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Developing audiation through internalisation : using the pivots system as an example

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Developing Audiation through Internalisation: Using the Pivots System as an Example

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This dissertation is submitted for the degree of Bachelor of Music Honours
2013

Candidate's Declaration

I certify that this dissertation does not, to the best of my knowledge and belief:

- i) Incorporate without acknowledgement, any material previously submitted for a degree or diploma in any institution of higher education;
- ii) Contain any material previously published or written by another person except where due reference is made in the text; or
- iii) Contain any defamatory material.

Steven Vacca, 8/11/2013

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Abstract

Having well-developed aural skills is an important factor in many musical tasks, such as improvisation. The skill of *audiation* (the ability to hear and comprehend sound), as coined by Edwin E. Gordon, is attained by internalising certain concepts or elements, and storing these as a *vocabulary*. Just as verbal skills are acquired by learning and memorising words and phrases, so too is this aural skill developed by learning and internalising musical patterns and concepts. Through audiation, this vocabulary is recalled when the same or a similar pattern is heard again. The sound is identified and understood because it has been heard and learnt before; it is familiar.

One such concept that can be internalised to develop an audiation vocabulary is the *pivots system*, an ear training concept which enhances a person's pre-existing understanding of harmony. The research shows that an understanding of the audiation process can act as foundational knowledge for working on the pivots system, with the aim of developing an internalisation of this concept. This is but one example, and once an understanding of the audiation process and how to develop it is acquired, this information can potentially be put to use with any ear training exercise, concept or pattern.

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Introduction

Sound is an essential part of music; indeed music is essentially sound. Without sound, it can be argued that music cannot exist. The term *aural* is used in music to denote the perception of sound. Aural skill is the ability to hear, musically; that is, to be able to hear and identify specific elements of the performed piece, or created improvisation. Dynamics, timbre, tonality, and even specific harmony or pitches all rely on the auditory sense. This skill is heavily stressed in music education as being essential, especially in jazz education with regard to improvisation.

Many prominent jazz educators and players often say that when they improvise they are just playing what is in their head, or are playing what they hear, internally. This skill to *play by ear*, as it is commonly referred to, is an internal perception process, that is, internally hearing and comprehending what is heard.

The aims of this paper are two-fold:

1. To present research in the field of aural pedagogy, and discuss methods for developing the skills required to play by ear, and
2. To present an ear training concept, the *pivots system*, as an example of how it can be used to develop this skill.

Rationale

The inspiration for this paper came about when the author was introduced to an ear training concept, the pivots system, by jazz guitarist Paul Bollenback, which was aimed at enhancing foundational knowledge of harmony and theory. The author identified a personal need to develop his aural skills, and it is hoped that the research presented here will possibly aid others, as it has this author.

The pivots system was developed by Dr. Asher Zlotnik, a music scholar and pedagogue. It is a system devised to develop a clearer, enhanced understanding of harmony. The pivots system is essentially concerned with hearing chords from any starting point. This also involves the practitioner singing and hearing arpeggios from common tones.

This paper aims to collate research from various sources on developing the skills required to play by ear and present a clear understanding of how these skills can possibly be implemented. To enhance this information the pivots system will be used as a primary example of how these skills can be developed.

The pivots system is not a widely known concept, and the author feels there is merit in presenting such a system since it was developed by such a knowledgeable pedagogue¹, has been continued by one of the world's top jazz guitarists and educators, and has proved to be beneficial to the author.

The ideas presented in this paper, despite being highly valuable as an ear training concept, are not assumed to be beneficial to a beginning music student. A knowledge of harmony and theory is assumed throughout, and as Bollenback states, the pivots system facilitates "... a clearer understanding of [the] harmony."²

The concepts presented may possibly aid further learning and understanding, and could complement learning at the high school or university level. They are not meant as a

¹ See Dr. Asher Zlotnik's Biography in Appendix C

² Paul Bollenback, Personal correspondence with the author via Email, October 26, 2013.

substitute for any pre-existing systems or pedagogical approaches, rather as an enhancement to those which already exist.

The author also acknowledges that playing by ear and specifically, improvisation, are complex tasks. There are many other factors which may also influence the ability to improvise and play by ear. These will not be the subject of this paper, but it should be noted that research shows other factors to include experience³, the process of converting aural stimuli into motor output (ear to hands)⁴ and kinesthetic memory⁵. Aural sources is also shown to be just one of three possible sources for ideas generation in improvisation.⁶ Playing by ear is an internal perception process. This is just one process in the act of improvisation, and other processes such as internal generation (the idea) and external generation (playing it on the instrument) will not be covered in this paper.

The paper aims to answer the following research questions:

1. What does it mean to play by ear, and is this the best terminology that exists?
2. How can the skill to play by ear be developed?
3. Can the answers for questions 1) and 2) be used in the context of an ear training exercise, such as the pivots system?

³ Jennifer Mishra, "A Theoretical Model of Musical Memorization," *Psychomusicology* 19, no. 1 (2005): 76.

⁴ Wendy Hargreaves, "Generating Ideas in Jazz Improvisation: Where Theory Meets Practice," *International Journal of Music Education* 30, no. 4 (2012): 360-62; Aaron Berkowitz, *The Improvising Mind: Cognition and Creativity in the Musical Moment* (New York: Oxford University Press, 2010), 37-38; Robert H. Woody, "Playing by Ear: Foundation or Frill?," *Music Educators Journal* 99, no. 2 (2012): 85.

⁵ Mishra, "A Theoretical Model of Musical Memorization," 82.

⁶ The other two being strategy-generated and motor-generated. Hargreaves, "Generating Ideas in Jazz Improvisation: Where Theory Meets Practice," 354-67.

Methodology

The paper is divided into two distinct chapters:

- Chapter 1 will provide an explanation and description of the audiation process, why it is desirable, and how it can be developed. This will also provide foundational knowledge, which will be put to use in subsequent chapters.
- Chapter 2 will present an ear training concept, the pivots system. This will be used as an example of how the previously sourced information can be put to use, to develop the ability to *audiate* a chord tone (pivot) as any scale degree in a harmonic context.

The research for Chapter 1 comes from two different sources: music researchers, and music educators. The information sourced pertains to ear training pedagogy, and learning and memory research, with specific regard to music and aural processes where possible.

Research on ear training pedagogy comes mostly from educators who have first-hand experience in teaching, specifically teaching aural skills. The information gathered will be supported by research in the field of learning and memory, with specific regard to music.

This research aims to provide foundational knowledge for Chapter 2, which will present and discuss the pivots system as a method for developing aural skills for hearing harmony. The information here is sourced from jazz guitarist Paul Bollenback, through personal correspondence via email. Bollenback was a past student of Dr. Zlotnik, where he learnt the pivots system. Since Dr. Zlotnik's passing in 1997, Bollenback remains a primary source of this ear training method.

Glossary

Audiation:

Gordon (1977) defines audiation as:

Audiation takes place when one hears music through recall or creation (the sound not being physically present except, of course, when one is engaging in performance) and derives musical meaning, as compared to aural perception when one listens to music actually being performed by others.⁷

Playing By Ear:

Playing by ear means that the notes they play [...] are informed by an inner hearing. Skilled ear players do not require cues from notation (or another source) to know what notes to play, but are instead guided by an internal model of what the music should sound like.⁸

Memory/Learning:

Remembering, or memory, refers to behavior once acquired which is repeated in some fashion following the passage of a period of time [...] Learning, on the other hand, refers to the process of behavioral acquisition.⁹

Aural Memory:

A similar term discussed by Mishra (2005) is 'aural memory'. Mishra states: "Aural memory is the ability to hear the notes of a piece of music in the proper order without relying on a sound source or notational cues."¹⁰

⁷ Edwin E. Gordon, *Learning Sequence and Patterns in Music*, 1st ed. (Chicago: G.I.A. Publications, 1977), 2.

⁸ Woody, "Playing by Ear: Foundation or Frill?," 82.

⁹ Robert W. Lundin, *An Objective Psychology of Music*, 2nd ed. (New York: Ronald Press Co, 1967), 123.

¹⁰ Mishra, "A Theoretical Model of Musical Memorization," 82.

This is different to 'visual memory': "the ability to recall a mental picture of musical notation, as a whole or in parts, or visualise finger patterns or hand positions on an instrument", and 'kinesthetic memory': "Retention of the muscular movements involved in performing a piece of music."¹¹

Internalisation:

For the purposes of this paper, internalisation is taken to mean "To make internal, [...] To acquire knowledge of."¹²

Implicit/Explicit Memory:

Implicit memory is "memory that does not depend on conscious recollection"¹³, whereas explicit memory does. For the purposes of this paper, it is assumed that implicit memory and internalisation carry similar meanings.

Numbers/Solfege:

For the purposes of this dissertation, both refer to a method of organising pitches of a scale, and assigning them a reference:

-In Solfege, this is a monosyllabic sound (e.g. do, re, mi).

