4

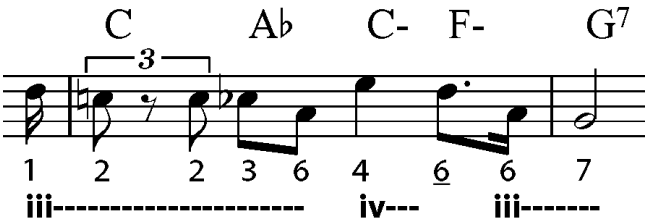


Figure 10: Bar 22 Dreams of Paper Roses, Inter-Partiality on Alternate F6

We can sum from these improvised solos that Macaulay is fluent with specific alternate positions which he uses to create:

1. Minimal slide movement by playing phrases consisting of proximity based note choices such as the use of D and F in 4th position to combine with other 3rd and 4th position notes.
2. Inter-partial jumps such as F (6) to C and D (4) to G, to negate slide movement and thereby greater economy by emphasizing partial changes.
3. Motion based slide movement, with slide positions travelling a single direction such as 1-3-4 to allow a broader range of pitches with less awkward motions.
4. Interchangeability between 'regular' and alternate positions based on which continuity and proximity. None of these degenerate pitches are defined solely by themselves; they are always performed in regards to their surrounds in Macaulay's phrases.

This fluidity with alternate positions allows Macaulay greater energy efficient options in his improvising and are present throughout the solos. This reflects the view that alternate positions can assist an improviser to achieve greater efficiency and economy, in tandem with the trombone interface and surrounding note choices.

4.2 Partial Movements

4.2.1 Intra-Partiality/Slide Motions

A common finding amongst the solos were that most intra-partial lines played by Macaulay are highly direction based- meaning the note choices also reflect how he moves the slide. This happens throughout the solos, with seemingly no 'jerky motions' randomly chosen.

For example, a common archetype that emerges amongst the solos is a descending melodic/chromatic line which occurs whilst moving the slide out. This appears in various forms both fused amongst larger phrases and as melodic devices. Figure 11 below shows an instance where this occurs as a motif is shown firstly on the iii partial descending F-Eb-D (positions 1-3-4), a transposition of this then occurs in the next bar of Eb-D-Db (positions 3-4-5). Figure 12 similarly shows this descending chromatic pattern, wherein Macaulay plays a group of semiquavers on the iv partial Bb-A-Ab-G (slide positions 1-2-3-4). These examples show how Macaulay uses this motion as a melodic device, simply by moving the slide forwards.

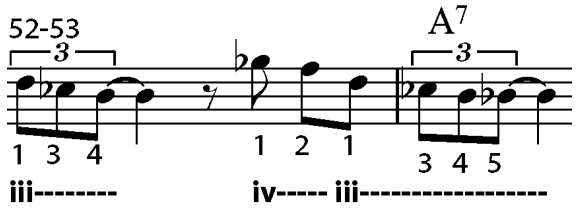


Figure 11: Bars 52-53 Lingering Notes, Slide Direction

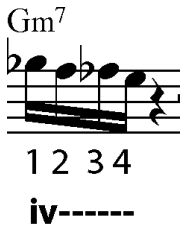


Figure 12: Bar 87 Lingering Notes, Descending Slide Chromatic

Figures 13 and 14 features how this concept can be used as part of bigger lines. Figure 13 features Bb-Ab-G (1-3-4) and Figure 14 shows Bb-A-Ab and also a smaller motion of Eb-D (3-4). This quite literally provides a sense of direction in the phrase, moving outwards on the slide whilst creating a corresponding descending chromatic sound. This

corresponds with De Souza's (2017) stance on 'Beethoven's prothesis', wherein the piano achieves a sense of direction as the left hand moves and pitches descend to create a sensation of falling. Likewise this is occurring with Macaulay's 'falling' slide motions which also experience a similar sense through pitch descension and physical movement. This descending motion also correlates with Ekhdahl (2001) and Brubeck's (2011) statements that once an initial impulse is created with the slide, it is efficient to continue the motion forwards as the forces of inertia and gravity allow Macaulay to economically move to each note.

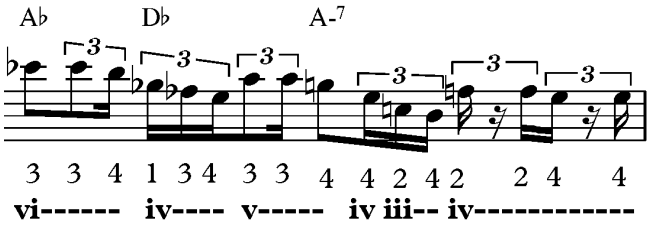


Figure 13: Bar 31 Dreams of Paper Roses, Embedded Intra-Partial Slide Movements

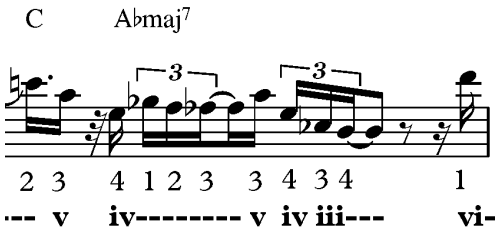


Figure 14: Bar 35 Dreams of Paper Roses, Embedded Intra-Partial Slide Movements

Slide motions in these solos aren't limited to just forward motions as other movements also occur. Figure 15 features the slide travelling in a backwards direction towards the performer, thereby creating momentum that raises the pitch and contour of the phrase in correlation to the movement.

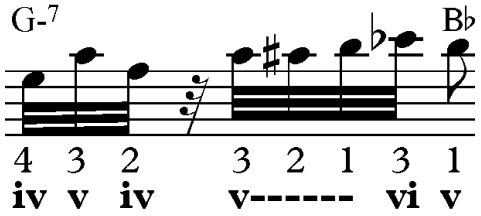


Figure 15: Bar 62 Dreams of Paper Roses, Upwards motion

Back and forth slide motions as can be seen in Figures 16 and 17. Figure 16 features a fast slide motion back and forth that remains easy to execute as it is one position away. Likewise Figure 17 features a broad array of motions starting with a backwards one (2-1) forwards (1-2-3) and then backwards again (3-2-1). Despite moving in multiple directions in one phrase, each direction follows specific lines before re-pivoting in the opposite direction. This creates back and forth movement whilst adhering to inertia rules as each direction remains clear, switching in opposite directions for multiple notes.

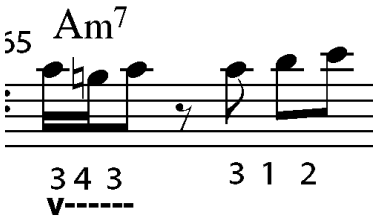


Figure 16: Bar 65 Lingering Notes, Back and Forth Motion

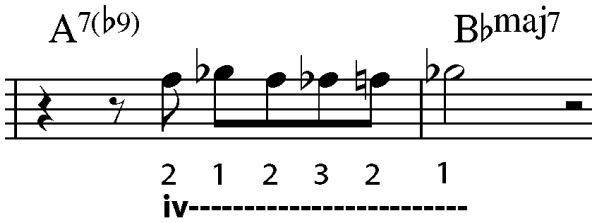


Figure 17: Bar 54 Lingering Notes, Back and Forth motions

An unexpected motion found in the solos is what I will call a 'slide enclosure'. In a bebop context an enclosure refers to a chromatic wrapping of a note, such as D-C-C# to create a sense of back and forth movement and tension or resolution. Likewise in an idiomatic trombone context this occurs when the slide moves away 2 positions from an initial note, resolving in the position between the two notes played. This occurs in Figure 18 below with the slide positions moving 6-4-5 (F-G-Gb) to create a downwards enclosure. This can also be seen in Figure 19 wherein the slide positions move 1-3-2 (C, C#, D) creating an upwards enclosure. Macaulay's use of these slide enclosure remains energy efficient due to a few physical theories. As the slide moves only two positions away, it is less difficult to move to the position in-between as changing slide direction is easier at closer positions. The initial energy impulse required to move two positions away can be absorbed and re-pivoted in the opposite direction, as this does not occur numerous times in a row or across randomised positions it does not become uneconomical for Macaulay. Figure 19 also shows how it can be used in a larger line, with the aforementioned enclosure of 1-3-2 continuing in one motion to D in 1st. This shows an enclosure also being part of a single, continuous slide direction occurring from C-C#-D (3-2-1), consequently revealing that slide enclosures can link other movements together to create a larger phrase. Therefore it can be said that enclosure movements remain efficient for a trombonist and are used to great effect by Macaulay, simply adding small changes in direction both pitch and slide-wise in an economical manner.

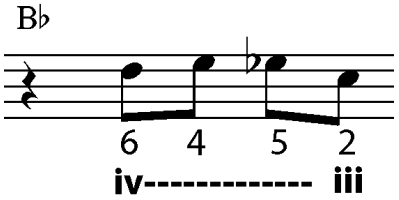


Figure 18: Bar 17, Christmas Day Love Song, Slide Enclosure 6-4-5

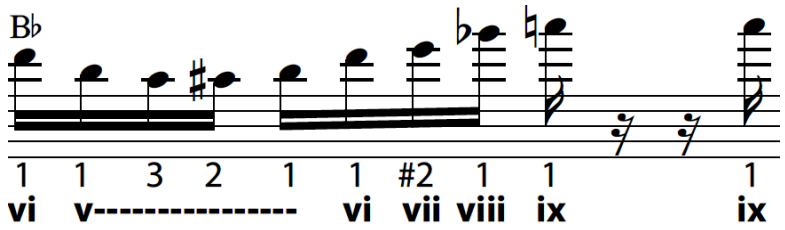


Figure 19: Bar 132, Christmas Day Love Song, Slide Enclosure 1-3-2

To summarise the use of intra-partiality and slide motions in these solos:

1. Intra-Partial lines especially at speed, typically move in definitive slide directions. This can be forwards (descending in pitch), backwards (ascending in pitch), back and forth and as an Enclosure.
2. The positions used in these lines are never at random, always clear in directions and show clear pivot locations which can lead to other motions.
3. Back and forth movements and enclosures are normally between 1-3 positions away and never used for large position changes at speed- instead being used melodically, or as part of a larger phrase.

These findings show how Macaulay uses intra-partial phrases and concurrent slide movements in a way which is economical and less ‘awkward; on the trombone. This enables him to create energy-efficient solutions to the handslide constraint, ultimately using it to create musical ideas and motion rather than as a limitation.

4.2.2 Inter-Partiality

In these solos there are clear examples of inter-partial movement to fluidly move vertically on the instrument. Figure 20 shows inter-partiality (the movement of pitches across partials) occurring in its most obvious form. Whilst the notes in this semiquaver

run are all in first position, as it is rising and descending into consecutive partials it is able to be executed at a greater speed.

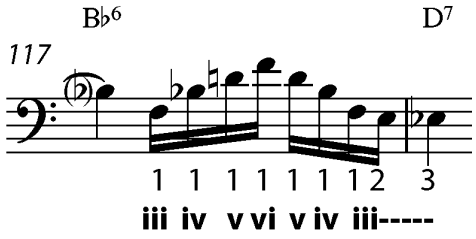


Figure 20: Inter-Partial Movement: Bar 117 Christmas Day Love Song

Across the solos there are a clear trend of partials moving up and down adjacently rather than larger partial jumps, for example Figure 21 features sixteen partial movements total yet all are in close proximity to each other. Partial vi (E) moves to the partial directly below v (D) which then moves to iv (Bb), raises back to v (C#) and so on throughout the entire line. This shows that despite being a long, dense phrase which features many partial jumps they are all economical to reach as they are moving one adjacent partial at a time. Figure 22 features more inter-partial leaps on single positions to add colour to a phrase. Albeit somewhat ghosted, these leaps provide a different rhythmic shape and contour with accented clear notes occurring on each even semiquaver. This adds variety and colour to the solo whilst remaining efficient as it is simply 'flicking' through the partials.

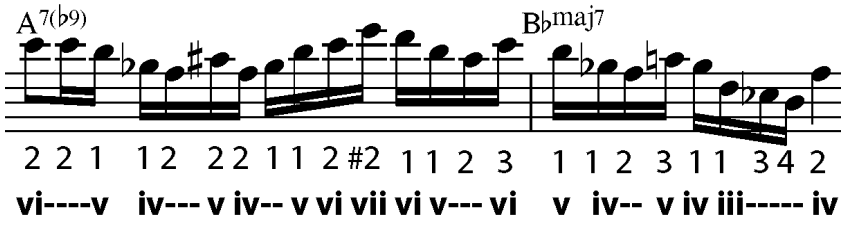


Figure 21: Bars 90-91 Lingering Notes- Small Inter-Partial Jumps

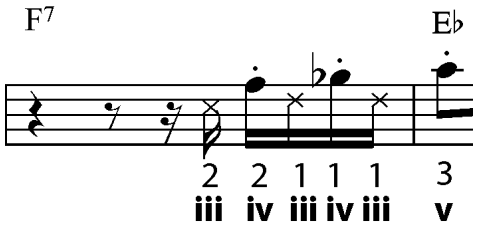


Figure 22: Bar 78 Christmas Day Love Song, Inter-Partial Jumps

Large partial leaps can also be seen in the solos, Figure 23 shows this in action as it jumps from partial viii (Bb) to partial v (D). Although this large leap may usually be considered difficult, it remains in a single slide position. This adds slight ease to this large leap as despite having a glissando up to the D, the emphasis remains on the embouchure and airstream with less need to coordinate with the slide.

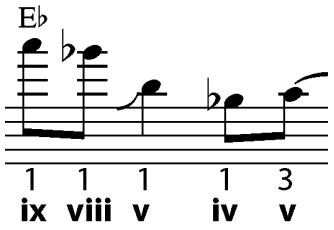


Figure 23: Bar 134, Christmas Day Love Song Large Partial Leap

The 'going against the grain' concept presented by Baker (1974) can also be seen in these improvised solos. In Figure 24 below, Macaulay plays a line starting at the v partial (C#) raising to D. As Macaulay ascends across partials v, vi, vii, viii he simultaneously moves slide positions outwards 1, 1, 2, 3. Figure 25 shows the use of this technique again with slide positions moving 1-2-3-#3 and partials ascending iv-v-vi-vii.

