

Mental Practice in Music Performance: A Literature-Based Glossary and Taxonomy

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A thesis submitted to the  
Faculty of Graduate and Postdoctoral Studies  
in partial fulfillment of the requirements for the  
Master's degree in Music

School of Music  
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## Abstract

Mental practice is a strategy that can be used to acquire the necessary skills for piano and other music performance. This type of practice strategy involves the use of imagery as opposed to the motor skills used in physical practice. In a preliminary review of piano pedagogy material and recent scientific literature, the benefits of mental practice were established. However, this review also revealed a lack of clarity in the use of terminology which sometimes interfered with readability. In order to better understand this problem of terminology, 33 current studies on mental practice in music performance were collected and examined for both the quantity and quality of term usage. Terms were identified and recorded using existing terminology and classification methods. Terminological records were created for each term appearing more than twice in the literature. In total, 83 records were created. Issues related to frequency of use (repetition), use of multiple terms (synonymy), lack of term definitions, and the need for clarity in term usage (semantic vagueness and ambiguity) were then analyzed using these records. This term analysis process resulted in the creation of a glossary and taxonomy. The glossary of 21 terms and corresponding hierarchical taxonomy (tree diagram) are proposed as an aid to help clarify the terminology of mental practice in music performance. Given the value of mental practice in learning to play music it is important to develop and maintain terminology that will facilitate both the understanding of existing literature and the design of future studies.

*Keywords:* auditory imagery, glossary, imagery, mental practice, model, music performance, taxonomy, terminology

## **Acknowledgements**

I would like to thank my thesis supervisor Dr. Gilles Comeau for his expertise, encouragement, dedication, and many kindnesses. I am also thankful for the thoughtful comments and insights from my examiners, Drs. Elaine Keillor and Donald Russell. I am grateful for the support of the staff and my colleagues at the Piano Pedagogy Research Laboratory and the School of Music. For financial assistance and the opportunity to pursue graduate studies, I thank the University of Ottawa. Finally, I would like to thank my family for the many boring monologues they cheerfully endured, and especially for their love and support.

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## Mental Practice in Music Performance: A Literature-Based Glossary and Taxonomy

### **Chapter 1: Mental Practice in Music Performance**

Music performance in general, and piano playing in particular, require an extended period of technical and artistic skill development. Both cognitive and motoric demands are involved in music performance and the role of practice is important in the acquisition of these skills. Practice involves both physical and mental aspects: practice with an instrument (physical) and practice away from the instrument (mental). While physical practice is the most well known method of improving music performance, mental practice is also becoming more accepted as a method of music performance improvement. Mental practice can be defined as:

A form of practice in which subjects produce a vivid mental image of actually performing a technique; that is, they do not imagine that they are watching themselves perform, but they actually carry out the activity in their imagination without overt physical movement. Some research evidence suggests that, for a skilled person, mental practice can be as effective as actual practice. (Kent, 2007, p. 430)

Mental practice is a useful strategy for injury prevention from repetitive physical practice; frequency and duration of physical practice is one factor associated with injury (Allsop & Ackland, 2010). Mental practice is also useful in situations where a musical instrument is not available for practice. The rationale for the use of mental practice may also include the following: to improve learning and memory, to make practice more efficient, to overcome technical difficulties and develop skills, to heighten sensory awareness, to gain more interest in the music, to refocus attention during performance, to enhance general confidence and resilience

on stage, to achieve greater control over negative emotions, to establish a greater connection and presence with an audience, and to achieve peak experience (Williamon, 2004). Mental practice can be introduced at any level of proficiency and even to young students and beginners (Freymuth, 1993).

The continuum between mental practice and motor performance is described by Jeannerod (2006) as the overt execution preceded by a covert representation. Both mental practice and observational learning can be explained by this covert practice of the motor system. Observational learning is a technique that uses imagery to incorporate mental practice into learning; for example a student observing a teacher. Through observing the teacher, the student is able to form a representation of the action; for example a two-note slur gesture. This representation subsequently facilitates the performance of the action by the student. It is important to note that imagery developed through action observation should include enough information for reproducing the observed action. In summary, the observed action activates the motor system creating a simulation of the action, the only way to "access the intricacies of motor execution" (p. 127). The imagery techniques used most often in mental practice for music performance are visual, motor, and auditory.