-In the numbers system, it is a number, with the tonic of the scale being assigned '1'.

¹¹ Ibid.

¹² Oxford English Dictionary, "*Internalize*, V." (Oxford University Press).

¹³ Michael W. Eysenk and Mark T. Keane, *Cognitive Psychology: A Student's Handbook*, 5th ed. (East Sussex: Psychology Press, 2005), 214.

Literature Review

Jazz Educators

Gary Burton's video *Gary Burton Lesson Series: Practise Suggestions* (2011) is a highly resourceful explanation of Burton's thought process whilst improvising. He makes the point that during spontaneous improvisation there just isn't time to think about and consider the possible note choices on a particular chord, and that one has to "have an instant recall of a group of notes and see them on your instrument, or 'see' them in your imagination."¹⁴

Saxophonist Jerry Coker has had a highly respected career, performing with seminal jazz big bands, such as those led by Woody Herman, Mel Lewis and Stan Kenton, and has also published several jazz instruction texts. Two Coker texts are considered in this dissertation: *How to Practise Jazz* (1990), and *Improvising Jazz* (1964). Both of these texts discuss the aural ability to play what one hears (in one's head), with Coker labelling this skill *dictation*. He states that whether one is transcribing (external source) or improvising (internal source), "the main process is the same, that of dictation."¹⁵ He also mentions the importance of learning, and learning to hear specific elements of music, such as intervals:

*The sooner we acquire the ability to perform and hear all interval sizes, the sooner we can learn to play what we hear in our mind's ear.*¹⁶

Current educator Hal Galper's material is presented in the form of recorded masterclasses, available online. Several of Galper's videos are sourced as part of this paper, their content ranging from developing a musical vocabulary¹⁷, to technique.¹⁸

¹⁴ Gary Burton, "Gary Burton Lesson Series, Part 8: Practice Suggestions," Youtube Video, 5.15, October 27, 2011, http://www.youtube.com/watch?v=8hnDzBG_s8w.

¹⁵ Jerry Coker, *Improvising Jazz*, 1st ed. (Englewood Cliffs, N.J.: Prentice-Hall, 1964), 34.

¹⁶ *How to Practise Jazz*, 1st ed. (New Albany, IN: Jamey Aebersold, 1990), 18.

¹⁷ Hal Galper, "Hal Galper's Master Class: Musical Vocabulary," Youtube video, 5.15, April 28, 2010, <http://www.youtube.com/watch?v=b4kVUIpfTPU&list=RD02b4kVUIpfTPU>.

¹⁸ "Hal Galper's Master Class: Technique, Part 2," Youtube video, 9.45, April 28, 2010, <http://www.youtube.com/watch?v=NehOx1JsuT4&list=RD02b4kVUIpfTPU>.

Across the numerous videos sourced, Galper presents a very clear opinion in his teaching: that one must obtain a “vocabulary”¹⁹ to learn jazz improvisation, and that this must be internalised, stating “you’re the instrument. Everything you’re working on is internal to you”.²⁰

Jean-Michel Pilc is another current jazz performer and educator, whose material is accessed in the form of online video masterclasses. Pilc is a strong advocate of playing by ear, and his numerous videos on the subject support this assertion. In one such video, he warns of moving through a suggested process too quickly, stating:

*When you start playing the horn, what’s going to happen is; the horn is going to start playing you. Which means you’re going to start moving your fingers, and what you hear is not what you would hear without the horn, it will be what the horn plays. [In a process where you’re not playing what you hear] it is mechanical; I can hear what I’m playing, but I’m not playing what I hear [...] it should go from the hearing, to the playing.*²¹

A personal email questionnaire with New York guitarist Paul Bollenback is included in Appendix A. The topic of this questionnaire is an ear training method called the pivots system which will provide the subject of the second half of this dissertation. Educator Bollenback currently teaches the pivots system, and an example of his educational material is included Appendix B. These two resources will be the primary source of information on the pivots system, and will be presented in chapter 2.

Memory and Learning Literature

Music psychologist and jazz bassist Edwin E. Gordon’s work spans numerous books, articles, videos and a website. Two of Gordon’s texts are used in this dissertation, namely *Learning Sequence and Patterns in Music* (1977), and the more recent *Learning Sequences in Music* (1993). His research into the teaching of music has led him to

¹⁹ "Hal Galper's Master Class: Musical Vocabulary."

²⁰ "Hal Galper Masterclass: The Illusion of an Instrument," Youtube video, 9.14, April 7, 2013, http://www.youtube.com/watch?v=y_7DgCrzil8.

²¹ Jean-Michel Pilc, "Jean-Michel Pilc *Jazz Improvisation* Tip: Playing What You Hear Vs. The Instrument Playing You," Youtube video, 5.31, August 8, 2011, <http://www.youtube.com/watch?v=iwrbPXwow4Y>.

develop what he calls 'Music Learning Theory', which is "an explanation of how we learn music when we learn music".²² His research calls for a sequential method of developing music which is similar to that of learning to speak, beginning with listening and learning aural patterns. Much is taken from Gordon's work in this paper, most notably his definition of the term 'audiation', which he states is "when we hear and comprehend music for which the sound is no longer or may never have been physically present".²³ This will be presented in Chapter 1.2, with further discussion on how to develop the audiation process in subsequent sections of the chapter.

2010's *The Improvising Mind: Cognition and Creativity in the Musical Moment* by Aaron Berkowitz combines neuroscience and music into a text which seeks to uncover the cognitive processes exhibited whilst improvising. A classical pianist and neuroscientist, Berkowitz's book is largely focused on what knowledge is required in classical improvisation, and how this knowledge is internalised for performance. He collates research from substantial sources to present the idea that a *knowledge base* must be learnt and internalised, in order to be accessible during the act of improvisation.²⁴ Further, definitions regarding learning and memory which appear in his book will be used and discussed in Chapter 1.3.

Jennifer Mishra's 2005 paper *A Theoretical Model of Musical Memorisation* describes the process of how music is memorised for performance.²⁵ Besides presenting useful definitions for different types of memory, which are used in the glossary of this paper, Mishra also presents factors which can affect the memory process. These will be examined in chapter 1.4.

An Objective Psychology in Music by Robert Lundin (1967)²⁶ contains useful information regarding learning and remembering music. His definitions are used in the glossary of this paper, as well as aspects of effective memorisation being presented and discussed in chapter 1.4.

²² Edwin E. Gordon, *Learning Sequences in Music* (Chicago: G.I.A. Publications, 1993), 33.

²³ *Learning Sequences in Music* (Chicago: G.I.A. Publications, 1993), 13.

²⁴ Berkowitz, *The Improvising Mind: Cognition and Creativity in the Musical Moment*, 6.

²⁵ Mishra, "A Theoretical Model of Musical Memorization," 75-89.

²⁶ Lundin, *An Objective Psychology of Music*.

Connecting the Inner Ear and The Voice (Klonoski, 2003) is a paper concerning techniques and strategies to strengthen the *inner ear* to the voice, that is; pitching in tune to what is heard, or *singing by ear*.²⁷ Despite using the term inner ear and *inner hearing* throughout the paper, Klonoski also supports Gordon's definition of audiation, and defines the two as having similar meanings, stating:

*Each of these terms share the core idea that inner hearing entails recalling or mentally creating new musical sounds.*²⁸

Generating Ideas in Jazz Improvisation: Where Theory Meets Practice (Hargreaves, 2012) is a paper concerned with the sources from which one can draw whilst improvising. Hargreaves identifies three such sources; audiation-generated, strategy-generated and motor-generated.²⁹ In all cases, Hargreaves hypothesises that once an idea is generated, the brain must process this information, and devise a "motor schema", which is then executed to perform "musical output."³⁰ Quoting Gordon's definition of audiation, Hargreaves essentially discusses the process of 'playing by ear' in her section on audiation-generated ideas.

Other texts which have been found to use or support the term audiation range from research papers to pedagogy and educational texts. Besides the above-mentioned examples, papers using Gordon's term are *Playing by Ear: Foundation or Frill?* (Woody, 2012), which discusses the skill of playing by ear, *Honing the Craft of Auditation: Music is an Aural Art* (Stowasser, 1995), which discusses the use of audiation in learning music, and Christopher Azzara's 1993 paper *Audiation-Based Improvisation Techniques and Elementary Instrumental Students' Music Achievement*, which states:

²⁷ Edward Klonoski, "Connecting the Inner Ear and the Voice," *Choral Journal* 44, no. 3 (2003): 35-40.

²⁸ "Connecting the Inner Ear and the Voice," *Choral Journal* 44, no. 3 (2003): 36.

²⁹ Hargreaves, "Generating Ideas in Jazz Improvisation: Where Theory Meets Practice," 359.

³⁰ "Generating Ideas in Jazz Improvisation: Where Theory Meets Practice," 358.