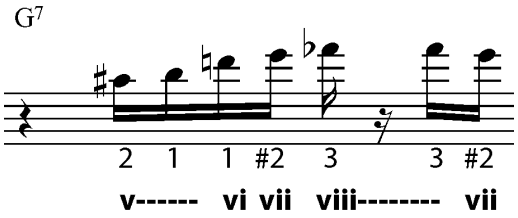


Figure 24: Bar 88, Christmas Day Love Song- Against the Grain

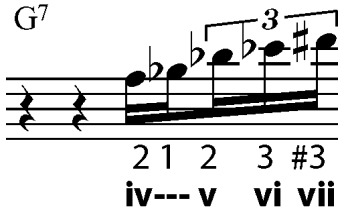


Figure 25: Bar 108 Christmas Day Love Song- Across the Grain

As this employs both inter-partiality and slide motions simultaneously with no interruptions, they can be seen as a piece of idiomatic trombone language used as a means to efficiently reach higher pitches at speed. This is without a reliance on solely slide manipulation or single position intra-partials, instead existing as a combination of the two affordances working together. Because the movement of the slide and the partials are simplified to slide moving out and partials moving up, it remains efficient as Macaulay only needs to coordinate these two simple actions rather than changing throughout a phrase.

Although these passages can also be analysed rhythmically and harmonically, from an embodied lens various outcomes emerge. Regardless of Macaulay's conceptualisation behind his practice, throughout the improvised solos it can be seen that a vast majority of the combinations consist of controlled motions in the slide and partials.

We can see clearly that Macaulay utilises movement between partials to create melodic patterns and pieces of information across the trombone interface. Inter-partial movement

usually occurs one step at a time, either up or down rather than skipping multiple steps at a time. If larger partial jumps occur, they most commonly are used in singular or proximate slide positions. Likewise intra-partial phrases are often direction based along the slide occurring in one linear motion or repivoted movements regardless of different rhythmical speeds and 'difficulty'. The combination of the two allow a greater outcome through across the grain techniques, but isolated many efficient outcomes can also be achieved.

4.3 Chunking and Combinations of Partial and Slide Movement

Perhaps the most significant observation of this analysis is not only how the affordances are used in isolation, but how they are grouped together in larger phrases. These affordances can be separated into chunks of information. 'Chunking' refers to smaller bits of data and information that humans store as part of the memory system, which can then be placed amongst other 'chunks' to create something much larger (Miller, 1994). In this case the use of the aforementioned affordances can be seen in Macaulay's extended and most virtuosic 'difficult' phrases. Usually these can be categorised as chunking in one specific concept then another to break it up; For example Macaulay frequently uses a descending chromatic slide motion intra-partially before moving up one partial to accent and add rhythmical interest to a phrase. Likewise when movement throughout different partials is the focal point of a phrase, he breaks them up and links them together with intra-partial slide movements. Figure 26 is an example of how these concepts 'chunk' together at a fast tempo. We can see clearly partial movements between Eb (vi) -C (v)- Ab (iv) all located in 3rd position, Db (v)- A (iv) E (iii) located in second, F (iii)- Bb (iv) in 1st, jumping out to E (iii) in 2nd position and concluding with D (iii)- G (iv) in 4th position. These partials are linked by small slide position movements as Ab moves forward to G in 4th, returns back to Db in 2nd and connects E-F moving backwards one

position. Bb (iv) is then linked to D (iii) in 4th by a forward slide motion of Bb (1st) E (2nd) Eb (3rd) and D (4th), before concluding with a partial movement up to G. This example shows chunking in action as the main affordance of the phrase used are the partials, which are then connected by small slide movements to execute a difficult, yet idiomatically efficient phrase.

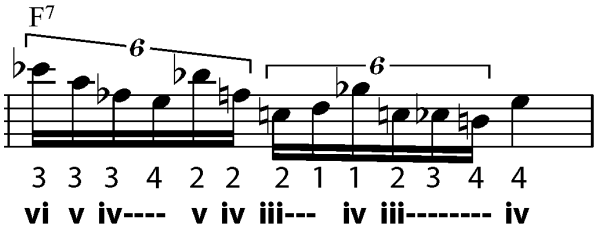


Figure 26: Christmas Day Love Song 'Chunking

Figure 27 also shows affordances in a chunking form, however in this case there is no obvious emphasis on any concept in particular. Firstly parallel slide movements occur on adjacent partials on positions 4-3, starting in the v partial (B-C) then the vi partial (D-Eb). Then from the Eb (vi), inter-partial movement occurs again to C (v) and G (iv). From G it transforms into an intra-partial line with the forwards linear slide movement of Bb-A-Ab (1-2-3) before moving up inter-partially Ab-C-Eb (iv-v-vi). The is then followed by another descending inter-partial block of D-Bb-F (v-iv-iii) before jumping up inter-partially to Ab (iv). Parallel slide movements occur across adjacent partials of Ab-G (2-3, iv) and Eb-D (iii), before jumping up and down adjacent partials D-G-D (iii-iv-iii). The phrase concludes by moving up one slide position to Eb, travelling up inter-partially Eb (iii)-Ab (iv)-C (v) -Eb (vi) and descending inter-partially between E (vi)- C (v)- G (iv)- F (iii).

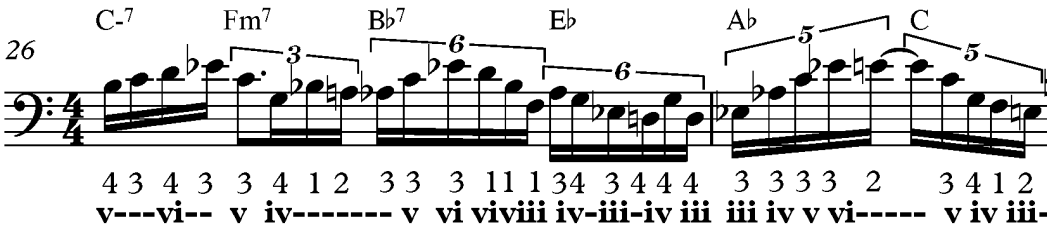


Figure 27: Chunking, bar 26 Dreams of Paper Roses

This example shows chunking in action, with each particular affordance connected with another affordance. By utilising these affordances in chunks, Macaulay is able to execute a fast extended line that is complex harmonically and rhythmically, whilst remaining highly economical. Utilising solely slide movements on a single partial or groups of partial movements without the use of the slide can be exhausting and limiting to a trombonist if performed for too long. Each affordance in this case however is broken into smaller chunks, allowing each component to be used in the phrase before moving on to a different affordance. This lets the lips and arms regain energy to continue lengthier lines and thus play at virtuosic speeds whilst the energy remains efficient. We can therefore say through the use of these physical concepts- regardless of whether Macaulay was aware at the time in his practice or if it is a mere learned habit- he is able to navigate the trombone interface efficiently to produce a virtuosic and highly individual outcome.

4.4 Conclusion

The findings of this study show that the trombone affordances studied are prevalent in these selected solos of James Macaulay. I would argue that in order for a trombonist to achieve virtuosic outcomes such as those that Macaulay achieves in these improvisations, a series of symbiotic relationships must occur. This consists of sensing the surrounding music and context being played and reacted to by the body, which is then connected to

the trombone. The affordances of the trombone can then be used to play energy efficient phrases, whether they are melodic or used for density. Through a fusing/chunking of inter and intra-partial affordances, fast extended virtuosic patterns thought of as extremely difficult to play on the trombone can be executed; performed with efficient slide and inter-partial motions which do not hinder the player. These affordances can be seen as a useful tool to a trombonist and with enough practice, can ultimately provide greater efficiency and economy.

Whether or not these concepts were part of Macaulay's thought process at the time remains unknown. Because of the complex nature of improvisation and the prevalence of melody, harmony and rhythm within a jazz setting, it would be amiss to state that these affordances alone guide Macaulay's artistic practice and process. However, if one was to analyse any of the examples or transcriptions provided from purely compositional or harmonic points of view, it would lack a greater understanding of how Macaulay has executed these phrases. By analysing these improvised solos from an idiomatic, embodied paradigm a much deeper understanding is gained; not only how Macaulay is able to execute these ideas physically, but how the trombone itself can be used to a greater potential using affordances and specific connections to the instrument.

Future research from this study may be broad and encompass different fields relating to musical analysis. Firstly, the framework of analysing the trombone interface in accordance to the presented affordances may be used by researchers to study other trombonists to gain a further understanding of how they navigate the instrument. Likewise other instrumentalists or researchers may wish to breakdown the frameworks of different instrumental interfaces, finding similar frameworks and affordances that can then be analysed to provide further insights. With the concepts explored in this thesis, further research into Macaulay's playing with analysis specific to melody, harmony and rhythm

can be influenced and understood from an embodied paradigm rather than as dualist theories alone. A trombonist aware of these affordances may wish to utilise them as material for their improvising- able to practice as drills for specific embedding or simply as a concept to guide their practice in a way which feels less ‘clunky’ and more energy efficient. These concepts can be used in a broader sense such as idiomatic composition, as a composer can use these concepts to create idiomatic works pertinent to trombone that a soloist can play efficiently. Finally, this study in conjunction with others specialising in specific harmonic, theoretical and social analysis may reveal a much greater view of improvisation and understanding how an artist behaves, both physically and psychologically to create their work.

5 References

'About-James Macaulay Biography'. (n.d.)., Retrieved from http://www.jamesmacaulay.com.au/about/

Aebersold, J. (2000). Jazz Handbook. New Albany, IN: Jamey Aebersold Jazz.

Baker, D. (1974). Contemporary Techniques for the Trombone. In. Usa: Charles Colin.

Barker, S. (2015). Korea and the Western Drumset : Scattering rhythms. London: Routledge.

Berrett, J., & Bourgois III, L. G. (2001). The Musical World of J.J. Johnson (Vol. 35). Lanham,Maryland USA: Scarecrow Press.

Brubeck, D. W. (2011). Trombone Slide Motion: An Alternate Position (relaxation and resonance part II). ITA Journal, 39, 11-14. Retrieved http://www.davidbrubeck.com/2013/03/trombone-slide-motion-an-alternate-position-reprint-from-the-journal-of-the-international-trombone-association/

Curl, A. (2018). JAMES MACAULAY: "TODAY WILL BE ANOTHER DAY' LAUNCH. Retrieved from http://jazz.org.au/james-macaulay-today-will-another-day-launch/

Davids, K., Araujo, D., Vilar, L., Renshaw, I., & Pinder, R. (2013). An Ecological Dynamics Approach to Skill Acquisition: Implications for Development of Talent in Sport. Talent Development & Excellence, 5, 21-34.

De Souza, J. & Oxford University Press. (2017). Music at Hand: Instruments, bodies, and cognition. New York, NY: Oxford University Press.

Ekdahl, G. (2001). A Simple Model of the Mechanics of Trombone Playing (Doctoral dissertation, Mekanik).Retrieved from http://www.diva-portal.org/smash/get/diva2:7162/FULLTEXT01.pdf

Faske, B. E. (2013). A Matter of Coordination: A Pedagogical Study of Respiration, Slide Placement and Articulation for the Student Trombonist and a Synthesis of these Processes for Improved Classroom Instruction. (Doctor of Musical Arts), The University of Alabama, Tuscaloosa, Alabama.

Fotakis, N. (2017). James Macaulay: "the charm of the trombone is in its mystery". Retrieved from http://australianjazz.net/2017/12/james-macaulay-charm-trombone-mystery/

Gendrich, J. M. (2003). Teaching and Learning Jazz Trombone. (Doctor of Philosophy), The Ohio State University, Ohio.

Gibson, J. J. (2015). The Ecological Approach to Visual Perception (Classic edition. ed.). London ;: Routledge.

Huron, D., & Berec, J. (2009). Characterizing Idiomatic Organization in Music: A Theory and Case Study of Musical Affordances. Empirical Musicology Review, 4. doi:10.18061/1811/44531

'Info- From James Macaulay Website'. (n.d.). Retrieved from https://jamesmacaulay.wixsite.com/james-macaulay/info

Kee, J. (2017). JAMES MACAULAY NJA FINALIST. Retrieved from http://jazz.org.au/james-macaulay-nja-finalist/

Lambert, D. (2005). A comparison of three divergent Jazz Trombone Styles from 1953: Jack Teagarden, J. J. Johnson, and Frank Rosolino. (Doctor of Musical Arts), University of Miami, Coral Gables, Florida.

Lancaster, R. A. (2009). Transcription and Analysis of Selected Trombone Solos from J. J. Johnson's 1964 Recording Proof Positive. (Doctor of Musical Arts), University of Miami, Coral Gables, Florida.

Macaulay, J. (2014). Three Minute Blitz, Melbourne: Pound Records.

Macaulay, J. (2018). Today Will Be Another Day. Australia: Earshift Music.

McLean, J. (2018). A New Way of Moving: Developing a Solo Drumset Practice Informed by Embodied Music Cognition. (Doctor of Philosophy), University of Sydney, Sydney.

Miller, G. A. (1994). The magical number seven, plus or minus two: some limits on our capacity for processing information. (Special Issue: The Centennial Issue of the Psychological Review). Psychological Review, 101(2), 343. doi:10.1037/0033-295X.101.2.343

Mooney, J. (2011). Frameworks and affordances: Understanding the tools of music-making. Journal of Music, Technology & Education, 3(2/3), 141-154. doi:10.1386/jmte.3.2-3.141_1

Nero, J. (2017). Developing and Implementing the Double and Triple Tongue Techniques through study of J.J. Johnson and Curtis Fuller: A Guide for Jazz Trombonists. (Doctor of Musical Arts), University of Miami, Coral Gables, Florida.

Newell, K. M. (1986). Constraints on the Development of Coordination. In M. G. Wade & H. T. A. Whiting (Eds.), Motor Development in Children : Aspects of Coordination and Control. Dordrecht ;: Kluwer Academic Publishers.

PoundRecordings (Upload Channel). (2014). James Macaulay Quartet - Dreams of paper roses –Bennetts Lane Jazz Club. Retrieved from https://www.youtube.com/watch?v=v632cqnCCVs

PoundRecordings (Upload Channel). (2014). James Macaulay - Christmas Day Love Song - Bennetts Lane Jazz Club. Retrieved from https://www.youtube.com/watch?v=uafetibE2I8

PoundRecordings (Upload Channel). (2014). James Macaulay Quartet - Lingering Notes - Bennetts Lane Jazz Club. Retrieved from

https://www.youtube.com/watch?v=hZHn9diUJJw

Raph, A., & Watrous, B. (1983). Trombonisms. NY, USA: Carl Fischer.