## **1.1 Imagery in Mental Practice**

### **1.1.1 Visual imagery**

Visual imagery is the ability to "*see* an object or scene in your mind" (Frenkel, Herzig, Gebhard, Mayer, Becker, & Einsiedel, 2014, p. 225); for example visualizing the position of the hand on the piano keys. It is "a mental picture or conception of something that is not physically present. That is, visual images occur exclusively within the brain" (Ely & Rashkin, 2004, p. 479). Visual imagery, in the context of mental practice, is not simply the vague visualization of a

successful performance or of imagery such as associated artwork, but rather something more specific. It requires "self-visualization of a movement from a first-...or third-person... perspective" (Guillot, Collet, Nguyen, Malouin, Richards, & Doyon, 2009, p. 2158). The first-person perspective corresponds to the representation of a movement as if the individual is making the movement themselves, like wearing a camera on their head. In contrast, the third-person perspective corresponds to the representation of the movement as if the individual is a spectator observing either themselves or another individual perform the action. Bernardi and colleagues (2013) found various performance improvements when they asked students to use visual imagery, as part of mental practice, to "see" objects such as the keys on the keyboard, the position of the hand, and the width of the arm movement (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013, p. 3).

### **1.1.2 Motor imagery**

Motor imagery is associated with the representation of tasks or body movement involved in music performance without actual movement execution. A specific type of motor imagery, kinesthetic imagery, is used to "*feel*, and thus to experience the somato-sensory feelings related to the movement, i.e. to perceive muscles contractions mentally" (Frenkel et al., 2014, p. 225-226). It is the internal representation of muscle contractions and stretches; it requires one to "feel the movement" (Guillot, et al., 2009, p. 2158). The motor system regards this action representation as the simulation of real action; motor imagery and motor execution are functionally equivalent. In *Motor Cognition: What actions tell the self*, Jeannerod (2006) explains that "many aspects of overt actions are centrally represented and motor images appear to encode rules and constraints inherent to executed actions" (p. 41). Motor imagery abilities have been found to help with both learning and recall of music; for example improved pitch

accuracy (Brown & Palmer, 2013). Motor imagery was also associated with greater changes in movement speed in a study where participants were asked to "feel inside your body how the fingers should press the keys, initially using a legato touch" (Bernardi, De Buglio, et al., 2013, p. 3). While motor imagery has been studied widely, especially in sports psychology, auditory imagery is less well known. Given that playing a musical instrument is largely an auditory art, one of the most important imagery skills in music performance is auditory imagery.

### **1.1.3 Auditory imagery**

Auditory imagery has been defined by Godøy and Jørgensen (2001) as "our mental capacity for imagining musical sound in the absence of a directly audible sound source" (p. ix). In her book *Movement and Mental Imagery: Outlines of a Motor Theory of the Complexer Mental Processes*, Washburn (1916) describes auditory imagery:

For we can get, as conscious experiences, sensations not only from outside stimuli, but by the processes which are commonly known as 'memory' and 'imagination.'... I can not only hear the tones of a violin playing the 'Prize Song' from the *Meistersinger* when the violinist is actually before me (or the phonograph is actually running), but I can sit here in my study, with no actual sound stimuli acting on my ears save the voices of the children across the street, and hear the tones of the violin through the entire air. (p. 27)

Haddon (2007) describes the use of auditory imagery as an experience that "may be manifest in multiple ways including deliberate use (to rehearse musical ideas, to experience a musical work in one's mind, to analyze and imagine a new score, or to compose), and non-deliberate use, such as hearing music in the mind as an involuntary experience" (p. 301). Auditory imagery is central

to Kochevitsky's (1967) system for the development of motor skill in playing the piano.

Kochevitsky stressed the importance of an auditory rather than a visual starting point for playing piano. His scheme is as follows: "auditory stimulus (the inwardly heard tone) →anticipation of motor act →motor act resulting in actual sound →auditory perception and evaluation of the actual sound" (p. 30). Auditory imagery helps the musician to understand how music works (Strobbe & Regenmortel, 2012).

While there is as yet no general theory of auditory imagery, a possible explanation involves the phonological or articulatory loop (Hubbard, 2010). The phonological loop is the part of working memory that deals with spoken and written material. The loop is assumed to have two components: a short-term store that holds acoustic or speech based material, and subvocalization, an articulatory control process similar to inner speech (Baddeley, 1992, p. 558). This loop can maintain phonological material within the store through subvocal repetition. The phonological loop is dependent on the cooperation between the short-term store or "inner ear" and the subvocalization or "inner voice" (Smith, Wilson, & Reisberg, 1995, p. 1434). While auditory material can be stored without the use of subvocalization this is not the case for visually presented phonological material which requires the use of subvocalization for recall (Alan Baddeley: Introduction of the Phonological Loop, 2010). It is yet unclear whether this theory is specific to language or can be applied equally to music. In addition, although there is relatively good understanding of the neural programming and perception of simple, isolated sounds, there are few coherent models of how complex sounds are perceived (Lotto & Holt, 2010).