*The ability to internalise and bring organisation to aural structures of music through audiation is necessary for the meaningful manipulation of tonal and rhythmic information.*³¹

³¹ Christopher D. Azzara, "Audiation-Based Improvisation Techniques and Elementary Instrumental Students' Music Achievement," *Journal of Research in Music Education* 41, no. 4 (1993): 330.

Chapter 1: Review of Memory and Learning Literature

1.1 Importance of Aural Skills in Music

The importance of aural ability in music has been well established, across all genres of music and all areas of music learning and performance. This information comes from two distinct sources who tend to agree upon this idea: music researchers and music pedagogues.

Research shows that “aural awareness and acuity are basic to musical development”³², and are important factors in many other areas, such as improvising, sight reading and performance.³³ Aural proficiency has also been shown to improve a person’s ability to pitch in tune whilst singing³⁴, and that it is “critical to achievement in jazz improvisation”³⁵.

Specifically, this paper will be discussing the skill that is commonly referred to as playing by ear³⁶, that is, the ability to hear a sound source internally and reproduce it, usually on an instrument. The importance of this specific skill has also been the subject of research, with one study finding that out of five musical skills - improvisation, performing rehearsed music, playing by ear, playing from memory and sight reading - playing by ear was the only skill that contributed to all the others.³⁷

This skill of playing by ear has many applications, but is a common subject in jazz education, particularly in the area of improvisation. Many jazz educators stress the skill to hear, and play what is heard, in their teaching. Early jazz educator David Baker states:

³² Lissa F. May, "Factors and Abilities Influencing Achievement in Instrumental Jazz Improvisation," *ibid.* 51, no. 3 (2003): 246.

³³ Woody, "Playing by Ear: Foundation or Frill?," 82.

³⁴ Klonoski, "Connecting the Inner Ear and the Voice," 35-40.

³⁵ May, "Factors and Abilities Influencing Achievement in Instrumental Jazz Improvisation," 245.

³⁶ See the Glossary

³⁷ Gary E. McPherson, Michael Bailey, and Kenneth E. Sinclair, "Path Analysis of a Theoretical Model to Describe the Relationship among Five Types of Musical Performance," *ibid.* 45, no. 1 (1997): 103-29.

*The jazz player must conceive an idea, place it in a tonal perspective, translate it into actual notes for his instrument and play, all this in a split second. This demands a very special kind of hearing - an ability to hear everything he plays before he plays it.*³⁸

Another prominent jazz educator, Jerry Coker, calls this skill dictation, and states that the basic skill and process is the same whether the practitioner is improvising, composing, transcribing to notation, or transcribing to the instrument. He writes:

*[...]if a student can transcribe what he hears from an outside source, he can translate what he hears from an inner source through the same developed technique of taking dictation".*³⁹

Therefore, it can be argued that regardless of whether the sound source is internal (improvisation or composition) or external (transcription), the process of transferring the source into a musical understanding is the same.

Besides Coker's definition, many different terminologies exist between educators and researchers alike. This discrepancy will be avoided by defining terminology in the next section.

³⁸ D Baker, *Jazz Improvisation: A Comprehensive Method of Study for All Players* (Chicago, Illinois: Maher Publications, 1969).

³⁹ Coker, *Improvising Jazz*, 34.

1.2 Audiation

The previous section shows that whilst there are many sources stressing the importance of the development of aural skills, specifically the ability to play by ear, terminology is not clearly defined across all sources. For the purposes of this dissertation there is a need to properly define terminology that will be used throughout the remainder of the paper.

Music theorist and educator Edwin E. Gordon provides the strongest definition of the aural ability discussed in this dissertation. Gordon's concept of 'audiation', which he states "takes place when we hear and comprehend music for which the sound is no longer or may never have been physically present"⁴⁰, is the ability to hear and comprehend sound from any source, heard or created. The strength of Gordon's definition is in the idea that sound is not only heard but concurrently understood, giving the analogy that "audiation is to music what thought is to speech."⁴¹

Gordon also makes a distinction between other commonly used terms. He dismisses the term *aural imagery*, saying:

*The word 'image' is classically associated with the visual, not the aural sense. To use the word 'imagery' is to suggest a process that deals with notation, a process that involves seeing imaginary or real notation without necessarily hearing what is seen. The term 'aural imagery' is therefore confusing. I prefer the term 'notational audiation' because it is specific and makes clear the distinction between audiation and notational audiation.*⁴²

By Gordon's definition, notational audiation is the skill specifically relating to hearing (or audiating) music that is seen as notation.

⁴⁰ Gordon, *Learning Sequences in Music*, 13.

⁴¹ "Audiation is to music what thought is to speech [...] Although music is not a language, the process is the same for audiating and giving meaning to music as for thinking and giving meaning to speech. When we listen to speech, we are giving meaning to what was just said by recalling what we have heard on earlier occasions. At the same time, we are anticipating what we will hear next as we are thinking about what is being said." Ibid.

⁴² *Learning Sequences in Music*, 15.

Also discerned is the difference between audiation and imitation, with imitation being similar, albeit without the comprehending component of audiation. In Gordon's view, this renders imitation less valuable than audiation, as what is imitated "is soon forgotten."⁴³

Gordon's terminology is also supported by various other pedagogues and researchers, who either use similar definitions,⁴⁴ describe a similar process⁴⁵, or in fact, use his terminology.⁴⁶ His concepts for teaching audiation are also prevalent in literature, with some papers focusing on teaching notational audiation⁴⁷ whilst others concern themselves with devising a method for developing the skill in a classroom environment⁴⁸ or in a school band setting.⁴⁹

Also supporting the above are examples from music educators such as Jean Michel-Pilc, who stresses the importance of developing the skill to play by ear. In an online video masterclass, Pilc warns that not having this skill means that a student may "start moving [their] fingers, and what [they] hear is not what [they] would hear without the horn, it will be what the horn plays."⁵⁰ That is, the student may play mechanically first, and internally hear only after the sound is produced on their instrument. In this instance, Pilc states that "[they] can hear what [they're] playing, but [they're] not playing what [they] hear [...] it should go from the hearing, to the playing."⁵¹

⁴³ "Audiation and imitation are often confused. Imitation, sometimes called inner hearing, is a product. Audiation is a process. that is, one can inner hear without comprehending, and one can imitate without audiating. Although imitation is not audiation, learning how to imitate is nonetheless a necessary readiness for learning how to make the best use of one's potential for audiation. [...] Imitation is learning through someone else's ears. Audiation is learning through one's own ears. [...] Imitation is analogous to using tracing paper to draw a picture. [...] What is imitated has almost no value for learning something new. In a practical sense, it is soon forgotten." *Learning Sequences in Music*, 16.

⁴⁴ Klonoski, "Connecting the Inner Ear and the Voice," 36.

⁴⁵ Hargreaves, "Generating Ideas in Jazz Improvisation: Where Theory Meets Practice," 355-61.

⁴⁶ Azzara, "Audiation-Based Improvisation Techniques and Elementary Instrumental Students' Music Achievement," 328-42; Helen Stowasser, "Honing the Craft of Audiation: Music Is an Aural Art," in *Australian Society for Music Education. National Conference (10th : 1995 : Hobart, Tas.)* (1995); Woody, "Playing by Ear: Foundation or Frill?," 84.

⁴⁷ Alison Maerker Garner, "Ear to Eye to Hand: Audiation as a Basis for Note-Reading," *American String Teacher* 59, no. 3 (2009): 24-26.

⁴⁸ James S. Hiatt and Sam Cross, "Teaching and Using Audiation in Classroom Instruction and Applied Lessons with Advanced Students," *Music Educators Journal* 92, no. 5 (2006): 46-49.

⁴⁹ Bruce Dalby, "Teaching Audiation in Instrumental Classes," *ibid.* 85, no. 6 (1999): 22-46.

⁵⁰ Pilc, "Jean-Michel Pilc *Jazz Improvisation* Tip: Playing What You Hear Vs. The Instrument Playing You."

⁵¹ *Ibid.*

Audiation is an internal process: sound is heard (whether physical or imagined), and it is internally comprehended. This process is independent of the instrument. Gordon states that “An instrument is simply an extension of the audiation of the person who uses it.”⁵² This idea is supported by educator Hal Galper, who paraphrases George Kochevitsky⁵³ in a masterclass, stating:

*...this (points to a piano) is not the instrument; it's an illusion, you're the instrument. Everything you're working on is internal to you.*⁵⁴

⁵² Gordon, *Learning Sequences in Music*, 41.

⁵³ George A. Kochevitsky, *The Art of Piano Playing: A Scientific Approach* (Evanston, Ill.: Summy-Birchard Co., 1967).

⁵⁴ Galper, "Hal Galper Masterclass: The Illusion of an Instrument."