Russell, G. (1953). The Lydian Chromatic Concept of Tonal Organization. New York: Russ-Hix Publishing.

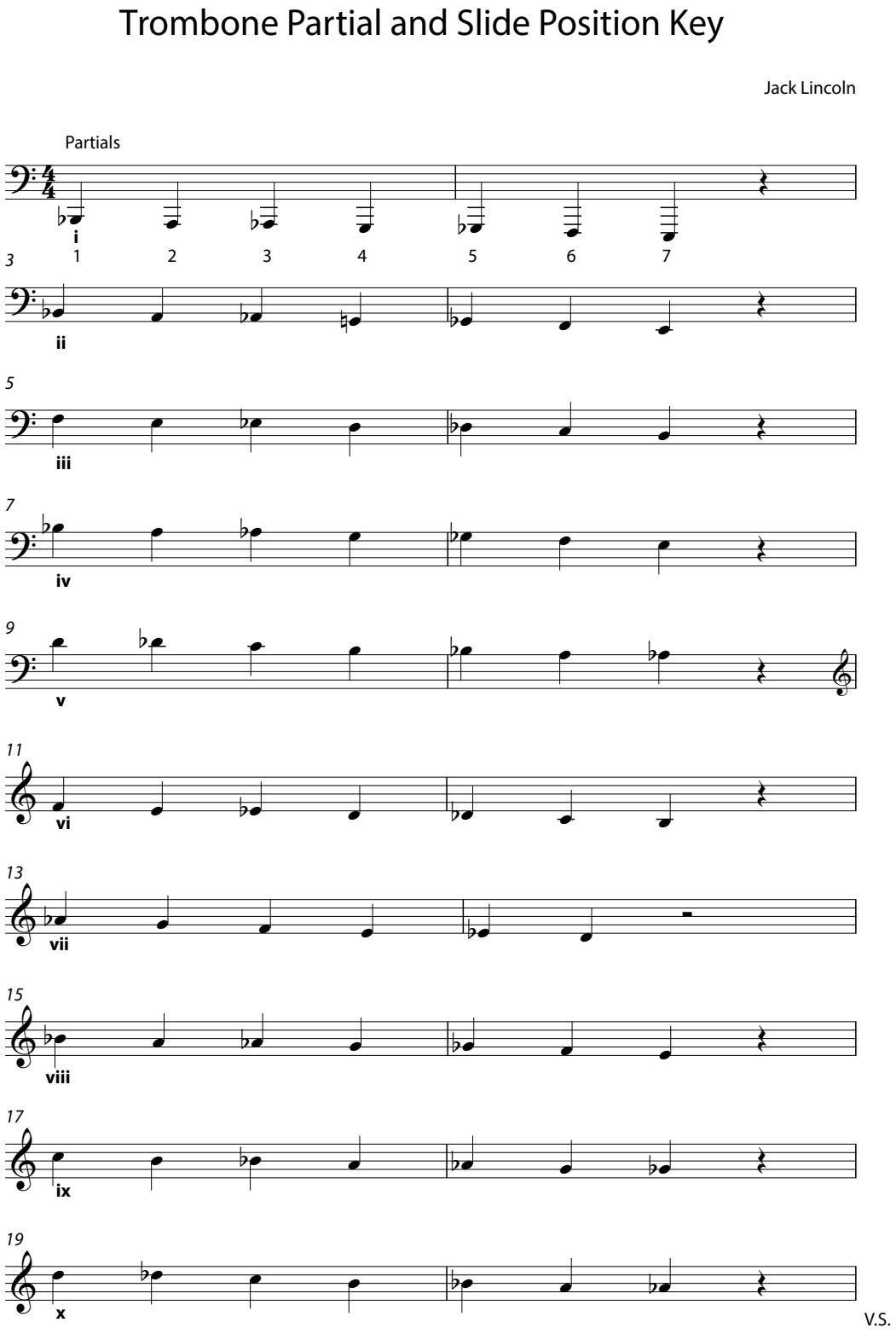
Slater, P. (2019). [Personal Communications with Supervisor].

Steed, B. (2018). Jack Teagarden, J.J. Johnson and Bill Watrous: A Transcription of an Improvised Solo from each that changed the style of Jazz Trombone. (Doctor of Musical Arts), University of Oklahoma, Oklahoma.

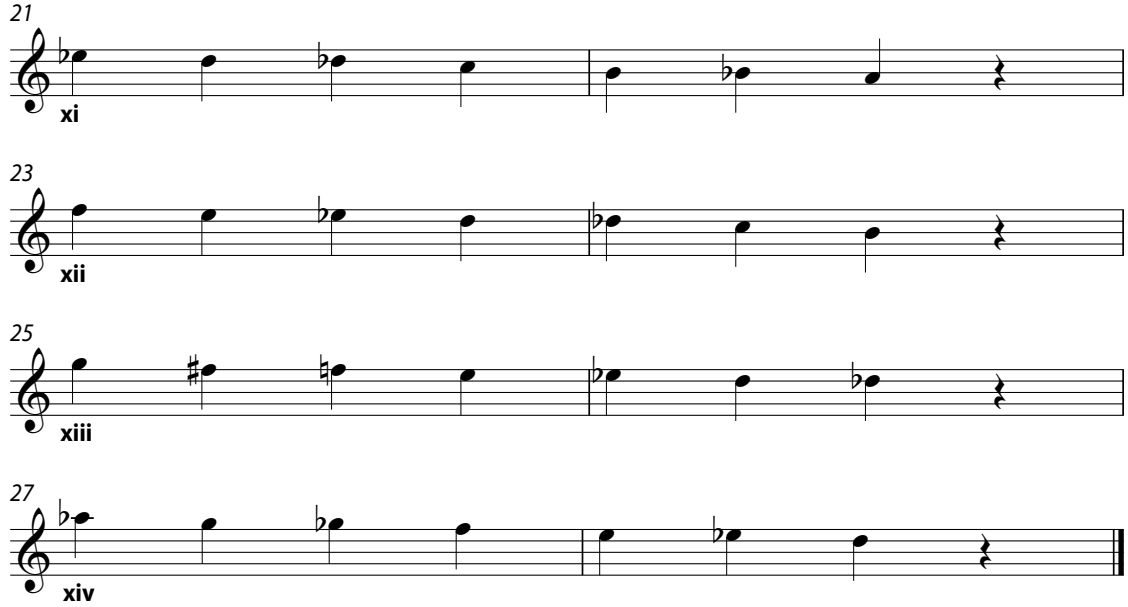
Vijay, I. (2014). Improvisation, Action Understanding, and Music Cognition with and without Bodies. In E. L. George & P. Benjamin (Eds.): Oxford: Oxford University Press.

Wick, D. (1971). Trombone Technique. London: Oxford University Press.

Wilkinson, M. (2013). Thematic Hooks as a Teaching/Learning Tool. (Doctor of Musical Arts), University of Arizona, Arizona, USA.


Trombone Partial and Slide Position Key
Jack Lincoln
Partials
i
1
2
3
4
5
6
7
3
ii
5
iii
7
iv
9
v
11
vi
13
vii
15
viii
17
ix
19
x
V.S.

2

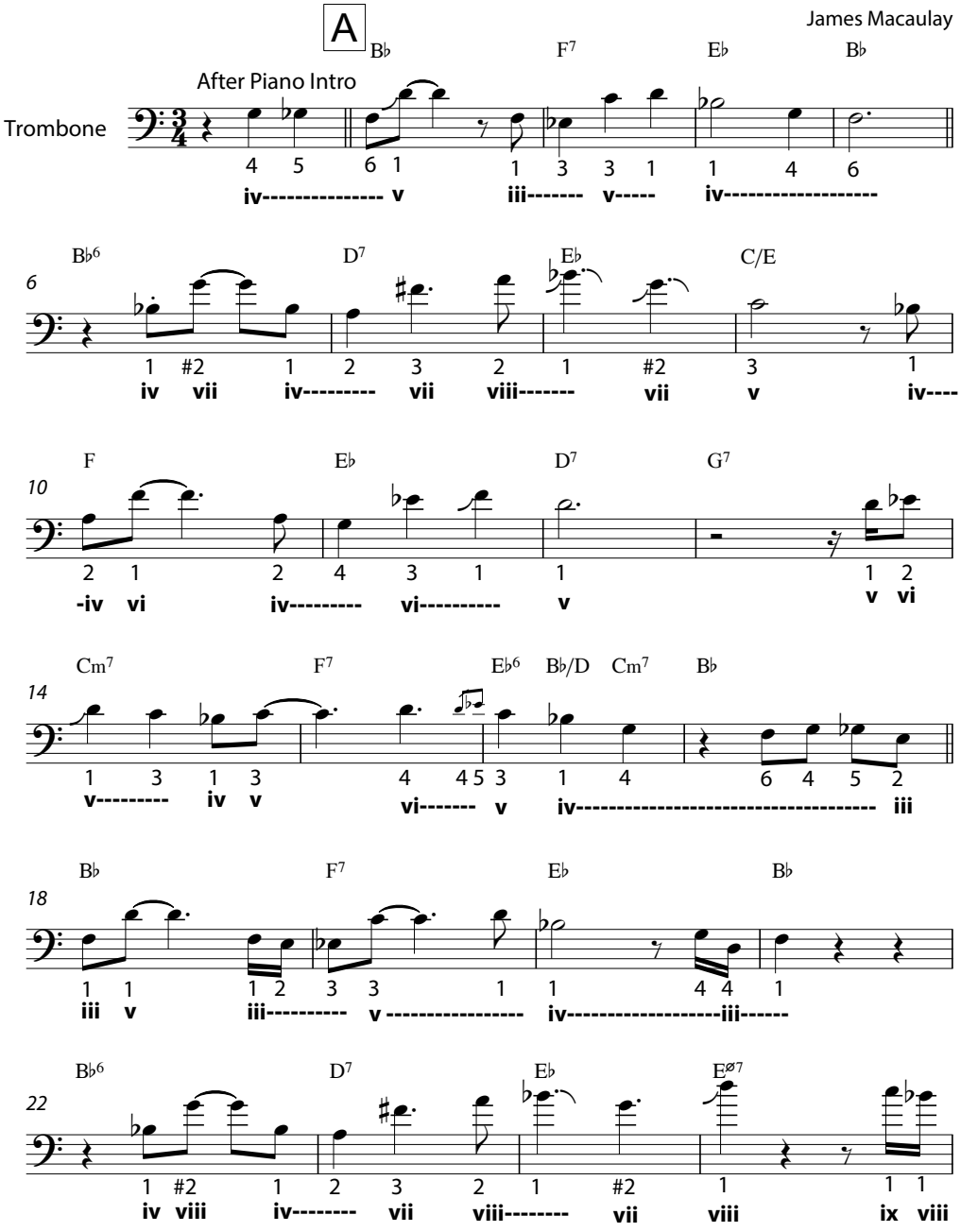


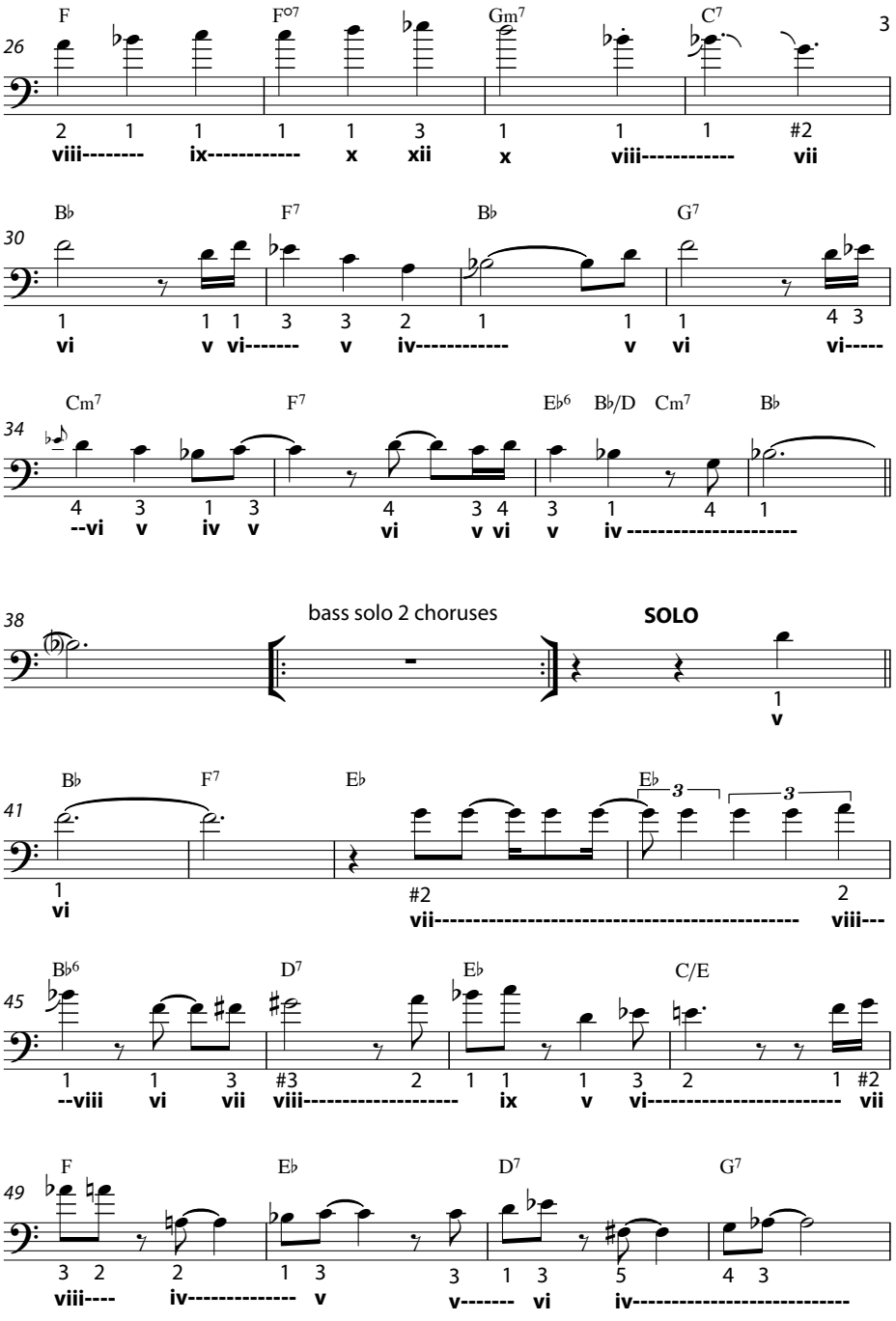
Christmas Day Love Song Live at Bennetts Lane Jazz Club 18/12/2014