### ***1.1.3.1 Auditory model***

An auditory model is a live or recorded performance used as an example to form auditory images; for example to form an auditory image of a new piece of music to be learned. Auditory

models are necessary tools for the development of auditory images which in turn can positively influence movement learning through entrainment or synchronization: "When we are entrained, our attention literally 'moves with the music,' and this engenders and encourages our bodily movements as well" (London, 2012, p. 5). Through their role in the formation of auditory images, auditory models can be used in the process of synchronizing movements such as those used in pressing the piano keys for example. This idea is seen in the work of piano pedagogue Abby Whiteside (1955/1997) and the foundation of her approach; that is, the concept of a basic body rhythm. Whiteside felt that the transfer of the idea of music to the actual production of music involved the whole body as centrally controlled by the auditory image. Auditory models, in providing auditory images of the "big picture" (p. 5), can help to balance what Whiteside saw as the harmful effect of training fingers for tone production which results in the conditioning of listening habits to a note-wise procedure of unconnected notes rather than to the whole phrase for example.

Auditory models may be especially useful to help create auditory images in the early stages of learning a new piece of music, giving the student a clear sense of the whole. When a melody is heard slower and slower, at some point it loses its sense of coherence and motion, and becomes a series of isolated tones (London, 2007). This can be the case when a student listens to themselves as they read unfamiliar music. If the student can hear the piece of music as a whole before beginning to read the notes and pitches, they may have a better musical sense of the piece. Auditory models are also helpful for the development of auditory images; especially for learning new or difficult rhythms. The reason may be that rhythmic movement has been found to be more strongly attracted to auditory than to visual rhythms so that people often move in synchrony with auditory rhythms but rarely with purely visual rhythms (Repp & Penel, 2004). This rhythmic



movement is important as this sense guides the motor behaviors used in the production of musical sounds (London, 2012).

Piano pedagogues Bigler and Lloyd-Watts (2011) who specialize in the Suzuki method of music learning, list several benefits of frequent listening to auditory models:

1. Familiarity with the melody and harmonies
2. A feeling for the rhythmic patterns
3. Exposure to a model of appropriate performance
4. Exposure to a beautiful piano sound
5. Sensitivity to nuance such as dynamic contrast and rubato (p. 19)

The authors suggest that parents begin early to play recordings of the music that children will eventually learn. Bigler and Lloyd-Watts recommend that recordings be played as often as possible, at least a year ahead of learning the material on the piano (Bigler & Lloyd-Watts, 2011). The use of auditory models can thus assist in creating an auditory image that will in turn help with mental practice.

## **1.2 Mental Practice Literature**

The study of mental practice began in the field of psychology and continued in sports psychology long before studies were done relating to music performance. In North America, research on the effects of mental practice can be traced back to the early twentieth century and the writings of Washburn (1916). In the abstract to her work *Movement and Mental Imagery: Outlines of a Motor Theory of the Complexer Mental Processes*, Washburn writes:

Since psychology undertook to call itself a science, there has existed a strong desire to connect the facts of the mind with the facts of bodily movement. The excuse which the present essay would offer for its own existence is that while the facts of attention, perception, and emotion have had their relation to bodily

movement fully discussed, there still remain many phenomena connected with the complexer life of the mind, the revival of past experiences and the construction of new thoughts and ideas whose connection with motor processes has not been satisfactorily traced. This book seeks to connect movement, the ultimate facts of physical sciences, with the domain of mental imagery, the world of imaginary objects. (Washburn, 1916, abstract)

The connection between movement and imagery put forth by Washburn was validated by Jacobson (1932) in the summary of his studies showing that muscular activity occurs when one imagines performing a physical skill. Using electromyography Jacobson showed that the action potentials produced in participants were quite specific to the body part which was moved in the imagination. The study of mental practice related to music performance, specifically piano, began around the middle of the last century. In her study on piano music memorization, Rubin-Rabson (1941), found that the use of mental practice, or what she called mental rehearsal or imaginary practice, before completing memorization at the keyboard was better than physical practice alone. The author also found that the mid-way learning period of mental practice was preferable to other time distributions, and suggested that students pause mid-way through learning for mental practice until the mental performance can be accomplished smoothly (Rubin-Rabson, 1941). For the remainder of the twentieth century studies on mental practice continued to demonstrate its positive effects in the development of motor skill (Clark, 1960; Shepard, 1978; Ross, 1985; Rosenthal, Wilson, Evans, & Greenwalt, 1988; Driskell, Copper, & Moran, 1994; Theiler & Lippman, 1995) and study in this specific area of music performance has continued, if on a relatively small scale. In addition to the scientific literature on mental practice in music performance, there is evidence of interest in mental practice in piano pedagogy textbooks.

Because of the popularity of piano learning and instruction in conservatories and post secondary institutions, there is a variety of piano pedagogy literature available; some of which demonstrates an interest in mental practice. This material will be presented in the next section.