1.3 Internalisation

Gordon's method for developing the audiation process, as discussed in his numerous books and articles, is to learn melodic and rhythmic patterns, to the point of memorisation. He states:

*We learn to audiate when we recall and understand what we have perceived and sensed, or when we create as a result of what we have perceived and sensed.*⁵⁵

In other words, Gordon suggests learning and acquiring knowledge (or a vocabulary), which is then recalled through audiation. The idea that to hear and comprehend sound, we must have previously heard and comprehended that (or a similar) sound, is a pivotal point in Gordon's concept of audiation. He continues:

*As with language, the more words we have in our vocabulary, the better we can communicate. In music, the more patterns of essential pitches and essential durations that we have in our tonal and rhythm vocabularies, the better we audiate. When the music that we are hearing is familiar, the audiation process becomes relatively simple but, when the music that we are hearing is unfamiliar, the audiation process becomes relatively complex.*⁵⁶

The process suggested is one of memorising certain elements, to the point of *internalisation*, so that the acquired vocabulary can be accessed through a simple, rather than a complex process. This is exemplified in a masterclass from educator Hal Galper, where he stops a student improviser, asking him "are you thinking? [...] Don't think, thinking doesn't work here - it's too slow!"⁵⁷ Galper also states in a different video:

When I'm playing, I'm not saying 'I think I'll play this, then I think I'll play that', it's going by too fast, that's the intellectual approach. What's going on is... the choice is actually out of my hands, it's going by too fast to consciously choose it, I'm choosing

⁵⁵ Gordon, *Learning Sequences in Music*, 54.

⁵⁶ *Learning Sequences in Music*, 25.

⁵⁷ Hal Galper, "Hal Galper's Masterclass: Thinking," Youtube video, 1.26, June 25, 2013, <http://www.youtube.com/watch?v=HjYx7g1m180>.

*it on an intuitive level. [...] The decision making process at the intuitive level functions 20,000 times faster than the intellectual process.*⁵⁸

Gordon further stresses the importance of building a vocabulary, specifically in the act of improvisation:

*The larger the student's vocabulary of tonal patterns and rhythm patterns, the better he will be able to make decisions and choose appropriate tonal patterns and rhythm patterns from his 'audiation dictionary' that will contribute to the artistry and syntax of the music that he is creating and improvising. [...] Without sufficient tonal patterns and rhythm patterns in various tonalities and meters that he can recall in audiation, a student can engage in only aleatory exploration; he cannot know or plan what to create or improvise.*⁵⁹

This idea is not unique to Gordon, as literature from many educators and researchers mention similar theories in playing or improvising by ear. Gary Burton sums up his thoughts on learning to improvise:

*...if you're learning to improvise, one of the first things you confront is what is the chord, and what is the scale of the harmony that I'm supposed to improvise on? Once you find what that chord is; the chord outline and the scale, then, what you want to do is imprint a memory of this group of notes, so that you can recall it instantly. [...]if you have to approach that chord that you see on the music, and say 'ok, it's an Eb chord; I can use a G, Bb and a D' - already two more chords have gone by! There isn't time to think is the point. You have to have an instant recall of a group of notes and see them on your instrument, or 'see' them in your imagination. And in fact what you do is have both a visual pattern, and I hear it in my ear, I hear the sound [in my head]... so that when I see the Eb major chord symbol occurs on the music, before I can even consciously start thinking about it, I 'see' it and I 'hear' it.*⁶⁰

⁵⁸ "Hal Galper Masterclass: The Illusion of an Instrument."

⁵⁹ Gordon, *Learning Sequences in Music*, 96.

⁶⁰ Burton, "Gary Burton Lesson Series, Part 8: Practice Suggestions."

Galper also advocates absorbing a vocabulary for learning jazz improvisation, stating “you need the vocabulary to do the process [jazz improvisation].”⁶¹ The fact that this vocabulary is internalised and not a product of having an instrument to rely on a mechanical process, is supported by educator Jerry Bergonzi in an online video masterclass, in which he states (with reference to mental practice):

*[...] and I find that whatever I make a mistake on in my mind, the same happens with the saxophone.*⁶²

Research in the field of behavioural science supports the concept that information that is internalised (unconsciously assimilated) is later recalled “without conscious direction”⁶³ during musical acts such as improvisation. Psychologist Johnson-Laird (1991) states:

*Some acts of creation occur in real time, and do not allow the individual to go back and revise earlier thoughts.[...] Such creations depend on the artist internalising the tacit principles of a genre along with idiosyncratic variations[...]. The artist is acquiring a skill that depends on tacit procedures in which conscious propositional knowledge has little part to play.*⁶⁴

Another concept found in behavioural science that supports this view is that of implicit and explicit memory. Implicit memory is “memory that does not depend on conscious recollection”⁶⁵, for example, recalling your phone number, whereas explicit memory does depend on it.

Research shows that knowledge that is implicit or explicit in nature doesn’t necessarily remain that way, as musicologist Aaron Berkowitz states:

⁶¹ Galper, "Hal Galper's Master Class: Musical Vocabulary."

⁶² Jerry Bergonzi, "*How to Practice Jazz* Master Jerry Bergonzi Spills the Beans Jazzheaven.Com Video Excerpt," Youtube video, 4.38, July 15, 2012, <http://www.youtube.com/watch?v=UGFTz7g8jE0>.

⁶³ Hargreaves, "Generating Ideas in Jazz Improvisation: Where Theory Meets Practice," 361.

⁶⁴ P.N. Johnson-Laird, "Jazz Improvisation: A Theory at the Computation Level," in *Representing Musical Structures*, ed. Peter Howell, Robert West, and Ian Cross (London: Academic Press, 1991), 322.

⁶⁵ Eysenk and Keane, *Cognitive Psychology: A Student's Handbook*, 214.

That is, something learned implicitly can be brought to the light of consciousness by analysis or through the need to make implicit knowledge explicit (eg., in pedagogy). Proceeding in the opposite direction, some believe that explicit knowledge can be rendered implicit “through practise, exposure, drills, etc”⁶⁶...⁶⁷

This idea that explicit information (such as patterns or a vocabulary) can become implicit in nature (i.e. requiring no conscious thought) through “practise, exposure and drills”, not only supports the premise that certain elements of a music vocabulary can be internalised, and later accessed during acts such as improvisation, but also begins to suggest a method for rendering this vocabulary implicit (internalised).⁶⁸

The concept of long and short-term memory is similar to that of implicit and explicit memory, in that knowledge that is internalised creates “a knowledge base in the long-term memory”⁶⁹, whereas knowledge in the short-term memory is superficial, and is forgotten within a period of time⁷⁰.

Research regarding these aspects of memory and music echo the previous sentiments of building and internalising a vocabulary, showing that “improvisational fluency arises from the creation, maintenance and enrichment of an associated knowledge base built in to long term memory.”⁷¹

These concepts are similar in terms of internalising knowledge. A knowledge base which when learnt requires conscious thought (explicit in nature), can possibly be memorised to the point of internalisation in the long-term memory, requiring less conscious thought (implicit). The statements from jazz educators show that it is through internalising

⁶⁶ Susan M. Gass and Larry Selinker, *Second Language Acquisition, an Introductory Course*, 3rd ed. (New York: Routledge, 2008), 243.

⁶⁷ Berkowitz, *The Improvising Mind: Cognition and Creativity in the Musical Moment*, 8.

⁶⁸ This will be covered in more detail in Chapter 2.4

⁶⁹ *The Improvising Mind: Cognition and Creativity in the Musical Moment*, 39.

⁷⁰ This echoes Gordon’s comparison of audiation and imitation, whereby he states that imitation is “soon forgotten”. Gordon, *Learning Sequences in Music*, 16.

⁷¹ Jeff Pressing, “Psychological Constraints on Improvisation Expertise and Communication,” in *In the Course of Performance: Studies in the World of Musical Improvisation*, ed. Bruno Nettl and Melinda Russell (Chicago, IL: University of Chicago Press, 1998), 53-54.

certain elements of music, that playing by ear (especially in improvisation) can be achieved, echoing Gordon's approach with regard to audiation.

1.4 Techniques

As previously stated, through a process of internalisation of certain musical elements, these elements are then able to be heard and comprehended through audiation. To develop the skill to play by ear, or play what is heard in one's head, a vocabulary of internalised information must first be built up.

In order to efficiently and effectively build this knowledge base and internalise it, several techniques are suggested which have been proven to be effective in the learning process. These techniques will be utilised in the following section, with regard to learning and internalising the information presented.

1.4a Patterns

One of the major points of Gordon's teaching materials on audiation is the learning and memorisation of tonal and rhythmic patterns. Gordon's reasoning for this stems from the idea that it is easier to recall and comprehend a group of notes, than to try to comprehend each individual note in a sequence. He states:

*Just as we read words (groupings of letters) in a language, so we read patterns (groupings of notes), both tonally and rhythmically, in music. [...] Only possibly with a sense of absolute pitch might it be imagined that meaning can be given to an individual note.*⁷²

This is also stated in research, which shows that "musical persons in particular apprehend a sequence of tones as a tonality with a characteristic constitutive contour, rather than a mere number of separate tones"⁷³. That is, it is a group of notes which are

⁷² Gordon, *Learning Sequence and Patterns in Music*, 3.