James Macaulay trans. Jack Lincoln
Uploaded to Youtube
by Pound Recordings
25/12/2014
https://www.youtube.com/watch?v=uafetibE2I8

Musicians
James Macaulay-Trombone
Steve Grant- Piano
Tamara Murphy- Contrabass
James McLean- Drums

Christmas Day Love Song

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E♭6
B♭/D
Cm7
B♭
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--vi v iv v vi v vi v iv ----------
38
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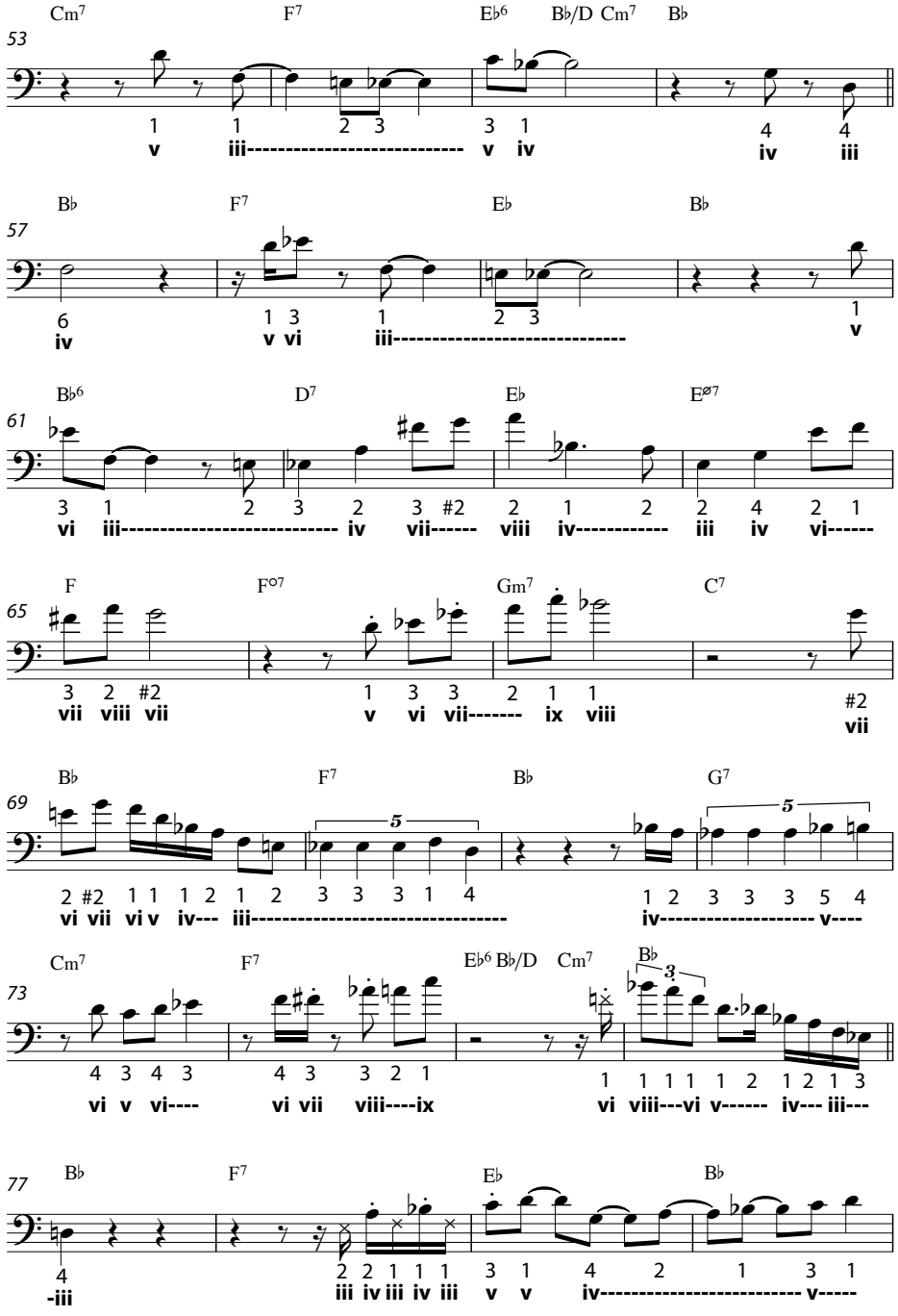
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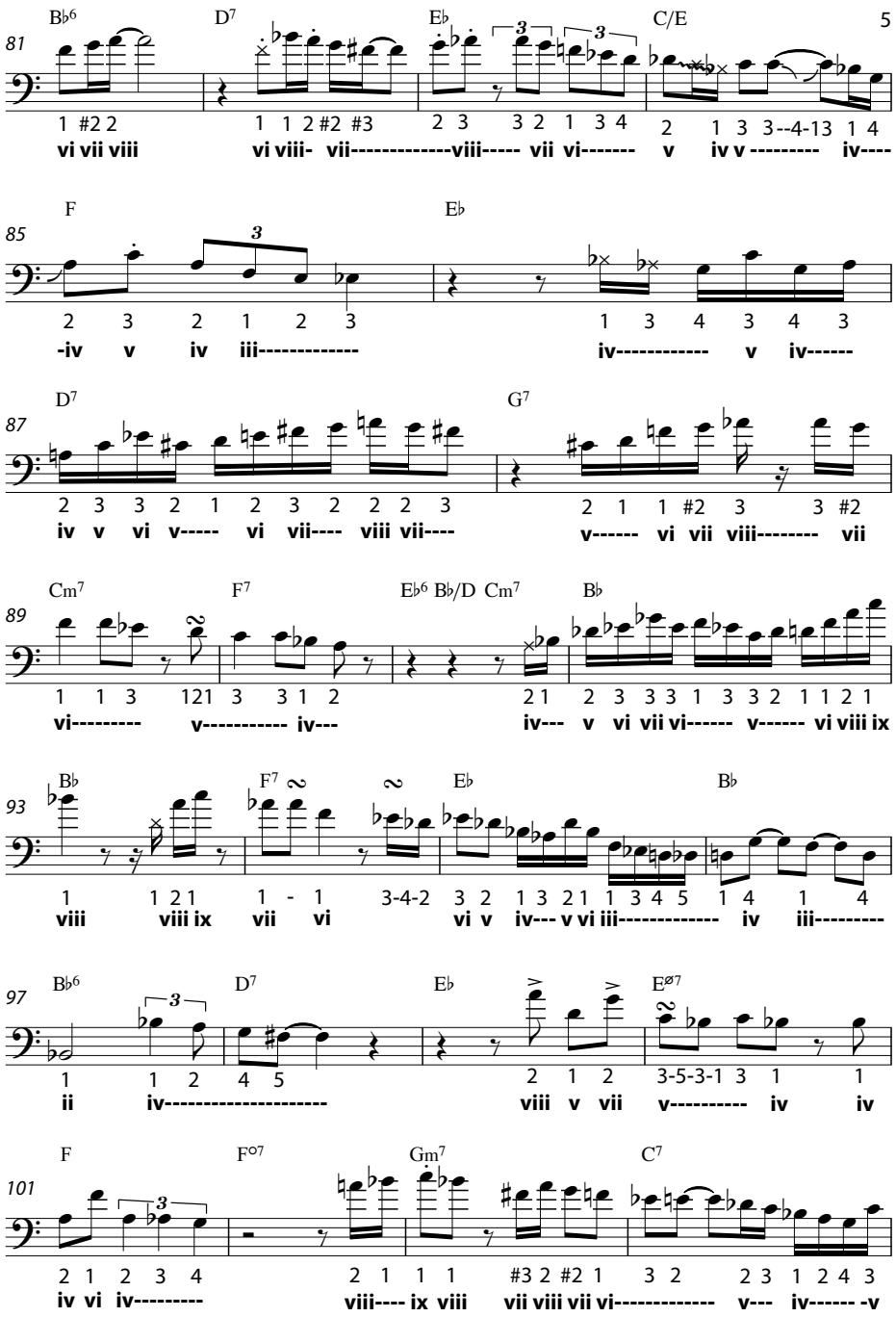
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2 3 2 1 2 3 1 3 4 3 4 3
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87
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89
Cm7 F7 E♭6 B♭/D Cm7 B♭
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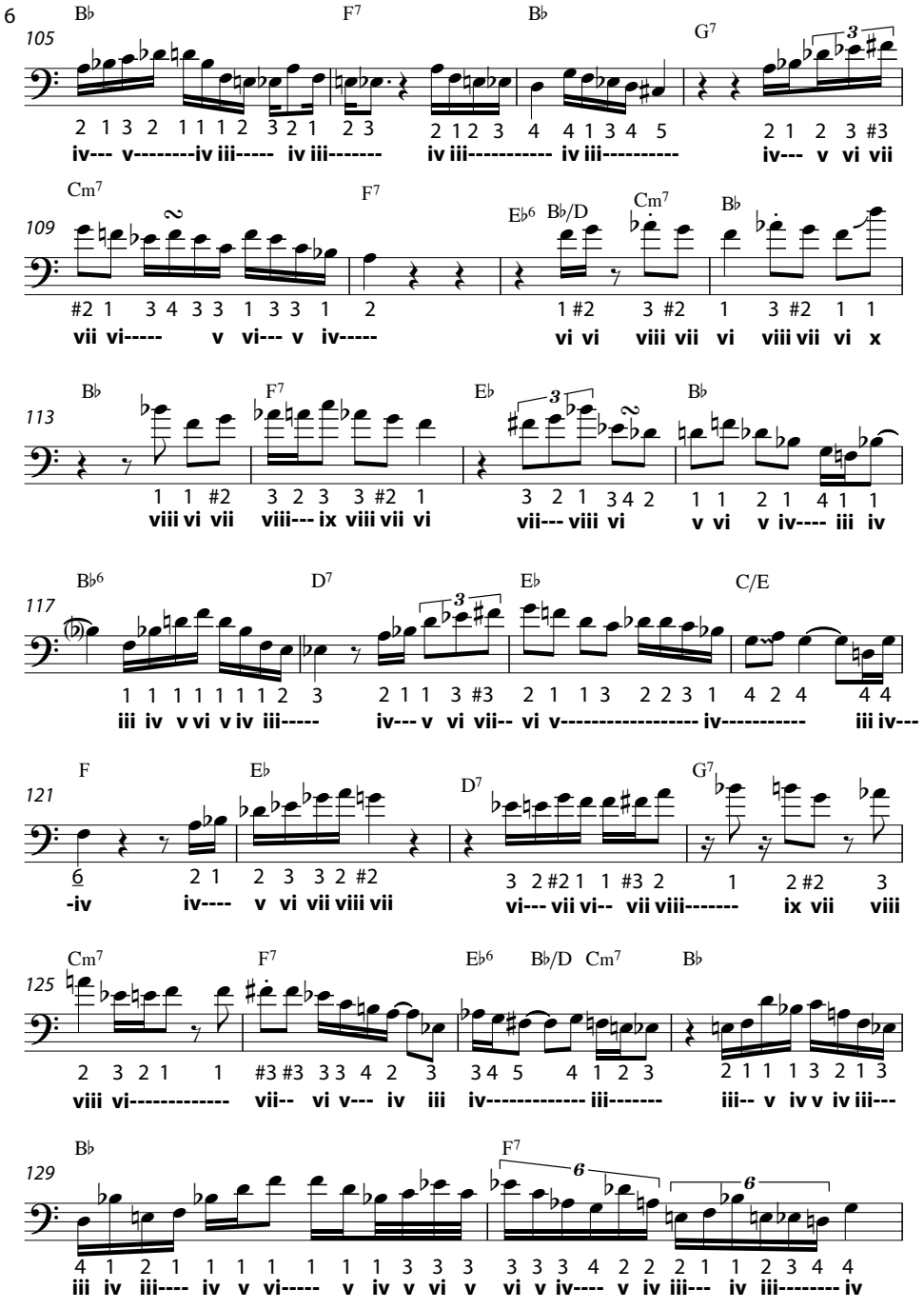
6
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109
Cm7 F7 E♭6 B♭/D Cm7 B♭
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vii vi----- v vi--- v iv----- vi vi viii vii vi viii vii vi x
113
B♭ F7 E♭ B♭
1 1 #2 3 2 3 3 #2 1 3 2 1 3 4 2 1 1 2 1 4 1 1
viii vi vii viii--- ix viii vii vi vii--- viii vi v vi v iv---- iii iv
117
B♭6 D7 E♭ C/E
1 1 1 1 1 1 1 2 3 2 1 1 3 #3 2 1 1 3 2 2 3 1 4 2 4 4 4
iii iv v vi v iv iii----- iv--- v vi vii-- vi v---------- iv---------- iii iv---
121
F E♭ D7 G7
6 2 1 2 3 3 2 #2 3 2 #2 1 1 #3 2 1 2 #2 3
-iv iv---- v vi vii viii vii vi--- vii vi-- vii viii------- ix vii viii
125
Cm7 F7 E♭6 B♭/D Cm7 B♭
2 3 2 1 1 #3 #3 3 3 4 2 3 3 4 5 4 1 2 3 2 1 1 1 3 2 1 3
viii vi---------- vii-- vi v--- iv iii iv---------- iii------- iii-- v iv v iv iii---
129
B♭ F7
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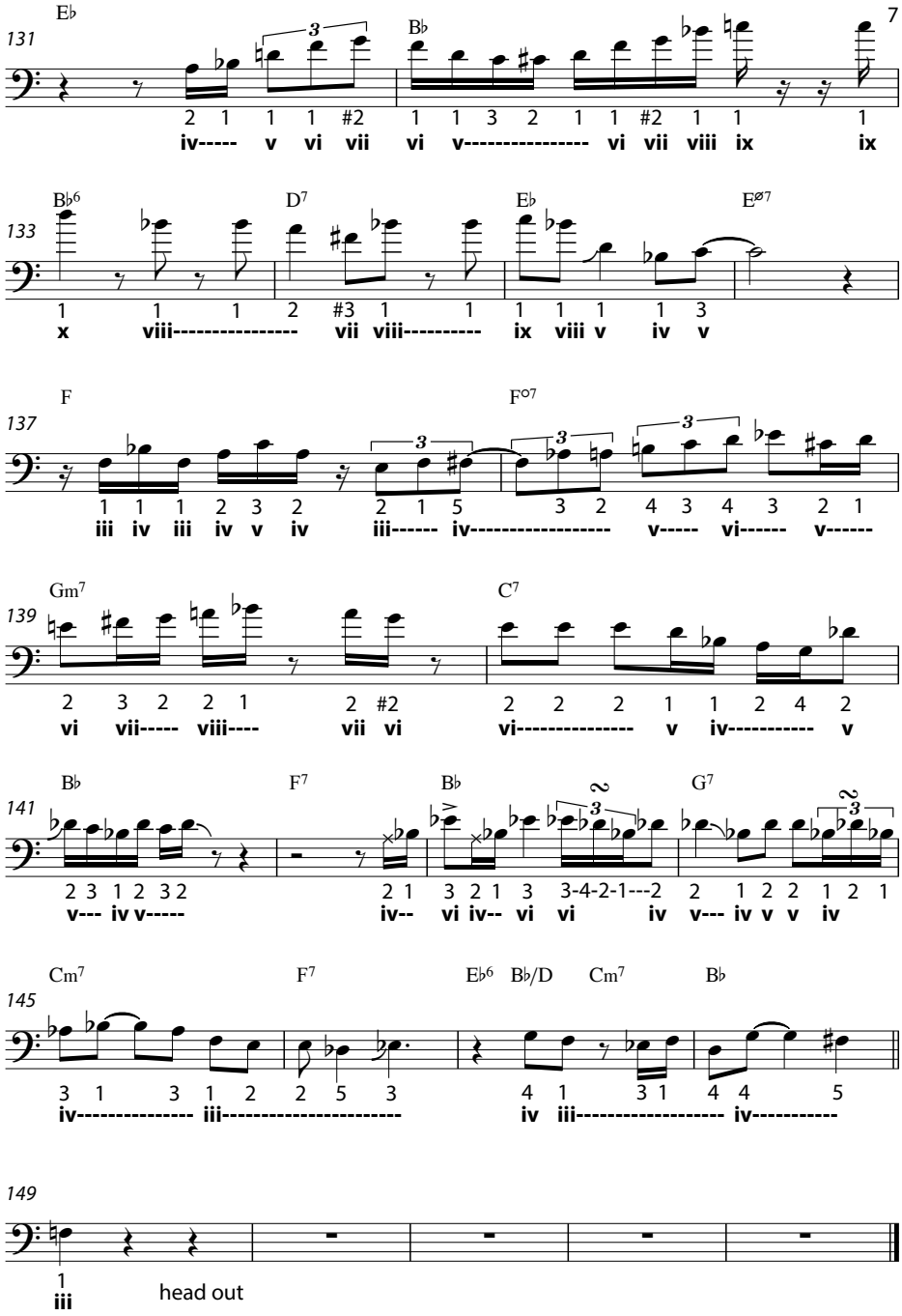
iii iv iii---- iv v vi----- v iv v vi v vi v iv---- v iv iii--- iv iii-------- iv