### **1.2.1 Mental practice in piano pedagogy literature**

The benefits of mental practice are addressed in some piano pedagogy resources such as textbooks, professional journals, and blogs. An early example of mental practice discussion without naming it as such is found in *The Piano Teacher's Companion* where the author (Maier, 1963) writes: "start all over again with the 'silent' process. Always remember that one of the best ways to learn to play the piano is to get away from it!" (p. 24). *The Art of Teaching Piano* (Agay, 2004) includes an essay by Robert with a section titled "demonstration" where the author discusses the importance of modeling the music for the student either live or with the use of recordings. In her piano pedagogy books, Jacobson (2006; 2015), discusses the benefits of various topics related to mental practice, especially those concerning auditory imagery; for example audiation, auditory development, and teacher performance modeling. In a section about the importance of listening to the sound, Jacobson (2006) writes: "Over time, the brain will begin to develop an auditory image of the sound and a visual image of the physical motions required to make the sound on the piano" (p. 228). In a more recent volume, Jacobson (2015) dedicates a short section to mental practice specifically, including various practice procedures; for example "study the piece away from the piano", "listen to recordings of the piece", and "complete basic harmonic, melodic, and rhythmic analysis" (p. 391). As mentioned in detail in the introduction, piano pedagogues Bigler and Lloyd-Watts (2011) write about the value of auditory imagery in their teaching manual *Mastering the Piano*. The authors list benefits of frequent listening to auditory models and suggest ways that models can be used in practice. Coats (2006) also

recommends the use of recordings as "a strategy to help students evaluate and find solutions to musical problems" (p. 14). The reference text *Dictionary of Music Education: A Handbook of Terminology* by Ely and Rashkin (2004), includes entries for several terms related to mental practice, specifically, *aural models/modeling*, *imagery*, *mental practice*, *model*, and *modeling*. Professional journals also reflect an interest in the benefits of mental practice. *Canadian Music Teacher Magazine* published an article, in the January 2015 edition, about the value of using recordings as auditory models to assist with learning repertoire (Lau, 2015). The same journal published a literature review investigating the use and benefits of mental practice in music performance (Mielke & Comeau, 2015). *Clavier Companion* has also published on the teaching aspect of mental practice: *What "away-from-the-piano" practice techniques do you use for young students?* (Rutman, Schorr, & Talley, 2003).

Two popular piano teaching blogs have recently featured articles on mental practice. The first is *The Curious Piano Teacher* from Cathcart, pianist, teacher and researcher. In an article from 2014, Cathcart cites music researchers Parncutt and McPherson in her discussion of the benefits of mental practice such as repeated listening and establishing a mental model through singing (Cathcart, 2014). The second is *The Bulletproof Musician* from Kageyama, a performance psychologist, and Juilliard faculty member. His article *Does Mental Practice Work?* examines growing evidence for the benefits of mental practice, Kageyama's personal experience using the technique, and guidelines for its use such as: "Concentrate on the motions that produce the sounds and effects you want as you go through the music, note by note, phrase by phrase in your head" (Kageyama, 2015). Kageyama has also published several other articles on mental practice including *To Listen or Not to Listen: Does Listening to a Recording help Us Learn Faster and Play More Accurately?*, *Dynamic Imagery: A More Effective Way to do Mental*

*Rehearsal?*, and *Kinesthetic Imagery: A Way to Minimize Backsliding When Dealing with Injuries?*. The benefits of mental practice are often discussed in social media; for example a search for "mental practice" in the Facebook group The Art of Piano Pedagogy shows several posts in the past year. Members of the group have discussed various aspects of mental practice such as its use for travelling students with no access to a piano or for those recovering from an injury, assisting in the memorization of music, and general performance improvement (Facebook, 2015).

In summary, interest in the effects of mental practice in music performance is reflected in the literature used in piano pedagogy such as textbooks on teaching piano (Agay, 2004; Bigler & Lloyd-Watts, 2011; Coats, 2006; Jacobson J. M., 2006; Jacobson J. M., 2015; Maier, 1963) and professional journals (Lau, 2015; Mielke & Comeau, 2015; Rutman, Schorr, & Talley, 2003). There is also an interest shown online in blogs (Cathcart, 2014; Kageyama, 2015) and in social media such as Facebook. Discussion about the use of auditory models appears to be particularly prevalent (Agay, 2004; Bigler & Lloyd-Watts, 2011; Cathcart, 2014; Coats, 2006; Ely & Rashkin, 2004; Jacobson J. M., 2006; and Lau, 2015). The various benefits of mental practice are investigated in a more formal way in the empirical literature which will be discussed in the next section. The empirical literature includes other areas of music performance in addition to piano.