He continues: "It is words, not individual letters, that contribute to comprehending language. It is patterns, not individual pitches and durations, that contribute to audiating music.[...] The more words a student has in his listening, speaking, reading and writing vocabularies in language, the better he will be able to think. The more tonal patterns and rhythm patterns that a student has in his listening, performing, reading and writing vocabularies in music, the better he will be able to audiate." *Learning Sequence and Patterns in Music*, 57.

⁷³ Christian Paul Heinlein, "A Brief Discussion of the Nature and Function of Melodic Configuration in Tonal Memory, with Critical Reference to the Seashore Tonal Memory Test," *The Pedagogical Seminary and Journal of Genetic Psychology* 35, no. 1 (1928).

comprehended, giving reference to each other, rather than the exact individual pitches. This is also stated in Hargreaves' research:

*[...] the information presented to the conscious brain is conceived in relative pitch
[...] Although musicians can distinguish a relationship between notes in the form of the melodic shape of the audiated idea, the precise identity of each frequency is established for most musicians in a separate process of conversion [...]*⁷⁴

Research also shows that memory for patterns is greater, and that memory “deteriorates when stimuli are randomly ordered, rather than in commonly encountered patterns.”⁷⁵ This fact is also supported by music psychologist Robert Lundin, who states that “memory span for music which is meaningful is greater than for purely unrelated tones”⁷⁶, and Educator Hal Galper, who states “the ear loves logic [...] To the ear, patterns are logical, and they make sense.”⁷⁷

1.4b Sing then Play

Also worth considering is the concept of not just singing, but singing and then checking the accuracy of the pitch sung. There are multiple reasons for this. On the subject of singing in general, it is said that “to be able to audiate tonally one has to be able to sing, because when one engages in tonal audiation, he is also actually singing silently.”⁷⁸ Gordon also states:

A student hears tonal patterns and rhythm patterns and then sings, chants, or moves to what he is hearing. As a result of performing the tonal patterns [...] he learns to listen better to those patterns. And as a result of listening to the tonal patterns [...] his performance of those patterns improves. The continuous loop,

⁷⁴ Hargreaves, "Generating Ideas in Jazz Improvisation: Where Theory Meets Practice," 361.

⁷⁵ Mishra, "A Theoretical Model of Musical Memorization," 76.

⁷⁶ Lundin, *An Objective Psychology of Music*, 129.

⁷⁷ Galper, "Hal Galper's Master Class: Technique, Part 2."

⁷⁸ James L. Mursell and Mabelle Glenn, *The Psychology of School Music Teaching* (New York: Silver Burdett, 1938), chap. 3.

*moving from aural to oral and from oral to aural, is the way a student develops his audiation skill.*⁷⁹

With specific regard to singing, and then checking the sung pitch at an instrument, Klonoski (2003) states the tendency is for students to “correct [the] intonation after they initiate a pitch, which they compare to the external pitch source for accuracy.”⁸⁰ This then becomes an external process, rather than audiating internally. He continues:

*When every vocalise, interval, and sustained pitch are perpetually reinforced by the piano, singers become desperately dependant upon the piano and not on their inner ears. Relying exclusively on the imitation of external sounds disconnects the inner ear from the process. The student relies entirely upon short-term memory for the retrieval of the target pitch, and uses the external sound for judgment of intonation.*⁸¹

Although relating specifically to teaching singers proper intonation, the above highlights the fact that if the desired pitch is played before or at the same time as the practitioner goes to sing, reliance then shifts to the external source rather than relying on the inner audiation process, and the practitioner is engaging only in imitation (sound without comprehension).

Educator Jean Michel-Pilc also advocated singing followed by playing as a process for developing playing by ear. In a video masterclass, his methodology for helping a group of university students follows a similar process to the aforementioned. He discusses an exercise for practising dictation, whereby one student performs a melody to an accompaniment, with a second student performing the phrase back, first by singing and then on their instrument. He states:

...[you must] acquire that ‘ok, I hear, I sing, I play. And when that becomes instant, then you’re going to realise that finally you know what improvisation feels like. Many

⁷⁹ Gordon, *Learning Sequences in Music*, 57.

⁸⁰ Klonoski, "Connecting the Inner Ear and the Voice," 36.

⁸¹ Ibid.

*of you are going to realise that so far [you've] been doing mechanical stuff, not musical stuff, and that's a very different thing.*⁸²

1.4c Verbal Association

Verbal association refers to the assigning of syllables to pitches as a reference point and to reinforce the intonation. Lacking syllables to verbally associate, pitching can become “imprecise and, when errors are made, it becomes almost impossible to recall where the error was made and how to fix it”⁸³. Gordon provides an analysis on “the commonly known tonal systems”, including “movable do” syllables, “immovable do” syllables, numbers, letter names and interval names.⁸⁴ Gordon himself favours ‘movable do’ syllables, but generally, opinions in music pedagogy vary on this subject.⁸⁵

Gordon’s research, however, does show some positive results with the use of the numbers system, stating:

*[...] it is commonly believed that the numbers system, particularly for young children, is the most efficient tonal technique for verbal association with aural/oral understanding. The reason is that the child is already familiar with numbers, and to learn a new system would complicate matters.*⁸⁶

Gordon’s reasons for not preferring the numbers system are the complication it provides when attempting a melodic line which involves “counting backwards (necessitated by a descending melodic line) and in skipping numbers,” and also that “no provision is made for accidentals.”⁸⁷ Gordon’s argument, then, is applicable only to using the numbers system on a more complex piece, one which might go through key changes

⁸² Jean-Michel Pilc, "Jean-Michel Pilc Masterclass Series Iv: Play What You Hear," Youtube video, 4.56, April 23, 2013, <https://www.youtube.com/watch?v=-tr9nkD7WUg>.

⁸³ Thom Mason, *Jazz Ears: Aural Skills for the Improvising Musician* (Victoria: Hal Leonard, 1997), 15.

⁸⁴ Gordon, *Learning Sequences in Music*, chap. 10.

⁸⁵ Mason, *Jazz Ears: Aural Skills for the Improvising Musician*. Thom Mason prefers the use of movable solfege in his text, whereas Armen Donelian advocates the use of the numbers system, stating that: “Solfege does not support the student’s conscious connection between a note’s sound and its scale function. In fact, Solfege burdens the student with translating a note’s scale function[...] into an unrelated word in the Italian language.” Armen Donelian, *Training the Ear* (Germany: Advance Music, 1992).

⁸⁶ Gordon, *Learning Sequence and Patterns in Music*, 109-10.

⁸⁷ *Learning Sequence and Patterns in Music*, 110.

or involve accidentals, or involve a complex melodic progression. This may not be the case when using such a system on a pattern which is repetitious in nature.⁸⁸ Gordon also states:

*The limitations of the number system notwithstanding, numbers are a useful technique for theoretical understanding learning, but only after one has already acquired music literacy.*⁸⁹

This sentiment is echoed in other research, which states that solfege “appears to be less successful for students at later stages of development”⁹⁰.

As this paper and the exercises presented in the next chapter are assuming a certain level of musical knowledge, it can be stated that the numbers system is a viable tool for use in the given circumstances.

1.4d Repetition

Analysis into learning mechanics reveals that “learning and memory are inseparable”⁹¹ and that there cannot be one without the other. Psychologist Arthur Reber states:

*There can be no learning without memorial capacity; if there is no memory of past events, each occurrence of an event is, functionally, the first. Equivalently, there can be no memory of information in the absence of acquisition; if nothing has been learned, there is nothing to store.*⁹²

As has been previously stated, explicit information can possibly be rendered implicit and internalised “through practise, exposure, drills, etc”⁹³, in that learning has occurred,

⁸⁸ As will be used in Chapter 2

⁸⁹ *Learning Sequence and Patterns in Music*, 111.

⁹⁰ Stowasser, "Honing the Craft of Audiation: Music Is an Aural Art," 257.

⁹¹ Berkowitz, *The Improvising Mind: Cognition and Creativity in the Musical Moment*, 7.

⁹² Arthur Reber, *Implicit Learning and Tacit Knowledge: An Essay on the Cognitive Unconscious* (New York: Oxford University Press, 1993), 109.

⁹³ Gass and Selinker, *Second Language Acquisition, an Introductory Course*, 243.

and the information has been memorised. However, it is worth noting that it is not merely “through the repetition of an act”⁹⁴ that learning is improved. As psychologist Lundin states:

*The value of practice lies only in the repetition of a pattern of response that inevitably will vary and whereby the better aspects of that pattern may be reinforced by the person or his teacher. It is the subtle manipulation of reinforcement that produces improvement, not the practise itself.*⁹⁵

That is, practice and repetition are only valuable if improvement is made and repeated. It is not beneficial if an exercise is repeated and practised without improvement occurring, or if deficiencies are being practised.