131
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2 1 1 1 #2 1 1 3 2 1 1 #2 1 1 1
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133
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x viii---------- vii viii---------- ix viii v iv v
137
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F○7
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139
Gm7
C7
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vi vii----- viii---- vii vi vi---------- v iv---------- v
141
B♭
F7
B♭
G7
2 3 1 2 3 2 2 1 3 2 1 3 3-4-2-1---2 2 1 2 2 1 2 1
v--- iv v----- iv-- vi iv-- vi vi iv v--- iv v v iv
145
Cm7
F7
E♭6
B♭/D
Cm7
B♭
3 1 3 1 2 2 5 3 4 1 3 1 4 4 5
iv---------- iii---------- iv iii---------- iv----------
149
1
iii
head out

Lingering Notes
Live at
Bennetts Lane Jazz Club
18/12/2014

James Macaulay
trans. Jack Lincoln
Uploaded to Youtube by Pound Recordings
04/01/2015
https://youtu.be/hZHn9diUJJw

Musicians
James Macaulay-Trombone
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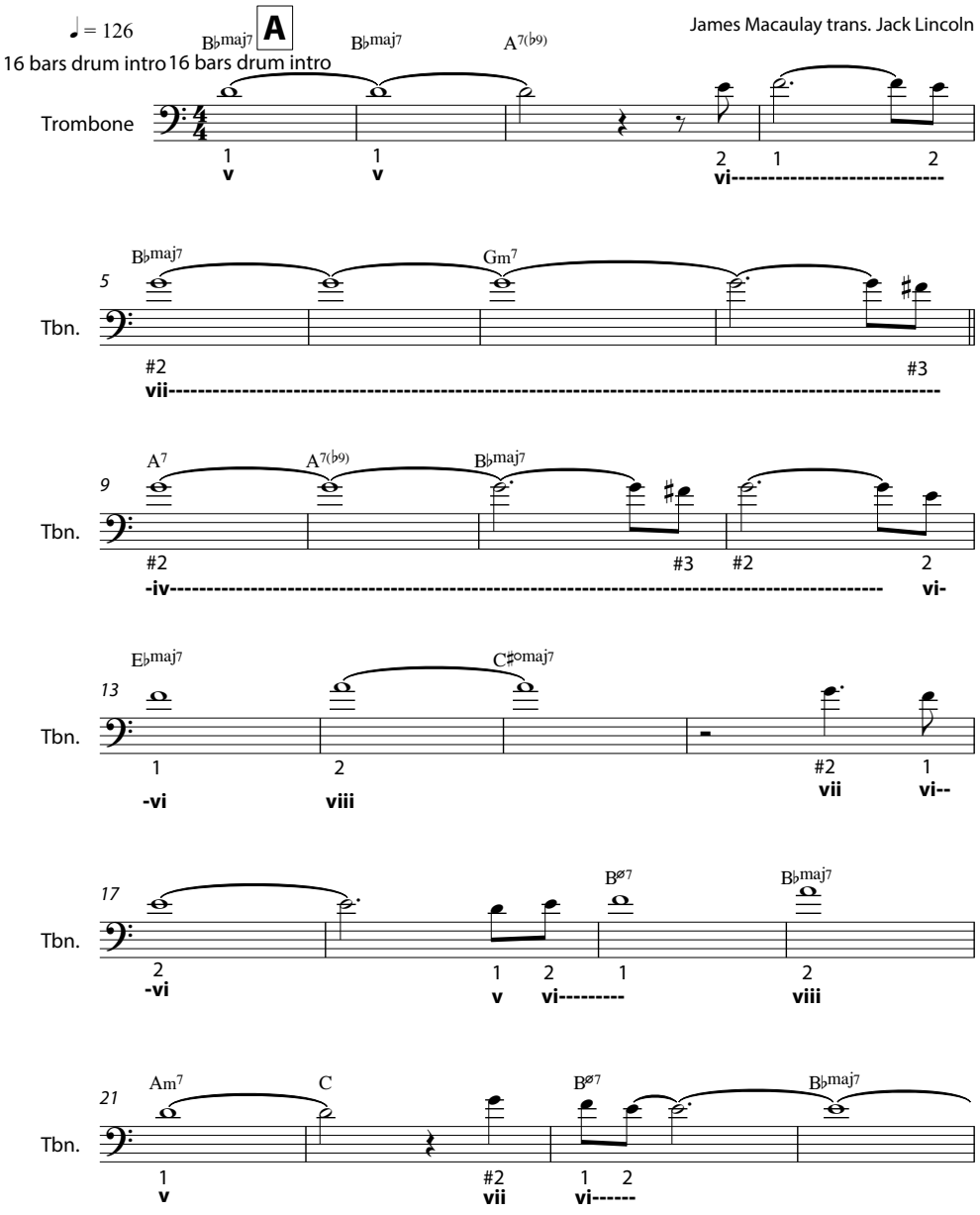
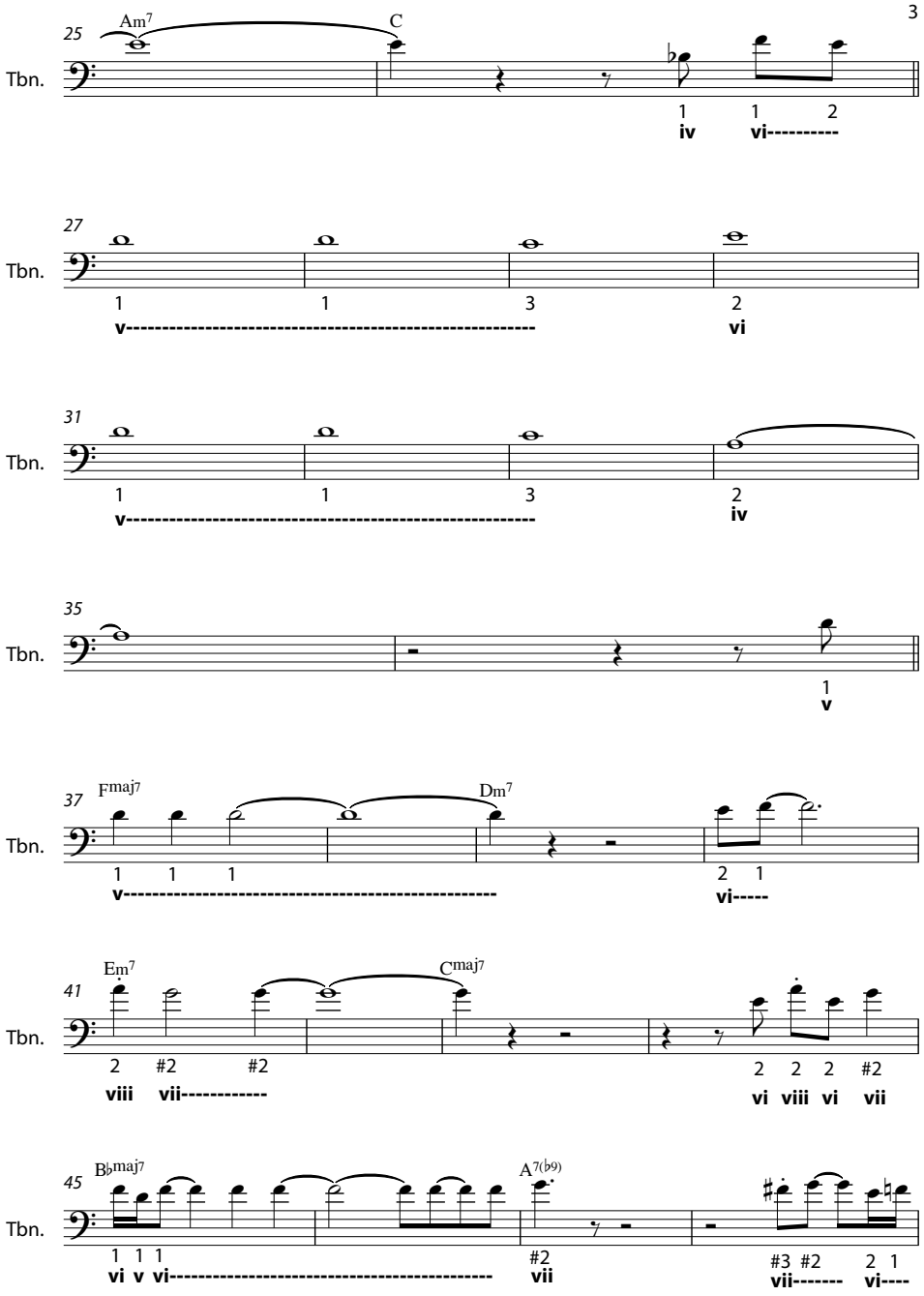
Tamara Murphy- Contrabass
James McLean- Drums

Lingering Notes James Macaulay Head and Solo

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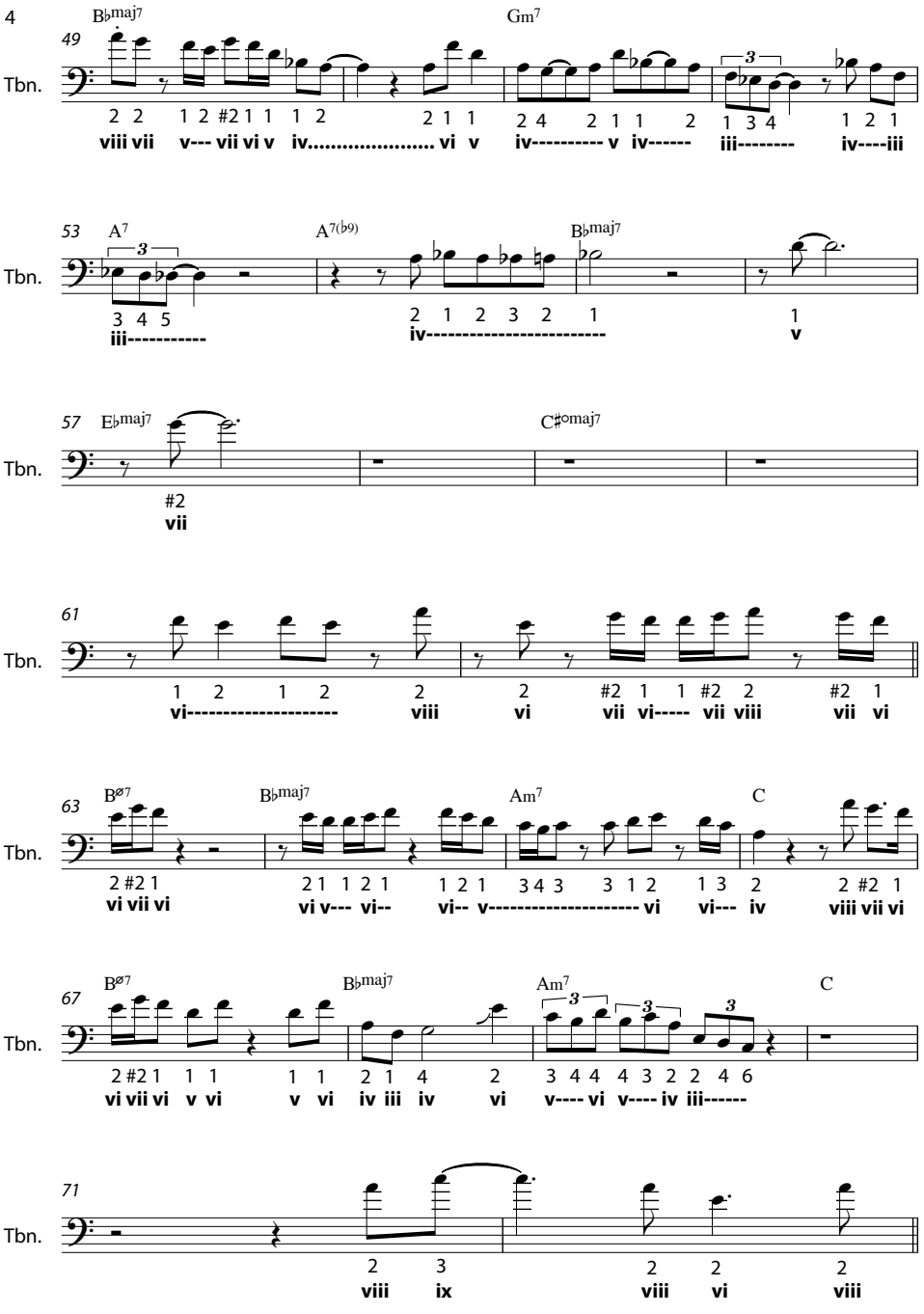
C
Tbn.
1 1 2
iv vi----------
27
Tbn.
1 1 3 2
v---------- vi
31
Tbn.
1 1 3 2
v---------- iv
35
Tbn.
1
v
37
Fmaj7
Dm7
Tbn.
1 1 1 2 1
v---------- vi-----
41
Em7
Cmaj7
Tbn.
2 #2 #2 2 2 2 #2
viii vii---------- vi viii vi vii
45
B♭maj7
A7(♭9)
Tbn.
1 1 1 #2 #3 #2 2 1
vi v vi---------- vii vii------- vi----