### **1.2.2 Mental practice in empirical literature**

The main focus of the literature on mental practice concerns the effects on music performance. However, two studies examined the understanding of, use of, and value attributed to mental practice (Fine & Bravo, 2011; Haddon, 2007). In the most recent of these studies, Fine and Bravo (2011) explored the perceived meaning and usefulness of the terms "mental practice" and "score analysis". Experienced musicians (89) completed an online questionnaire consisting

of 18 questions, both open and closed, providing quantitative and qualitative data. The participants were asked how they understood the terms "mental practice" and "score analysis", how useful they found these strategies, in what circumstances they used them, and what information they obtained from "score analysis". Interpretative phenomenological analysis was used to investigate open-ended responses to the two terms. While it was generally agreed that mental practice referred to practice in the "head" or "mind", participants disagreed as to whether mental practice took place with or without the score, the instrument, or a recording. The majority of participants (70 %) found "mental practice" very useful or vital, while only 48% considered "score analysis" to be very useful. The authors found that mental practice increased familiarity and aided performance preparation. Over 90% stated that they always or frequently reheard the music in their head. Score analysis was found to be useful in highlighting specific musical and structural aspects of music, and for an awareness of the composer's intentions. Limitations were not discussed by the authors although they did suggest further study into specific aspects of mental practice such as listening, as well as study into specific groups of musicians; for example pianists.

A study with a similar purpose was a survey conducted by Haddon (2007) where the author explored the way that musicians and music teachers understand and use mental practice. The survey focused on a university population of 11 third-year music students, 10 of their professors, and four instrumental and vocal teachers. Participants completed a short questionnaire where they described their understanding of the term "mental musical imagery". They were also asked to rate their awareness of musical elements, such as melody, timbre, and rhythm when imagining music as well as how often they used mental practice. Data was analyzed using predictive analytic software and thematic analysis. Results showed that almost all

participants agreed with the definition of musical mental imagery as "rehearsing music in your head" (p. 303). Many also agreed with the definitions "rehearsing physical movements in your mind", "visualizing a successful performance", and "realizing your mind is playing its own soundtrack and you are not consciously controlling it".

Participants also rated highly their awareness of elements such as melody and rhythm in their mental practice. Many participants reported using mental practice for specific musical activities such as practice, composition, and performance, although it was not necessarily a developed skill. Participants found imagery to be especially helpful with memorization and interpretation. Interestingly, the study respondents reported that while mental practice was the least popular aspect of music learning, they found it to be a useful part of practice.

Most of the literature looked at the effects of mental practice on music performance in experienced youth and adults. The effect of mental practice on two aspects of movement timing, anticipation and coordination, was investigated by Bernardi, De Buglio, and colleagues (2013). The authors studied 16 experienced adult pianists who were divided into two groups of eight. All study participants were first trained in mental practice techniques such as an exercise focusing on the participant's internal sense of touch and of the position and movement of their body parts. A digital piano was used to record MIDI data, and motion-capture equipment used to record the hand and wrist movements of the participants. Baseline performances were collected from all participants who were subsequently assigned to one of two groups: mental practice or physical practice. A control group, whose participants were not allowed to practice, was also used to confirm that the changes observed were not due to repetition during testing. The piece of music chosen for the study was a short technical exercise unfamiliar to the participants. Using their choice of mental practice techniques, while avoiding movement of the fingers/hands, the

participants in the mental practice group completed two short mental practice sessions (7 minutes), each followed by a performance. Members of the physical practice group followed the same procedure, of two practice sessions (7 minutes) followed by performance but used physical practice in their preparation. Interestingly, the physical practice group was not asked to exclude mental aspects of practice, but only to include physical practice in their preferred practice method. After each practice session, all participants also completed a questionnaire about the mental strategies used in practice. Using performance and motion-capture data as well as responses to mental practice questionnaires the authors found that both mental and physical practice could improve performance, specifically with movement speed, timing, and coordination. Mental practice affected performance improvements to a lesser degree than did physical practice. This study represents the first evidence that mental practice results in movement anticipation, reported in this study as an earlier rate of top movement speed and as a change in the coordination of the wrist and fingers; i.e. the wrist movement speed leads that of the fingers. The authors identified the main limitations of the study as the small sample size (16) and variability in music experience and motor performance of the participants.