⁹⁴ Lundin, *An Objective Psychology of Music*, 132.

⁹⁵ *An Objective Psychology of Music*, 133.

Chapter 2: The Pivots System

2.1 Explanation of the Pivots System

2.1a Overview

The pivots system is, essentially, concerned with developing the skill of hearing any note (pivot) as a chord tone of any possible chord which that note can belong to. As Bollenback states “If we can determine the ‘position’ of F in the chord (1, 3 or 5), and the chord quality, we can determine the chord name.”⁹⁶

For example, hearing the note ‘F’ not only as the first degree of an Fmaj7 chord, but also as the third in a Dbmaj7, the fifth in Bbmaj7, etc. This goes for all chord types, but beginner practitioners should limit themselves to practising the four triads (major, minor, diminished and augmented). With three chord tones (first, third or fifth), and four triad types, there are then 12 different triads which can involve just one distinct pivot tone (figure 2.1a).

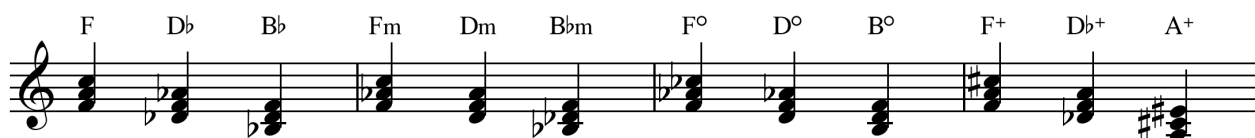


Figure 2.1a: Taking F as the pivot note

Further complexity occurs when considering seventh chords. The pivot tone can now be one of four possible chord tones (the first, third, fifth or the seventh), and there is now the possibility for eight or more different chord types⁹⁷, yielding 32 possibilities. Following from this, to obtain every possible seventh chord (for example, to cover every chord in a jazz standard), there only needs to be five different, chromatic starting pivots (e.g. F, F#, G, E and Eb)⁹⁸.

⁹⁶ Bollenback, via Email.

⁹⁷ Such as: Major seventh (ma7), minor seventh (m7), dominant seventh (7), diminished seventh, half-diminished seventh, dominant seventh sharp five, minor-major seventh and augmented-major seventh. The practitioner can choose to limit themselves to more common types initially, depending on their genre (jazz, classical, etc)

⁹⁸ As significant overlap begins to occur when all 12 pivot tones are used. Ibid.

2.1b Practice Notes

To attain the skill (or knowledge base) of hearing any pivot note as any chord tone, practice and repetition are required in order to render this information internalised for later recollection through audiation. The process for practising the pivots system, as stipulated by Bollenback, can be seen to adhere to the techniques used for efficient internalisation presented in the previous chapter.

As Bollenback shows, there is a set of “shapes” devised which are sung and learnt, that have the pivot note functioning as the root, third or the fifth respectively, of the given chord⁹⁹. Figure 2.1b shows these shapes for the basic major triads possible.



Figure 2.1b: Shapes used in the practice of the pivots system.

Bollenback continues this explanation with several ‘guidelines’ to aid in the learning process. These are:

1. *Always start on and return to ‘F’. For now this is our ‘pivot’ note.*
2. *Always sing numbers.*
3. *Each shape is built on thirds.*¹⁰⁰

From the research presented in Chapter 1 of this paper, it is highly recommended that a fourth guideline is added to this list:

4. *Always sing then play (check pitch)*¹⁰¹.

From these guidelines, it can be seen that points 1 and 3 (relating to the shapes of the exercise) are supportive of Chapter 1.4a: Patterns. The fact that the shape of the exercise is always being built up of third intervals, and always starting and returning to the

⁹⁹ Ibid.

¹⁰⁰ i.e. Always sing an interval of a 3rd. Ibid.

¹⁰¹ It is worth noting that, if the checking of the pitch is performed on the practitioners preferred instrument, tactile memory, and ear-to-hand coordination can also develop as a by product, which are also key elements in playing by ear.

pivot note, shows this as being a pattern. Once the three patterns¹⁰² (four if considering seventh chords) are learnt, repetitious practice can begin to allow participants to internalise their structures.

Adding to this, Bollenback's point 2 is supportive of Chapter 1.4c: Verbal Association. The system of choice in the pivots system is number allocation, whereby each scale degree is assigned a number (where the tonic of the tonality is '1'). As stated previously, the numbers system has some drawbacks, Gordon's main arguments for not favouring the system being the difficulty it presents in counting backwards (descending lines), skipping numbers (intervallic lines), and that no provision is made for accidentals (changing key). These points do not present an issue in the pivots system, as it is a pattern with only three possible variations (four, if using seventh chords). Once learnt, despite involving descending and skipping numbers, the sequence is simple, involves only three numbers (1,3 and 5), and is easily memorised.

In regard to Gordon's complaint about the numbers system's lack of allowance for accidentals, no need for accidentals arises here, as the practitioner is also audiating the quality of the exercise (major, minor, diminished and augmented). Therefore, if the practitioner is singing a minor chord from the third degree, he or she will still sing '3-1-3-5-3', but will internally hear the '3' as a lowered third (as the harmonic context states). Gordon argues that singing same numbers for pitches which differ creates issues¹⁰³ (for example, singing an F major triad, and an F minor triad involves the same number sequence, but the third degree will be an A and Ab respectively), but this aids the audiation process in the pivots system, by requiring the practitioner to audiate the tonality.

While practising the exercises, it is highly important to sing and then check the pitch, not the other way around, as stated in Chapter 1.4b: Sing then Play. If the pitch is played on an instrument before or after the pitch is sung, the practitioner is engaging in imitation, a short-term memory process. Imitation may, however, aid the practitioner if the exercise to be practised presents great difficulty initially. Just as Gordon's method is to engage students in aural (listening) followed by oral (performing)¹⁰⁴, so too should the

¹⁰² 1) The pivot and starting point being the first degree, 2) The pivot being the third degree, and 3) The pivot being the fifth degree

¹⁰³ Gordon, *Learning Sequence and Patterns in Music*, chap. 6.

¹⁰⁴ *Learning Sequences in Music*, 56.

pivots system exercises begin with listening, followed by imitation, and finally audiating the pitches without aid from an external source.

One way to practise a troublesome exercise could be:

1. Beginning Step: Perform the exercise on the instrument, just listening to the sound.¹⁰⁵
2. Intermediate Step: Play the exercise again, this time singing after each pitch is played on the instrument (imitation).
3. Final Step: This time, play just the starting pitch first. Then sing the exercise, checking each pitch after it is sung.

With these guidelines, efficient and effective internalisation of the concept can occur more readily through practice, leading to development of the audiation process.

¹⁰⁵ If the instrument used also has the ability to play accompaniment harmony (piano, guitar, etc), it is highly recommended that a chord also be played, to place the exercise in harmonic context, and also to aid in the practitioner developing audiation of the harmony. If the practitioner's instrument does not allow for this, practicing with access to a piano is recommended. Play the chord and sustain it on the piano, and engage in the exercise as normal. This will be discussed further in Chapter 2.4: Extrapolation.

2.2 Pivots System Exercises

Below are a number of possible exercises utilising one pivot tone (F). The practitioner should bear in mind that the five chromatic starting pivots should also be practised, to ensure covering all harmonic possibilities.

Exercise 1.1: Major Triads



Exercise 1.2: Minor Triads



Exercise 1.3: Augmented Triads



Exercise 1.4: Diminished Triads



Exercise 2.1: Major Seventh

Exercise 2.1: Major Seventh

Staff 1: Fmaj7, D♭maj7

Staff 2: B♭maj7, G♭maj7

Fingerings: 1 3 5 7 5 3 1, 3 1 3 5 7 5 3, 5 3 1 3 5 7 5, 7 5 3 1 3 5 7

Exercise 2.2: Minor Seventh

Exercise 2.2: Minor Seventh

Staff 1: Fm7, Dm7

Staff 2: B♭m7, Gm7

Fingerings: 1 3 5 7 5 3 1, 3 1 3 5 7 5 3, 5 3 1 3 5 7 5, 7 5 3 1 3 5 7

Exercise 2.3: Dominant Seventh

Exercise 2.3: Dominant Seventh

Staff 1: F7, D♭7

Staff 2: B♭7, G7

Fingerings: 1 3 5 7 5 3 1, 3 1 3 5 7 5 3, 5 3 1 3 5 7 5, 7 5 3 1 3 5 7

Exercise 2.4: Diminished Seventh

Handwritten musical notation for Exercise 2.4: Diminished Seventh. The exercise consists of two staves, each showing a sequence of notes and fingerings for two different diminished seventh chords.