4
49
Tbn.
B♭maj7
Gm7
2 2 1 2 #2 1 1 1 2 2 1 1 2 4 2 1 1 2 1 3 4 1 2 1
viii vii v--- vii vi v iv..... vi v iv---------- v iv------ iii-------- iv----iii
53
A7
A7(♭9)
B♭maj7
3 4 5 2 1 2 3 2 1 1
iii---------- iv---------- v
57
E♭maj7
C♯ºmaj7
#2
vii
61
1 2 1 2 2 2 #2 1 1 #2 2 #2 1
vi---------- viii vi vii vi----- vii viii vii vi
63
B⌀7
B♭maj7
Am7
C
2 #2 1 2 1 1 2 1 1 2 1 3 4 3 3 1 2 1 3 2 2 #2 1
vi vii vi vi v--- vi-- vi-- v---------- vi vi--- iv viii vii vi
67
B⌀7
B♭maj7
Am7
C
2 #2 1 1 1 1 1 2 1 4 2 3 4 4 4 3 2 2 4 6
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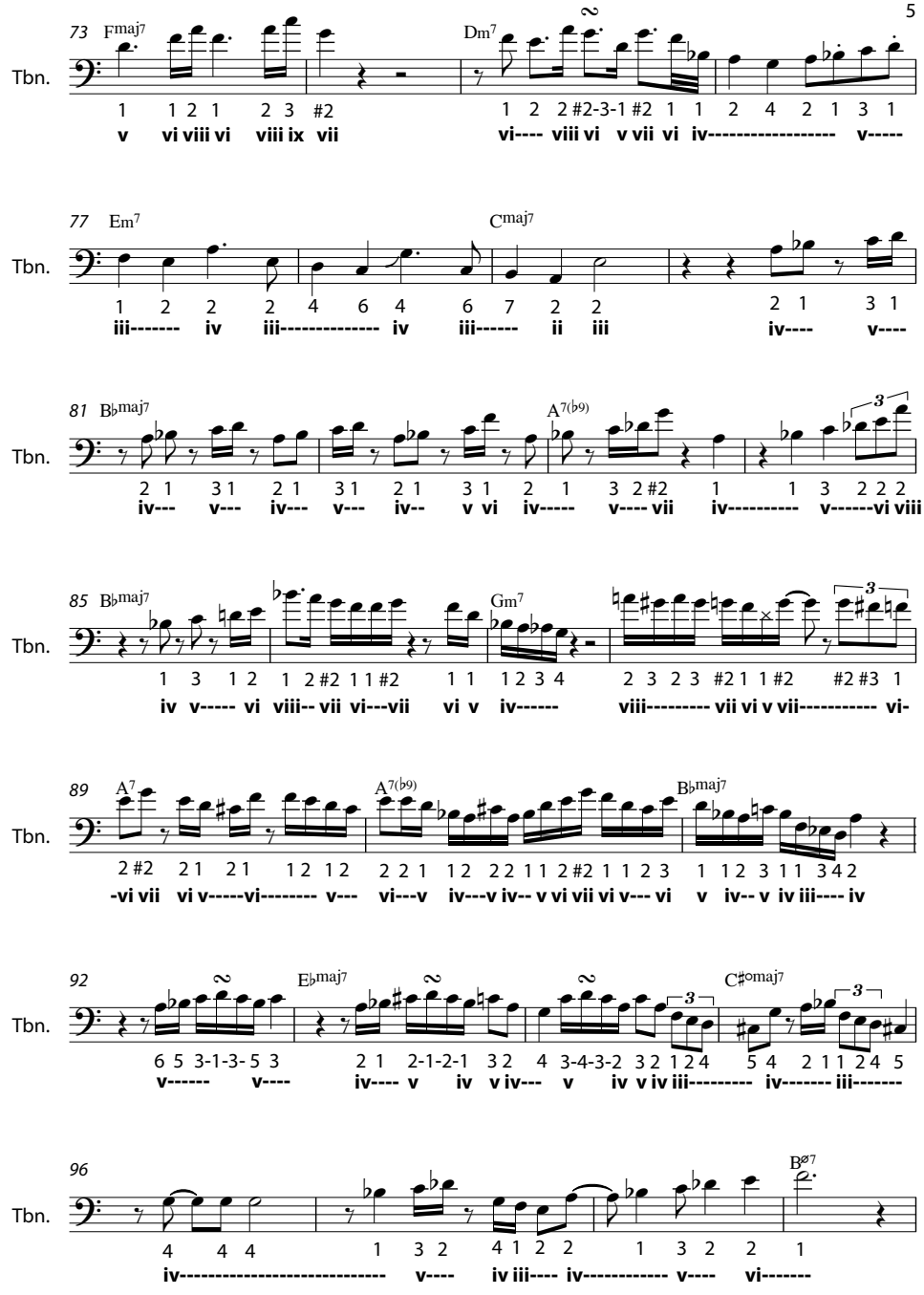
71
2 3 2 2 2
viii ix viii vi viii


73 Fmaj7 Dm7
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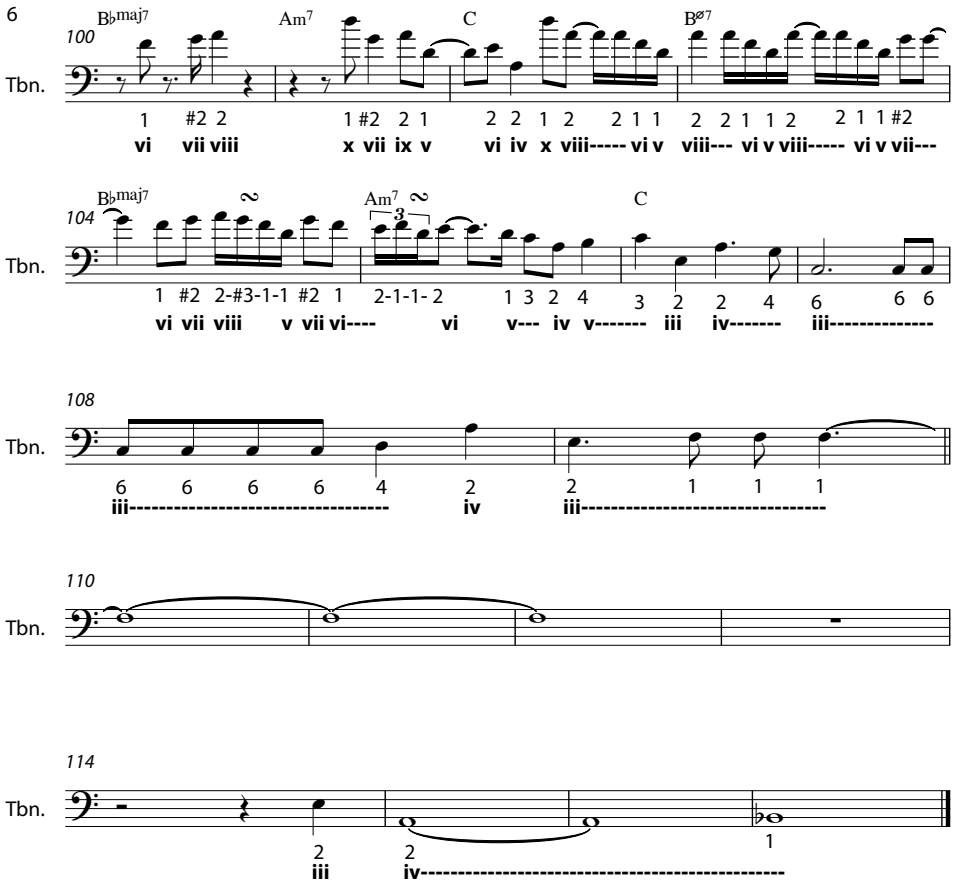
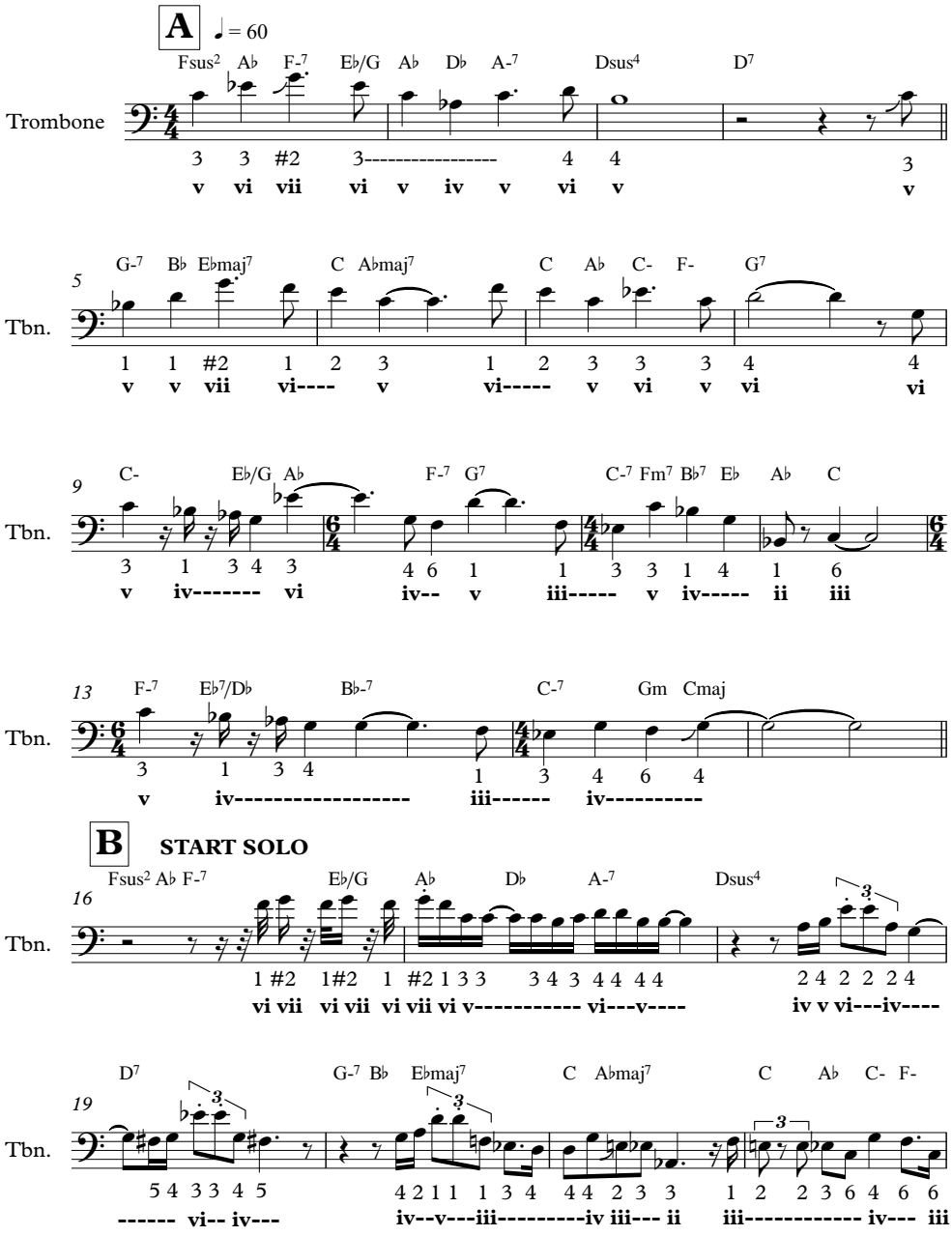
v vi viii vi viii ix vii vi---- viii vi v vii vi iv---------- v-----
77 Em7 Cmaj7
Tbn.
1 2 2 2 4 6 4 6 7 2 2 2 1 3 1
iii------- iv iii---------- iv iii------ ii iii iv---- v----
81 B♭maj7 A7(♭9)
Tbn.
2 1 3 1 2 1 3 1 2 1 3 1 2 1 3 2 #2 1 1 3 2 2 2
iv--- v--- iv--- v--- iv-- v vi iv----- v---- vii iv---------- v------vi viii
85 B♭maj7 Gm7
Tbn.
1 3 1 2 1 2 #2 1 1 #2 1 1 1 2 3 4 2 3 2 3 #2 1 1 #2 #2 #3 1
iv v----- vi viii-- vii vi---vii vi v iv------ viii--------- vii vi v vii---------- vi-
89 A7 A7(♭9) B♭maj7
Tbn.
2 #2 2 1 2 1 1 2 1 2 2 2 1 1 2 2 1 1 2 #2 1 1 2 3 1 1 2 3 1 1 3 4 2
-vi vii vi v-----vi-------- v--- vi---v iv---v iv-- v vi vii vi v--- vi v iv-- v iv iii---- iv
92 E♭maj7 C♯ømaj7
Tbn.
6 5 3-1-3- 5 3 2 1 2-1-2-1 3 2 4 3-4-3-2 3 2 1 2 4 5 4 2 1 1 2 4 5
v------ v---- iv---- v iv v iv--- v iv v iv iii--------- iv------- iii-------
96 Bø7
Tbn.
4 4 4 1 3 2 4 1 2 2 1 3 2 2 1
iv----------- v---- iv iii---- iv---------- v---- vi-------