In a similar study, Cahn (2008) compared the effects of two combinations of mental and physical practice with physical practice and mental practice alone. The 60 participants in the study were all undergraduate students who were experienced instrumentalists and were screened for their ability to fulfill the task. The study involved four practice condition groups: 3 minutes of physical practice; 1/2 minute of mental practice and 1 minute of physical practice; 3 minutes of mental practice; and 1/2 minute of physical practice and 1 minute of mental practice. The mental practice component consisted of looking at the score, facing away from the instrument and mentally hearing the notes and playing the prescribed pattern while imagining hand



movements, without actual movements. Before and after practicing, participants performed two harmonic song excerpts consisting of a tonal pattern (3-1-7-5) over a 16 bar chord progression: one easy and one difficult. The easy excerpt contained progressions in three key areas (D, B, E<sub>b</sub>) with chord changes once per bar. The difficult excerpt also contained progressions in three key areas (F<sup>#</sup> minor, E minor, D), but with chord changes mainly twice per bar. Both progressions were excerpted from classic songs found in a fake book and were transcribed to limit learning effects from one progression to the other and to obscure the origin of the music. The task involved the performance of the easy and difficult excerpts with a metronome set to 70 beats per minute. As a pre-test, each participant's performance of the excerpt was recorded prior to practice. Participants were then monitored by the researcher as they practiced according to practice conditions and without the use of a metronome. After practice, a post-test performance was recorded. Note errors in recorded performances were then judged by two professional musicians who were blind to whether the performance was pre- or post-test. Despite the result that the dominant physical practice group performed better on the difficult task than did the dominant mental practice group, overall the author did not find significant differences between the mental practice and physical practice groups. Regardless of the type and combination of practice, for the more difficult task, the greater the number of years of formal performance study the fewer the note errors. The reason for a lack of significant differences found between the practice groups was thought to be due to: the number of participants, difficulty of task, and type of task; for example the task may have been better suited to physical practice. Notwithstanding the lack of significant differences between the practice groups, the author recommended that mental practice be a compulsory part of music learning.

The following two studies by Brown and Palmer (2013) and Highben and Palmer (2004), highlighted the effects of two specific areas of mental practice or imagery abilities: auditory and motor mental practice. In the most recent of these studies, Brown and Palmer (2013) examined the effects of auditory and motor imagery abilities on musicians' learning and recall of musical sequences, and whether these imagery abilities compensate for missing information or affect sensitivity to interference. Each of the 24 participants, who were experienced adult pianists, completed a musical background questionnaire and tests of their auditory and motor imagery ability. The adapted imagery tests required participants to detect differences between notated and sounded melodies, and to detect differences between imagined and performed sequences of finger movements. For the study, the participants learned short unfamiliar melodies and subsequently performed them from memory. Performance data were recorded using a MIDI keyboard, and headphones were used by participants for auditory input. In total, twenty-four melodies (four melodies each for six learning-interference conditions) were learned by two practice conditions: 1) by listening alone (auditory learning) or 2) by playing, with the right hand, on a silent keyboard (motor learning) and subsequently were performed in the recall phase with auditory feedback. There were three interference conditions: 1) auditory interference where participants simultaneously heard a different melody from the one being learned, 2) motor interference where participants performed, with the left hand, an additional motor sequence, or 3) no interference. These conditions, in turn, created the six learning-interference conditions: 1) auditory learning with no interference—participants heard a recording of the melody six times while viewing the notation and holding their hands in fists to prevent movement, 2) auditory learning with auditory interference, 3) auditory learning with motor interference, 4) motor learning with no interference—participants performed the melody six times from notation

hearing only the first pitch of each melody, 5) motor learning with auditory interference, and 6) motor learning with motor interference. Two experiments were conducted, one with the interference conditions presented during learning, and the other with the interference conditions presented during recall. Using the MIDI data, the authors compared pitch accuracy and temporal regularity during recall performance with independent measures of the participants' auditory and motor imagery abilities. Because pitch errors commonly increase temporal variability, only pitch-perfect recall trials were included thus allowing timing to be examined separately from the influence of pitch errors. The authors found that both auditory and motor imagery abilities assisted with learning and recall; for example both abilities improved pitch accuracy. In particular, auditory imagery assisted learning of pitch order in music sequences and recall of temporal features suggesting that auditory imagery skills decrease vulnerability to interference and compensate for lack of auditory feedback in learning. The authors also found that performance was most susceptible to motor interference. The study findings were the first to demonstrate that performance from memory is more accurate following auditory learning than following motor learning. The authors noted possible limitations. Because of the use of notation, visual imagery abilities could have been involved and this influence is unknown. In addition, the motor interference task required participants to synchronize their movements which may have made this task more disruptive than the auditory interference task.