Staff 1:

- Chord 1: F^{o7} (F diminished seventh). Notes: F4, A^b4, C^b5, E^b5. Fingering: 1, 3, 5, 7.
- Chord 2: D^{o7} (D diminished seventh). Notes: D4, F4, A^b4, C^b5. Fingering: 1, 3, 5, 7.

Staff 2:

- Chord 1: B^{o7} (B diminished seventh). Notes: B3, D4, F4, A^b4. Fingering: 5, 3, 1, 3.
- Chord 2: G^{#o7} (G# diminished seventh). Notes: G#3, B3, D4, F4. Fingering: 5, 7, 5, 3.

2.3 Extrapolation

2.3a Harmonic Accompaniment

A question arises whether harmonic accompaniment before, during or after performing the exercises above will aid in developing the audiation process. As it has been previously stated that imitation (playing the required pitch on an instrument before it is sung) is not an effective means to develop audiation but can be used as an intermediate step, harmonic accompaniment can also be considered in the same way.

For example, if an exercise proves troublesome, instead of playing each separate pitch before it is sung (intermediate step), the practitioner may instead play the chord before the exercise is sung. He or she can then gradually wean off this reliance (as stipulated in Chapter 2.1), and merely perform the chord after each pitch, or the entire exercise itself.

2.3b Sing Through Composition

One extrapolation of the pivots system, as suggested by Bollenback¹⁰⁶, is that the acquired information (knowledge base) of the pivots system can then be used to reinforce a harmonic understanding of a composition, specifically jazz harmony.

For example, taking the jazz standard 'Autumn Leaves', one could decide on a pivot note for each chord in the tune¹⁰⁷ (for simplicity, only the first eight bars are shown).

¹⁰⁶ Bollenback, via Email.

¹⁰⁷ Keeping in mind that only 5 chromatic tones are needed to have all chord possibilities. For the purposes of this paper, the notes Eb, E, F, F# and G are used, as suggested by Bollenback.
Ibid.

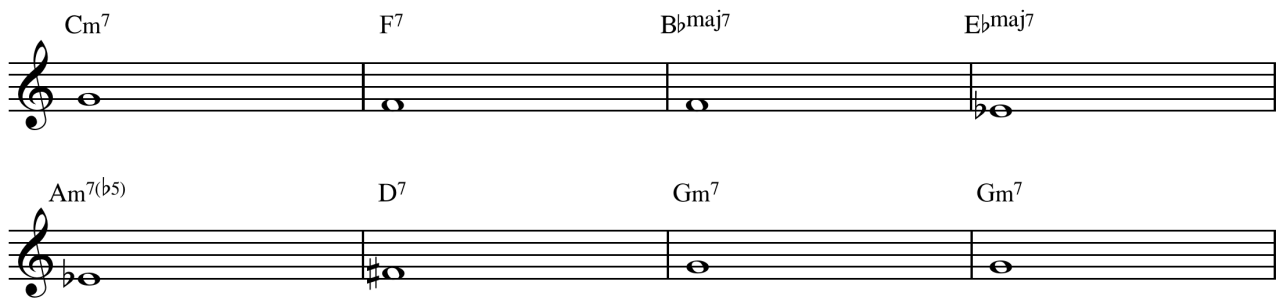


Figure 2.4a: The first eight bars of 'Autumn Leaves' with chosen pivot notes.

Taking these pivot notes as the starting point, the practitioner would then substitute the appropriate shapes in place.



Figure 2.4b: The first eight bars of 'Autumn Leaves' with the pivot system shapes substituted.

Some key points worth noting on this particular type of exercise are:

1. It would be advisable to sing through and internalise the pivot notes first, before attempting the second exercise.
2. It is recommended that rhythm and time be ignored initially¹⁰⁸, at least until the patterns have become solidified to some degree. If attempting in tempo, it may be advisable to double the length of every bar, or to perform at a very slow tempo (so the practitioner has time to sing the entire pattern). The rhythm in the above example is written as a guide only, and is able to be altered in any way the practitioner sees fit (e.g. they can be performed as triplets, semiquavers, etc).
3. Practice involving harmonic accompaniment to some degree (Chapter 2.3a) may be desirable.

¹⁰⁸ Gordon states that in learning tonal or rhythmic patterns, they should be independent from the other. That is tonal patterns should be learnt apart from rhythmic context, and rhythm patterns should be "learnt apart from a tonal context". Gordon, *Learning Sequence and Patterns in Music*, 112.

2.3c Other Concepts

The previously mentioned exercises (Chapter 2.2) remain just one possibility. Keeping the suggested techniques and process for developing audiation in mind, the idea could be applied to any possible exercise or concept that the practitioner wishes to internalise. The exercises were intended to develop the ability to “hear harmony more clearly”¹⁰⁹. The same process suggested in this paper for developing audiation for that concept could also be applied to internalising intervals, scales, tetra chords, upper structures of harmony, extensions of chords and so forth.

¹⁰⁹ Bollenback, via Email.

Conclusion

This paper has provided information pertaining to the skill of playing by ear, specifically the audiation process. Through audiation we hear and comprehend sound concurrently, by recalling information stored in our musical vocabulary. This information has been shown to be useful, as shown by the example of the pivots system.

In Chapter 1, information from the literature review was collated from two distinct sources: researchers and educators. These sources were shown to agree on certain key points: that developing aural skills is beneficial in a range of musical applications, that absorbing and internalising elements and concepts creates a musical vocabulary, and that it is this vocabulary on which we draw when performing spontaneous musical acts such as improvisation.

Techniques and strategies were established to allow for a clear understanding of how to develop the audiation process. These included learning patterns, verbally associating sound with a syllable, singing followed by playing, and repetition with some degree of improvement.

In Chapter 2, these techniques were then implemented in learning an example of an ear training concept, the pivots system. The research presented in Chapter 1 facilitated a clear understanding of how to develop the audiation process.

It is hoped that this knowledge can be further applied to other ear training exercises and concepts besides the pivots system. Knowledge of the audiation process can enhance pre-existing understanding of aural and harmonic knowledge, and the research here would best serve students of music with a foundational knowledge of theory and harmony.

The author has found this information on audiation and the pivots system concept to be beneficial to personal development, and hopes that others who also experience some problems with aural skills may find the research presented beneficial.

Appendix A

Questionnaire via Email with Paul Bollenback

Q: Can you offer a brief description of the Pivots System?

A: "Pivot System" was devised (as far as I know) by Dr. Asher Zlotnick, a talented cellist, flautist, composition and harmony teacher. Here is the way I use and teach the system both to hear harmony more clearly as it is played, and also to sing thru the harmony of a composition in a linear fashion, facilitating a clearer understanding of that harmony.

The system starts with one "Pivot" (in most cases, "F"-to facilitate ease of range for both men and women), and then adds a second pivot ("E"), third pivot ("G") and finally goes to 5 pivots (F-E-G-Gb-Eb). The single pivot is the starting place, and will explain the other ones easily. Start with triads:

F is the one-note pivot

The chords "pivot" around the F in this manner:

F is the root of F major

F is the 3rd of Db major

F is the 5th of Bb major

F is the root of F minor

F is the 3rd of D minor

F is the 5th of Bbminor

F is the root of F augmented

F is the 3rd of Db augmented

F is the 5th of A augmented

If we can determine the "position" of F in the chord (1, 3 or 5), and the chord quality, we can determine the chord name.

To facilitate this identification, use the following shapes to sing the outline of major, minor and augmented triads, from F, with F functioning as the root, 3rd or 5th of each (see attached-it has the shapes, by note, and the process).

For 7th chords, add the 7th to triad, a major or minor 3rd above the 5th:

1-3-5-7-5-3-1, 3-1-3-5-7-5-3, 5-3-1-3-5-7-5, 7-5-3-1-3-5-7.

When adding pivots to hear or sing other chords that do not contain F, use the same singing shapes from each pivot note.

Appendix B

Bollenback's PDF of Harmonic Hearing (Pivots System)

HARMONIC HEARING BASICS

LET'S SAY THAT OUR NOTE "F" CAN BE EITHER ROOT, 3 OR 5 OF A MAJOR, MINOR OR AUGMENTED TRIAD.

2 MAJOR F D^b B^b MINOR F^m D^m B^m

8 AUGMENTED F⁺ D⁺ A⁺

The image shows three staves of music in 4/4 time. The first staff shows the F major triad (F, D^b, B^b) and the F minor triad (F, D^m, B^m). The second staff shows the F augmented triad (F, D⁺, A⁺). The notes are written on a treble clef staff with a key signature of one flat (B^b).