6
100
Tbn.
B♭maj7
Am7
C
Bø7
1 #2 2 1 #2 2 1 2 1 2 2 1 2 1 1 2 2 1 1 2 2 1 1 #2
vi vii viii x vii ix v vi iv x viii----- vi v viii--- vi v viii----- vi v vii---
104
B♭maj7
Am7
C
1 #2 2-#3-1-1 #2 1 2-1-1- 2 1 3 2 4 3 2 2 4 6 6 6
vi vii viii v vii vi---- vi v--- iv v------- iii iv------- iii----------
108
6 6 6 6 4 2 2 1 1 1
iii---------- iv iii----------
110
114
2 2 1
iii iv----------

Dreams of Paper Roses
Live at
Bennetts Lane Jazz Club
18/12/2014

Comp.Aaron Cholaui
Solo:James Macaulay
trans. Jack Lincoln
Uploaded to Youtube by Pound Recordings
04/01/2015
https://youtu.be/v632cqnCCVs

Musicians
James Macaulay-Trombone
Steve Grant- Piano
Tamara Murphy- Contrabass
James McLean- Drums


A
♩ = 60
Trombone
Fsus2 A♭ F-7 E♭/G A♭ D♭ A-7 Dsus4 D7
3 3 #2 3---------- 4 4 3
v vi vii vi v iv v vi v v
5
Tbn.
G-7 B♭ E♭maj7 C A♭maj7 C A♭ C- F- G7
1 1 #2 1 2 3 1 2 3 3 3 4 4
v v vii vi---- v vi----- v vi v vi vi
9
Tbn.
C- E♭/G A♭ F-7 G7 C-7 Fm7 B♭7 E♭ A♭ C
3 1 3 4 3 4 6 1 1 3 3 1 4 1 6
v iv------- vi iv-- v iii----- v iv----- ii iii
13
Tbn.
F-7 E♭7/D♭ B♭-7 C-7 Gm Cmaj
3 1 3 4 1 3 4 6 4
v iv---------- iii------ iv----------
B
START SOLO
16
Tbn.
Fsus2 A♭ F-7 E♭/G A♭ D♭ A-7 Dsus4
1 #2 1#2 1 #2 1 3 3 3 4 3 4 4 4 4 2 4 2 2 2 4
vi vii vi vii vi vii vi v---------- vi---v---- iv v vi---iv----
19
Tbn.
D7 G-7 B♭ E♭maj7 C A♭maj7 C A♭ C- F-
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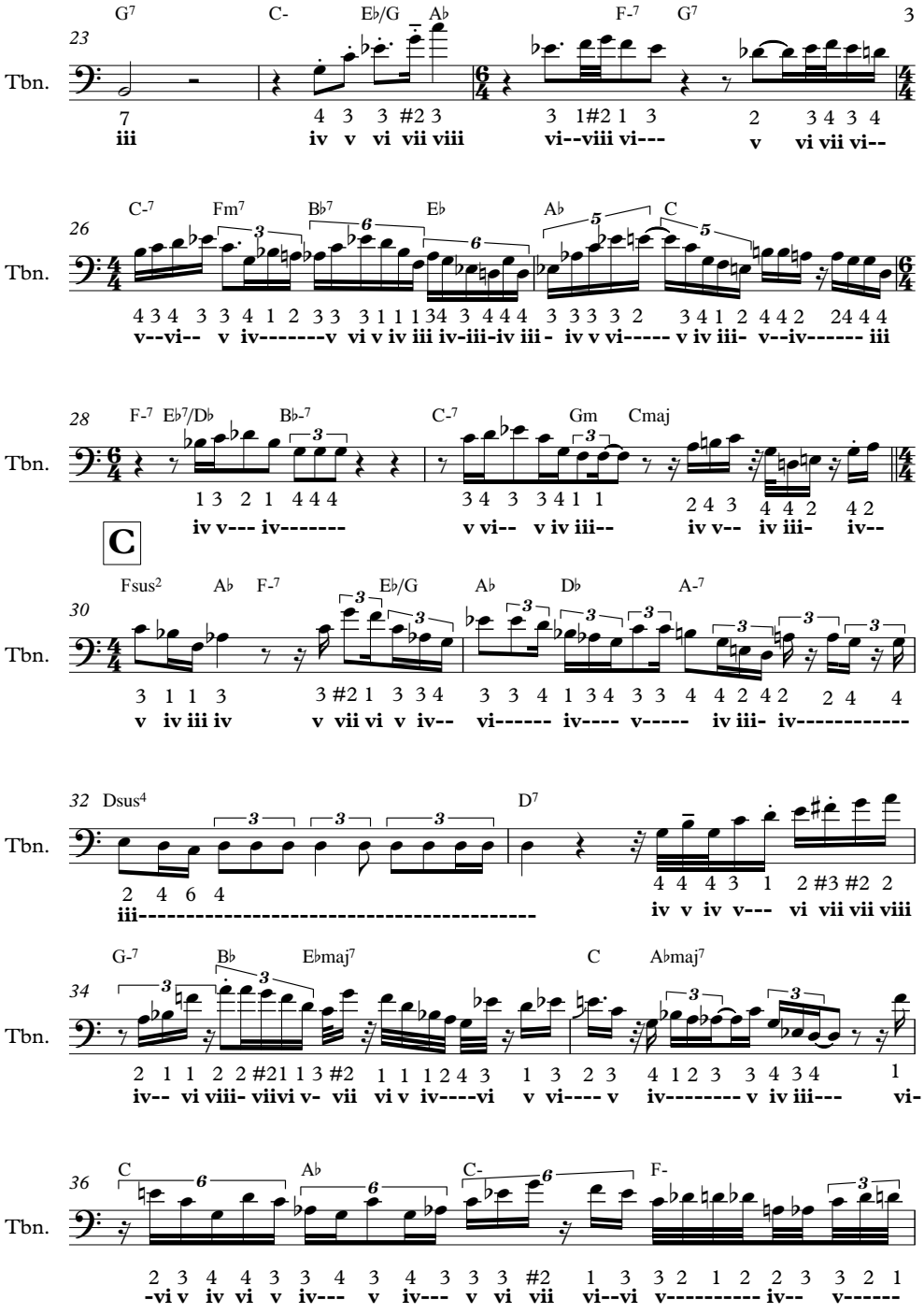
23
G7 C- E♭/G A♭ F-7 G7
Tbn.
7 4 3 3 #2 3 3 1#2 1 3 2 3 4 3 4
iii iv v vi vii viii vi--viii vi--- v vi vii vi--
26
C-7 Fm7 B♭7 E♭ A♭ C
Tbn.
4 3 4 3 3 4 1 2 3 3 3 1 1 1 3 4 3 4 4 4 4 3 3 3 3 2 3 4 1 2 4 4 2 2 4 4 4
v--vi-- v iv-------v vi v iv iii iv-iii-iv iii - iv v vi----- v iv iii- v--iv------ iii
28
F-7 E♭7/D♭ B♭-7 C-7 Gm Cmaj
Tbn.
1 3 2 1 4 4 4 3 4 3 3 4 1 1 2 4 3 4 4 2 4 2
iv v--- iv------- v vi-- v iv iii-- iv v-- iv iii- iv--
C
30
Fsus2 A♭ F-7 E♭/G A♭ D♭ A-7
Tbn.
3 1 1 3 3 #2 1 3 3 4 3 3 4 1 3 4 3 3 4 4 2 4 2 2 4 4
v iv iii iv v vii vi v iv-- vi------ iv---- v----- iv iii- iv----------
32
Dsus4 D7
Tbn.
2 4 6 4 4 4 4 3 1 2 #3 #2 2
iii---------- iv v iv v--- vi vii vii viii
34
G-7 B♭ E♭maj7 C A♭maj7
Tbn.
2 1 1 2 2 #21 1 3 #2 1 1 1 2 4 3 1 3 2 3 4 1 2 3 3 4 3 4 1
iv-- vi viii- viivi v- vii vi v iv----vi v vi---- v iv-------- v iv iii--- vi-
36
C A♭ C- F-
Tbn.
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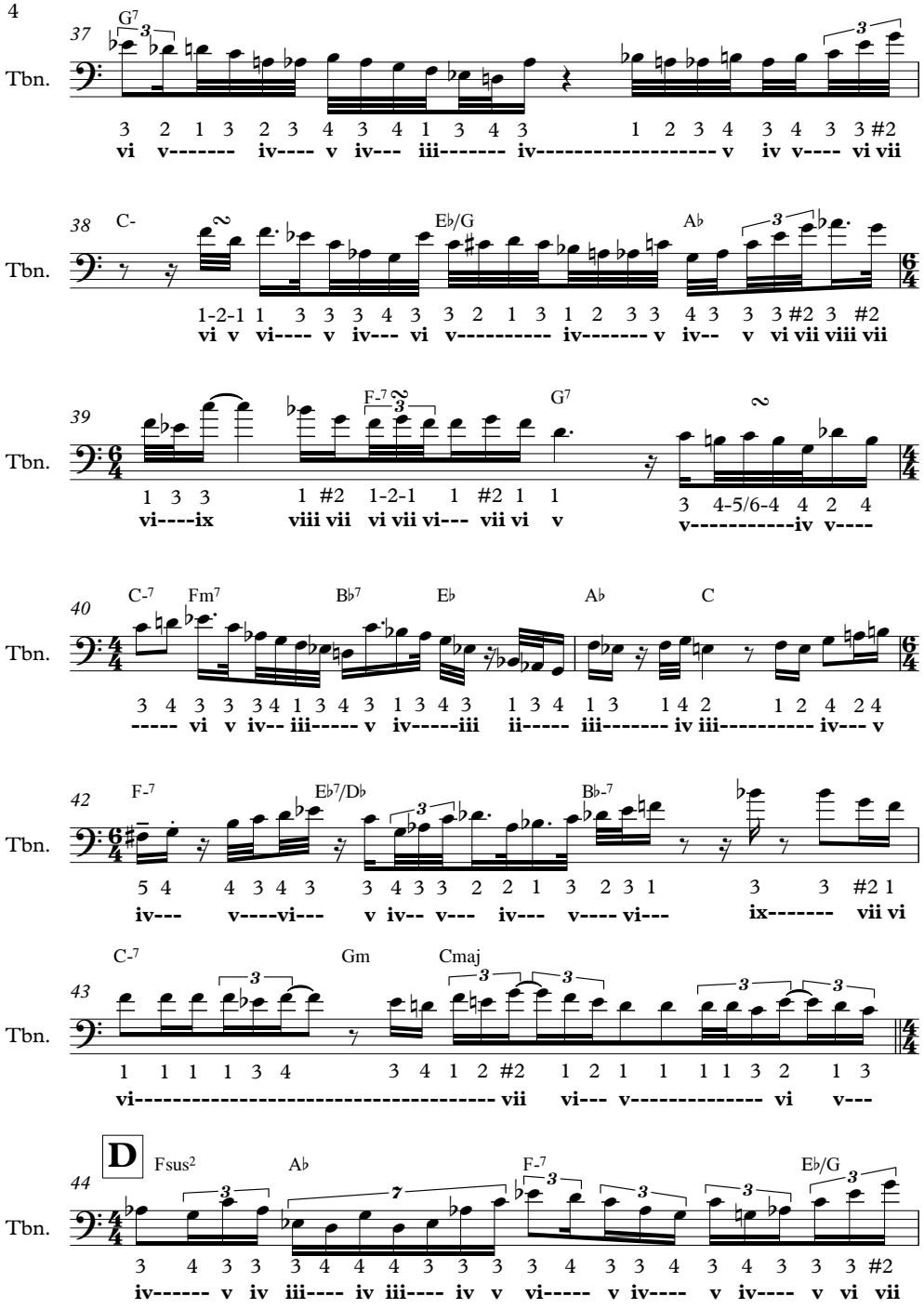
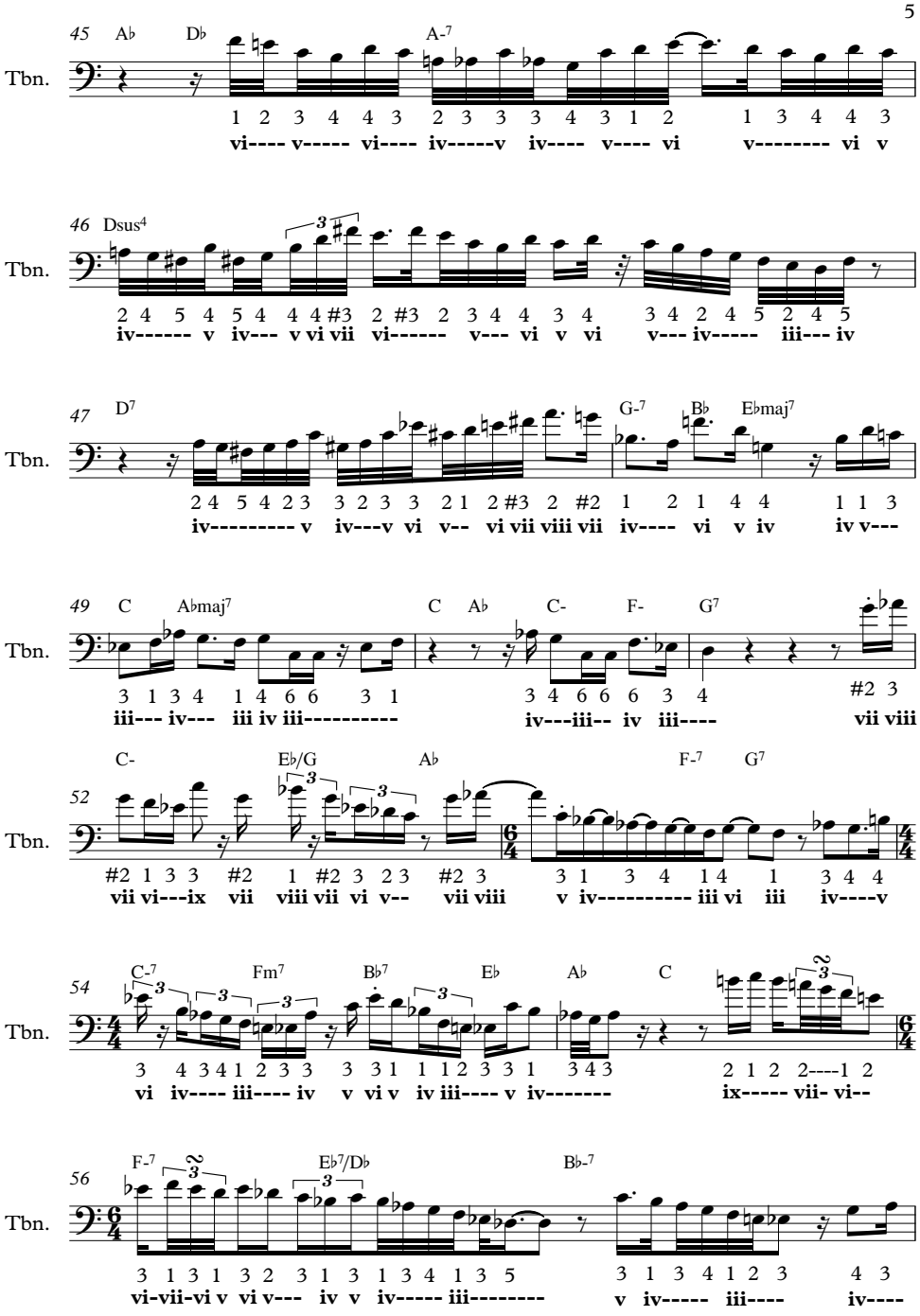