A similar study was conducted a few years earlier by Highben and Palmer (2004) to examine the effects of auditory and motor imagery abilities in learning to perform an unfamiliar piece of music. In this study, 16 experienced adult pianists learned four short (two bars) unfamiliar melodies that were composed for the study. Participants also completed two post-tests (similar to the adapted imagery tests described in the previous study by Brown and Palmer

(2013)) which measured their auditory and motor imagery abilities. The equipment, design and procedure were also very similar to the previously described study except that two extra practice conditions were added and there were no interference conditions. The four practice conditions were: 1) auditory practice - where participants heard the piece without moving while imagining the required finger movements, 2) motor practice - where participants moved their fingers on the keys while imagining auditory feedback, 3) normal practice, and 4) covert practice where participants neither moved nor heard the music but were instructed to depress the foot pedal each time they imagined sound and movements for the piece of music. For each of the four practice conditions of the study, the participants received practice instructions and practiced each piece of music 10 times with the notation. After each practice stage ended, the participants were recorded playing each piece four times from memory. In analyzing errors during performance, the authors found that both auditory and motor forms of practice were beneficial. The removal of auditory or motor feedback in learning caused significant memory deficits in performance. They also found that participants with strong auditory imagery abilities were least affected by the lack of auditory feedback in learning. This was also true for participants with a high self-rating of playing by ear. These findings suggest that an accurate auditory image is important for performance from memory. The authors outlined possible limitations which may have made the practice effects less visible; practice conditions such as practicing ten times without stopping or correcting mistakes may have been artificial. They also suggested that the material may have been too easy for the caliber of participants.

Three studies examined the effect of auditory modeling on music performance (Frewen, 2010; Henley, 2001; and Morrison, Montemayor, & Wiltshire, 2004). The effects of auditory modeling and tempo patterns were examined by Henley (2001). Only the discussion about

modeling is relevant here. Sixty adolescent wind and brass instrumentalists practiced an étude which was sight-read once as a pre-test, practiced six times for 20 minutes with or without the presentation of a recorded auditory model before each practice, and played once as a post-test. The model for the study was a musical excerpt recorded by a graduate-level violinist with spoken instructions for use. The model was presented at each of the six treatment trials. All of the recorded performances were evaluated by the author, and 20% of them by an objective observer, for pitch, rhythm, and articulation. The author found that the use of an auditory model assisted rhythm and tempo mastery but may or may not have affected pitch discrimination. He recommended replication of the study using a larger group of participants and a longer practice period for further insight into differences between the model conditions.

A study examining the effects of recorded ensemble models on band students' performance self-evaluations, achievements, and attitude was conducted by Morrison and colleagues (2004). Five bands from middle schools and high schools participated in the five week study. The five band directors each identified two single-movement concert works to prepare for a performance. A pre-test recording of both works was made within a week of the bands' first rehearsals, and post-test recordings were made within a week after the 5-week study period. Recorded auditory models were provided for one of the band's two music selections, and were used systematically. The music directors were requested 1) to play the entire piece once a week while band members listened and silently followed their individual parts, and 2) to play a particular section, on another day once a week, to correspond with the rehearsal goals for that day. Each week students also completed a self-evaluation "progress report" for each piece (model and no model) rating their performance with and without the use of a model. Pre- and post-test recordings were independently evaluated by five experienced instrumental music

teachers. Analysis of the results from the evaluations found no differences in performance achievement between model and no-model conditions. Possible reasons for this finding, as suggested by the authors, were insufficient assessment, or the transference of modeling effects to pieces where no model was used. Analysis of the student self-evaluations showed that lower achievement gains were reported in the model condition which may have been influenced by factors such as the need to generate their own personal standard of performance quality in the absence of a model. Despite the reported lower achievement gains the students did not have a negative attitude toward the model use, and some younger students were more enthusiastic toward the model pieces particularly with regard to expression and phrasing.

Of particular interest to those who teach beginner piano to children, is the study on the use of auditory modeling in keyboard performance by Frewen (2010) because it is the only study that looks at children and the only one to look at novices. As participants for her study, Frewen (2010) used 97 children in kindergarten through grade four (ages 5 to 10) with no formal instrumental instruction. Her study examined auditory modeling in keyboard performance of an unfamiliar melody. The participants were divided into two groups: familiar and unfamiliar. For 2 weeks the unfamiliar group were instructed and tested. Next, to become familiar with the music, all children in both groups listened repeatedly (128 times) to a model of the melody in four classes over a 2 week period. Then the familiar group were instructed and tested over a 2 week period. All children were then assessed, both before and after instruction, using a melodic error recognition test to test familiarity with the melody. The expectation was that children in the familiar group would be able to identify melodic errors before instruction and that all children would be able to do so after instruction. The author taught each participant individually (approximately 25 minutes per child) to play the melody by rote on a MIDI keyboard. Using the

MIDI data, Frewen found that the group that became familiar with the melody through the use of auditory modeling played significantly more correct notes than did the children not familiar with the melody. The author also found that older children performed the last two measures of the melody better than younger children did. The first two measures of the melody were easier to play, and were not much affected by familiarity or age. As was expected, with regard to melodic error identification, the author found that the familiar group identified more errors than the unfamiliar group and all children performed better on post-instruction than on pre-instruction. Frewen suggested that this finding shows that auditory modeling may be particularly advantageous when learning to perform more difficult or longer melodies.