WE CAN USE THESE SHAPES TO BOTH OUTLINE (SINGING) AND IDENTIFY (HEARING) THE 9 TRIADS MENTIONED ABOVE

11 F D^b B^b

14 F^m D^m B^m

17 F⁺ D⁺ A⁺

The image shows three staves of music in 4/4 time. The first staff shows the F major triad (F, D^b, B^b) and the F minor triad (F, D^m, B^m). The second staff shows the F augmented triad (F, D⁺, A⁺). The notes are written on a treble clef staff with a key signature of one flat (B^b). Fingerings are indicated below the notes: 1-3-5-3-1 for F major, 1-3-5-3 for F minor, 1-3-5-3-1 for F augmented, 3-1-3-5-3 for D major, 3-1-3-5 for D minor, 3-1-3-5-3 for D augmented, 5-3-1-3-5 for B major, 5-3-1-3 for B minor, and 5-3-1-3-5 for B augmented.

20 NOTICE ALL SHAPES START ON "F", AND USE THE APPROPRIATE NUMBER. WHEN SINGING OR TESTING A CHORD FOR HEARING, THE FOLLOWING GUIDELINES WILL MAKE IT MUCH EASIER TO COORDINATE:

- 1-ALWAYS START ON AND RETURN TO "F". FOR NOW, THIS IS OUR "PIVOT" NOTE.
- 2-ALWAYS SING NUMBERS
- 3-EACH SHAPE IS BUILT IN 3RDS. IF YOU SING A 4TH, CHANCES ARE YOU HAVE THE WRONG SHAPE.
- 4-TRY TO HEAR "F" AS 1, 3 OR 5 AND WORK FROM THERE. IF HEARING A NUMBER IS DIFFICULT, TRY A PROCESS OF ELIMINATION-- TRY 1. (33/66 CHANCE). IF 1 DOESN'T FIT, TRY 3 (50/50 CHANCE). IF 1 AND 3 DON'T WORK, MUST BE 5.

28 IN A 2 PIVOT SYSTEM, WE ADD THE NOTE "E", AND THE 9 TRIADS THAT GO WITH IT:

29 MAJOR E C A MINOR E^m C^m A^m AUGMENTED E⁺ C⁺

The image shows a single staff of music in 4/4 time. The notes are written on a treble clef staff with a key signature of one flat (B^b). The notes are E, C, A, E^m, C^m, A^m, E⁺, C⁺. Fingerings are indicated below the notes: 1-3-5-3-1 for E major, 1-3-5-3 for E minor, 1-3-5-3-1 for E augmented, 3-1-3-5-3 for C major, 3-1-3-5 for C minor, 3-1-3-5-3 for C augmented, 5-3-1-3-5 for A major, 5-3-1-3 for A minor, and 5-3-1-3-5 for A augmented.

2

ALL THE SAME SHAPES APPLY:



47 IN A 3 PIVOT SYSTEM, WE ADD THE NOTE "Q", AND THE 9 TRIADS THAT GO WITH IT:



ALL THE SAME SHAPES APPLY:



66 IN A 5 PIVOT SYSTEM, WE ADD THE NOTES "F#" AND "D#". WITH 5 PIVOTS YOU CAN HEAR AND SING ANY TRIAD.



Appendix C

Biographies

Dr. Asher G. Zlotnik¹¹⁰

Dr. Asher G. Zlotnik (1915-1997) was a music scholar and teacher who spent most of his career teaching music theory and sight-singing to practicing musicians. Born March 12, 1915, he received early training in music from Ralph L. Baldwin (1872-1943), contributor to many books on elementary music education. He attended the Eastman School of Music and studied privately with Jacques Gordon, then concertmaster of the Chicago Symphony Orchestra. When Gordon became conductor of the Hartford Symphony, Zlotnik joined the orchestra as principal flutist. For five years following World War II, Zlotnik traveled regularly to New York City to study the Schillinger Music Theory Technique with three of Joseph Schillinger's disciples. He began teaching music privately to musicians from the Glen Miller and Tommy Dorsey bands, and members of the radio network orchestras at ABS, CBS, NBC and the WOR radio orchestra. He earned two degrees in music from Yale University: B.A., 1955 and Master of Music, 1956. At Yale he developed a method for teaching sight singing that so impressed Benjamin DeLoach, a voice professor there, that he incorporated it into his own teaching. Zlotnik received his Ph.D. from Indiana University in 1972. His academic teaching positions included the Hartford School of Music (1947-1959), Manhattan School of Music (1957-1959), and Boston University (1963-1967). He engaged in research and private teaching in Baltimore until his retirement in 1995. He died on May 29, 1997, survived by his wife Roslyn.

¹¹⁰ ArchivesUM, "Asher G. Zlotnik Papers," University of Maryland, Accessed 10 October, 2013. <http://hdl.handle.net/1903.1/1210>.

Paul Bollenback¹¹¹

Guitar master **George Benson**, a long-time supporter, has described Bollenback's work as ". . . bona-fide playing, unambiguous, up-front and powerful," calling him "a versatile dynamo on guitar. His approach to jazz and blues has a uniqueness unto itself . . .". That comment has special resonance in that Bollenback counts Benson high among his wide range of influences; these also include Carlos Santana, Wes Montgomery, Kenny Burrell, John McLaughlin, Johnny Winter, and Jimi Hendrix (among guitarists), as well as such giants of improvisation and composition as pianists Herbie Hancock and Bill Evans, and saxists Wayne Shorter and John Coltrane.

Born just outside Chicago, Illinois in 1959, Paul Bollenback was raised in Hastings-on-Hudson, NY, just outside NYC. Bollenback got his earliest musical nudge from his father, a classically trained trumpeter who first provided the 7-year-old son with a nylon-string guitar – and then provided a new world of inspiration. The elder Bollenback, a scientist, relocated the family from New York to New Delhi, India when Paul was 11, and it was there that he cultivated a life-long interest in exotic musical sounds and timbres that remains evident in even his most jazz-based work. When the family returned to New York, Paul's father bought him an electric guitar and, like just about every other young guitarist in the 60s and 70s, Paul started gigging in local rock-and-roll bands – until he heard Miles Davis for the first time, which refocused his energies into jazz fusion.

Relocating again in 1975, from New York to Washington, DC, Bollenback began to study and perform both straight-ahead jazz and fusion. He majored in music at the University of Miami, then studied for eight years with Baltimore-based professor of Theory/Composition Asher Zlotnick. In 1987 he made his recording debut on saxophonist Gary Thomas's ***Seventh Quadrant*** (Enja), and in 1990 established a working relationship with the young organ legend Joey DeFrancesco, an association that lasted to this day, and produced 18 recordings.

In 1991 Bollenback's compositions "Wookies' Revenge" and "Romancin' the Moon" (featured on DeFrancesco's Columbia Records release ***Reboppin'***) were honored by SESAC with that organization's award for original composition. In 1993, a grant from

¹¹¹ Paul Bollenback, "Biography," paulbollenback.com, Accessed 30/10/2013. <http://www.paulbollenback.com/bio>.

the Virginia Commission on the Arts and the National Endowment for the Arts resulted in the composition "New Music for Three Jazz Guitars." In 1997, Bollenback was named Musician of the Year at the Washington Area Music Awards. That year he returned to New York City, where he now lives.

Bollenback debuted as a leader with ***Original Visions*** (Challenge), and his sophomore effort, ***Double Gemini***, was named "CD of The Month" by both *20th-Century Guitar Magazine* and WBGO Jazz Radio. His 3rd release on Challenge, ***Soul Grooves***, was named "Best Contemporary Jazz Album of 1999" by *Ndigo Magazine*. He has appeared on the *Tonight Show*, *Good Morning America*, the *Today Show*, and *Entertainment Tonight*, and has played with an impressive spectrum of musicians, including Joey DeFrancesco, Steve Gadd, Gary Bartz, Paul Bley, Charlie Byrd, Terri-Lyne Carrington, Herb Ellis, Geoffrey Keezer, Mike LeDonne, Joe Locke, Jack McDuff, James Moody, David "Fathead" Newman, Jim Snidero, Carol Sloane, Gary Thomas, Grady Tate, Stanley Turrentine, and Jeff "Tain" Watts, vocalist-composer, Chris McNulty and in the group East Meets Jazz with the renowned tabla virtuoso Sandip Burman, to name a few.

Bollenback's range and impressive discography as both sideman and leader speak for themselves. His last two releases "***Brightness of Being***" (ED4548) & "***Invocation***" (ED4550) remained on the USA Jazz Week charts for several months in 2007 and 2008 consecutively. "***Invocation***" was voted onto **Downbeat's Top 100 releases of 2008 and received wide critical acclaim in the international press garnering 4 and 5 star reviews in Jazz Times Magazine among others.**

In 2011 Bollenback garnered a Grammy nomination for co-production on Joey DeFrancesco's ***Never Can Say Goodbye (Hi Note)***, and also shares executive and co-producing credits with vocalist-composer Chris McNulty on her albums ***Dance Delicioso*** and her ***Whispers the Heart*** (Elefant Dreams). His international and national touring schedule currently include appearances with Joey DeFrancesco, Mike LeDonne, Jim Snidero, Gary Smullyan, Buster Williams, Chris McNulty's Magic Trio, as well as many appearances with his own trio.

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