4
37
G7
Tbn.
3 2 1 3 2 3 4 3 4 1 3 4 3 1 2 3 4 3 4 3 3 #2
vi v------- iv---- v iv--- iii------- iv---------- v iv v---- vi vii
38
C-
Eb/G
Ab
Tbn.
1-2-1 1 3 3 3 4 3 3 2 1 3 1 2 3 3 4 3 3 3 #2 3 #2
vi v vi---- v iv--- vi v---------- iv------- v iv-- v vi vii viii vii
39
F-7
G7
Tbn.
1 3 3 1 #2 1-2-1 1 #2 1 1 3 4-5/6-4 4 2 4
vi----ix viii vii vi vii vi--- vii vi v v----------iv v----
40
C-7
Fm7
Bb7
Eb
Ab
C
Tbn.
3 4 3 3 3 4 1 3 4 3 1 3 4 3 1 3 4 1 3 1 4 2 1 2 4 2 4
----- vi v iv-- iii----- v iv-----iii ii----- iii------- iv iii---------- iv--- v
42
F-7
Eb7/Db
Bb-7
Tbn.
5 4 4 3 4 3 3 4 3 3 2 2 1 3 2 3 1 3 3 #2 1
iv--- v----vi--- v iv-- v--- iv--- v---- vi--- ix------- vii vi
43
C-7
Gm
Cmaj
Tbn.
1 1 1 1 3 4 3 4 1 2 #2 1 2 1 1 1 1 3 2 1 3
vi---------- vii vi--- v---------- vi v---
44
D
Fsus2
Ab
F-7
Eb/G
Tbn.
3 4 3 3 3 4 4 4 3 3 3 3 4 3 3 4 3 4 3 3 3 #2
iv------ v iv iii---- iv iii---- iv v vi----- v iv---- v iv---- v vi vii


45 A♭ D♭ A-7
Tbn.
1 2 3 4 4 3 2 3 3 3 4 3 1 2 1 3 4 4 3
vi---- v----- vi---- iv-----v iv---- v---- vi v-------- vi v
46 Dsus4
Tbn.
2 4 5 4 5 4 4 4 #3 2 #3 2 3 4 4 3 4 3 4 2 4 5 2 4 5
iv------ v iv--- v vi vii vi------ v--- vi v vi v--- iv----- iii--- iv
47 D7 G-7 B♭ E♭maj7
Tbn.
2 4 5 4 2 3 3 2 3 3 2 1 2 #3 2 #2 1 2 1 4 4 1 1 3
iv--------- v iv---v vi v-- vi vii viii vii iv---- vi v iv iv v---
49 C A♭maj7 C A♭ C- F- G7
Tbn.
3 1 3 4 1 4 6 6 3 1 3 4 6 6 6 3 4 #2 3
iii--- iv--- iii iv iii---------- iv---iii-- iv iii---- vii viii
C- E♭/G A♭ F-7 G7
52
Tbn.
#2 1 3 3 #2 1 #2 3 2 3 #2 3 3 1 3 4 1 4 1 3 4 4
vii vi---ix vii viii vii vi v-- vii viii v iv---------- iii vi iii iv----v
C-7 Fm7 B♭7 E♭ A♭ C
54
Tbn.
3 4 3 4 1 2 3 3 3 3 1 1 1 2 3 3 1 3 4 3 2 1 2 2----1 2
vi iv---- iii---- iv v vi v iv iii---- v iv------- ix----- vii- vi--
F-7 E♭7/D♭ B♭-7
56
Tbn.
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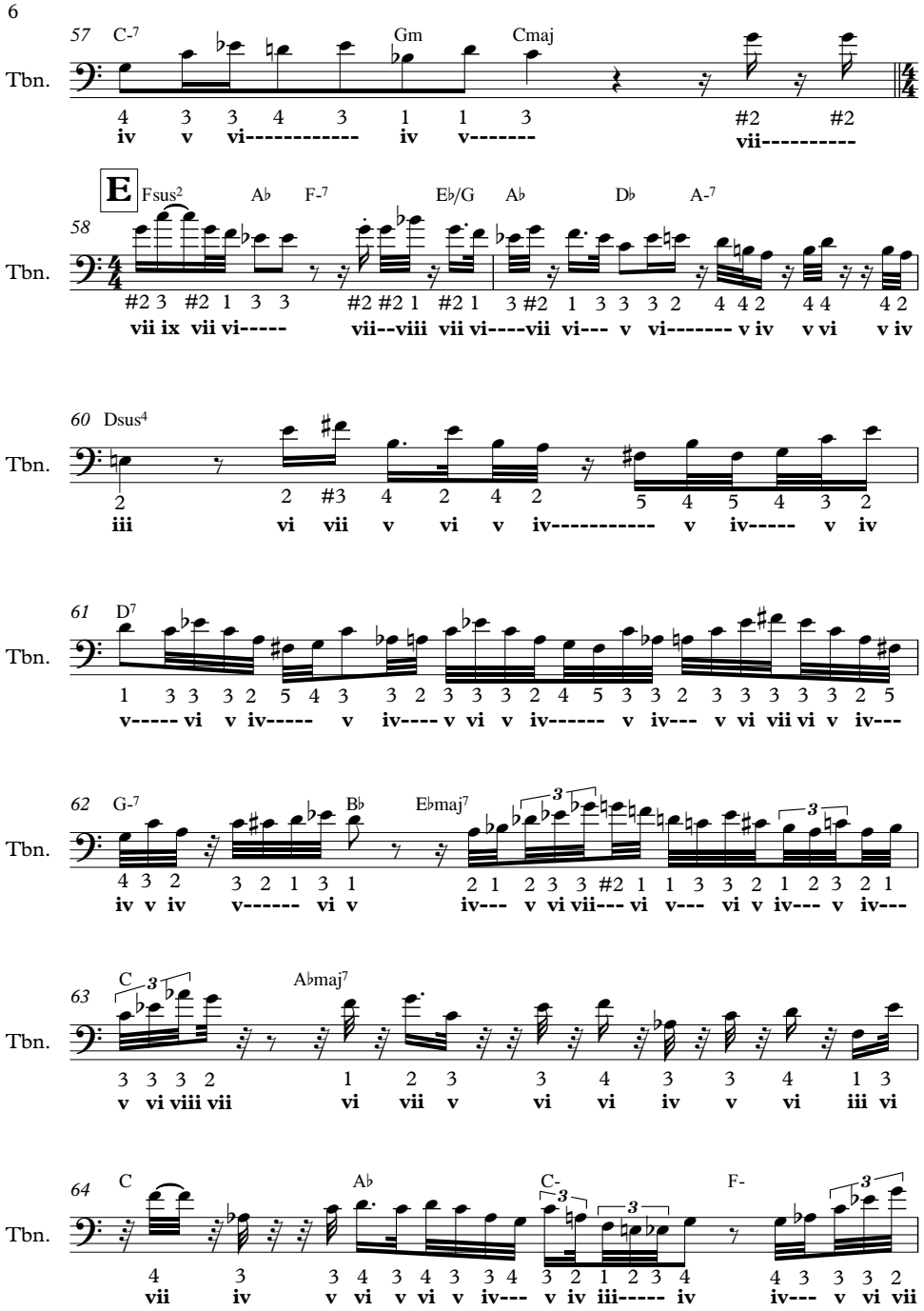
vi-vii-vi v vi v--- iv v iv----- iii-------- v iv----- iii---- iv----


6
57 C-7
Gm
Cmaj
Tbn.
4 3 3 4 3 1 1 3 #2 #2
iv v vi---------- iv v------- vii----------
E
Fsus2
A♭
F-7
E♭/G
A♭
D♭
A-7
58
Tbn.
#2 3 #2 1 3 3 #2 #2 1 #2 1 3 #2 1 3 3 3 2 4 4 2 4 4 4 2
vii ix vii vi----- vii--viii vii vi----vii vi--- v vi------- v iv v vi v iv
60 Dsus4
Tbn.
2 2 #3 4 2 4 2 5 4 5 4 3 2
iii vi vii v vi v iv---------- v iv----- v iv
61 D7
Tbn.
1 3 3 3 2 5 4 3 3 2 3 3 3 2 4 5 3 3 2 3 3 3 3 3 2 5
v----- vi v iv----- v iv---- v vi v iv------ v iv--- v vi vii vi v iv---
62 G-7
B♭
E♭maj7
Tbn.
4 3 2 3 2 1 3 1 2 1 2 3 3 #2 1 1 3 3 2 1 2 3 2 1
iv v iv v------ vi v iv--- v vi vii--- vi v--- vi v iv--- v iv---
63 C
A♭maj7
Tbn.
3 3 3 2 1 2 3 3 4 3 3 4 1 3
v vi viii vii vi vii v vi vi iv v vi iii vi
64 C
A♭
C-
F-
Tbn.
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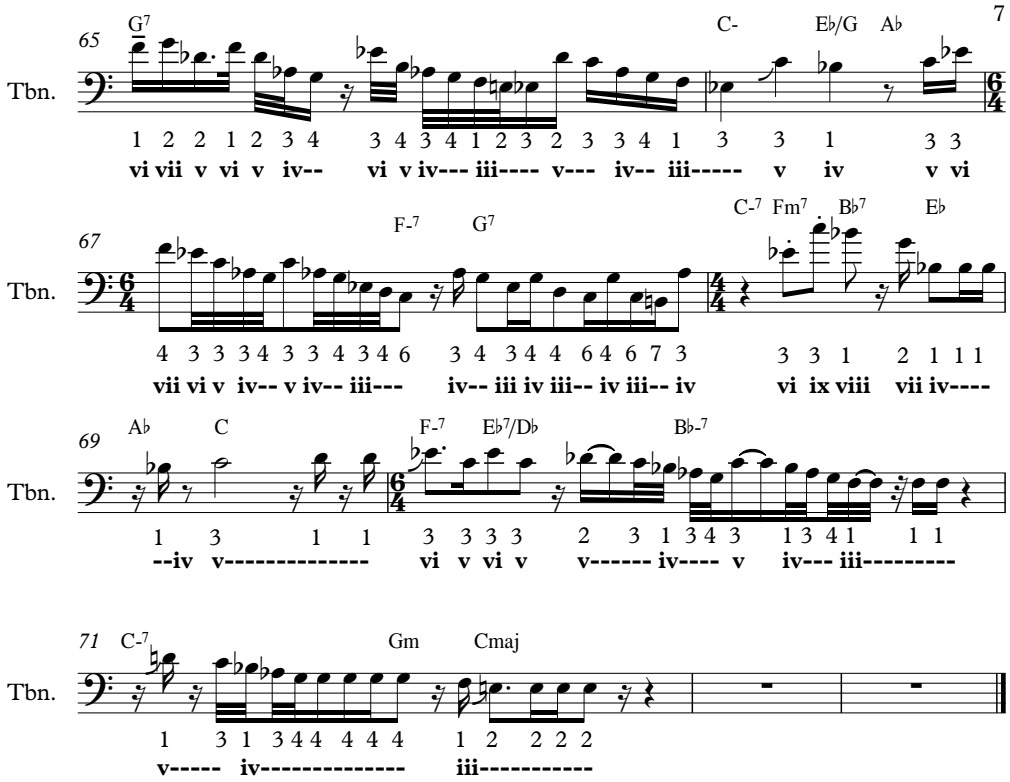
vii iv v vi v vi v iv--- v iv iii----- iv iv--- v vi vii


7
65
G7
C-
E♭/G
A♭
Tbn.
1 2 2 1 2 3 4 3 4 3 4 1 2 3 2 3 3 4 1 3 3 1 3 3
vi vii v vi v iv-- vi v iv--- iii---- v--- iv-- iii----- v iv v vi
67
F-7
G7
C-7
Fm7
B♭7
E♭
Tbn.
4 3 3 3 4 3 3 4 3 4 6 3 4 3 4 4 6 4 6 7 3 3 3 1 2 1 1 1
vii vi v iv-- v iv-- iii--- iv-- iii iv iii-- iv iii-- iv vi ix viii vii iv----
69
A♭
C
F-7
E♭7/D♭
B♭-7
Tbn.
1 3 1 1 3 3 3 3 2 3 1 3 4 3 1 3 4 1 1 1
--iv v---------- vi v vi v v------ iv---- v iv--- iii---------
71
C-7
Gm
Cmaj
Tbn.
1 3 1 3 4 4 4 4 4 1 2 2 2 2
v----- iv---------- iii----------