Of the nine studies examined for this review, only one looked at mental practice using children as the subject (Frewen, 2010). The others studied older participants, from adolescents to adults: middle school to secondary school students (Morrison et al., 2004), secondary school students (Henley, 2001), adults (Bernardi, De Buglio, et al, 2013; Brown & Palmer, 2013; Cahn, 2008; Fine & Bravo, 2011; Haddon, 2007; Highben & Palmer, 2004). Four studies focused on mental practice and keyboard playing (Bernardi, De Buglio, et al, 2013; Brown & Palmer, 2013; Frewen, 2010; Highben & Palmer, 2004), while the other five included other musical instrumentalists. Of the instrumentalists studied, almost all were experienced musicians; only one study looked at novices (Frewen, 2010). Although most studies were focused on the effects of mental practice on performance, two examined how participants understood mental practice, how they used it, and how useful they found mental practice to be (Fine & Bravo, 2011; Haddon, 2007). Almost all study results demonstrated some benefits of mental practice in music performance. Although two studies found no significant difference in performance after using mental practice techniques, the authors and some participants still found mental practice to be

valuable (Cahn, 2008; Morrison et al., 2004). The other studies examining mental practice in music performance all found strong evidence of benefits (Bernardi, De Buglio, et al, 2013; Brown & Palmer, 2013; Fine & Bravo, 2011; Frewen, 2010; Haddon, 2007; Henley, 2001; Highben & Palmer, 2004). Specifically, performance improvements were found in the following areas: movement velocity, timing, and coordination (Bernardi, De Buglio, et al, 2013); pitch accuracy and vulnerability to interference (Brown & Palmer, 2013); rhythm and tempo mastery (Henley, 2001). Four of the studies focused specifically on auditory imagery and modeling rather than on the other aspects of mental practice (Brown & Palmer, 2013; Frewen, 2010; Henley, 2001; Morrison et al., 2004). In addition to the benefits listed earlier, Henley (2001) found that the auditory model provided a rhythmic example that appeared to act as a teaching tool. Except for Morrison and colleagues (2004), the others found strong evidence of the benefits of auditory modeling. Three other studies looked at mental practice in keyboard performance (Bernardi, De Buglio, et al, 2013; Brown & Palmer, 2013; Highben & Palmer, 2004). As with the Frewen (2010) study, all three found benefits in mental practice; specifically for performance (Bernardi, De Buglio, et al, 2013), learning and recall of melodies (Brown & Palmer, 2013), and learning and performance from memory (Highben & Palmer, 2004).

Of the nine studies reviewed, the two papers examining the understanding and use of mental practice found that mental practice was considered to be very useful by participants (Fine & Bravo, 2011; Haddon, 2007). Participants in these two studies found mental practice to be especially useful for increasing familiarity with the music (Fine & Bravo, 2011), performance preparation (Fine & Bravo, 2011; Haddon, 2007), as well as for aiding in memorization (Haddon, 2007). Some very specific benefits were found; for example, motor imagery was associated with greater changes in movement speed, while auditory imagery was associated with



greater movement anticipation (Bernardi, De Buglio, et al, 2013). In addition, Bernardi, De Buglio, and colleagues stated that their study was the first to show evidence of an anticipatory influence following mental practice. Auditory imagery was found to aid in pitch accuracy, performance from memory, and to protect from interference (Brown & Palmer, 2013). Mental practice was found to be especially effective when combined with physical practice (Cahn, 2008). Auditory models were found to be beneficial (Brown & Palmer, 2013; Frewen, 2010; Henley, 2001), but not unreservedly (Morrison et al., 2004).

The literature indicates that mental practice strategies are beneficial in music performance and can enhance music learning. Given the importance of mental practice, for advanced musicians as well as for beginners learning to play piano and other musical instruments, it is likely that mental practice will continue to occupy a growing space in the practice of piano and music teaching as well as in the pedagogical and scientific literature. For this reason, it is important to know how mental practice is understood and defined by pedagogues and by those who study mental practice in music performance. The issue of clarity requires a closer examination of the language found in the literature about mental practice, and this will be explored in the review of literature that follows.

Because the topic of this paper is terminology<sup>1</sup>, which is outside the usual parameters of music study, the following glossary of key terms used in conducting this work is provided as an aid for the reader.

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<sup>1</sup> During the research process I have discovered that the relationship between the two terms lexicography and terminology, and additionally terminography, is not clear - which explains my difficulty in deciding on the most correct word for use in my thesis. Humbley (1997) outlines this issue naming it as a type of take-over by terminologists of lexicography using the following example "*terminography* replaced the older (and thus obsolete?)

## GLOSSARY

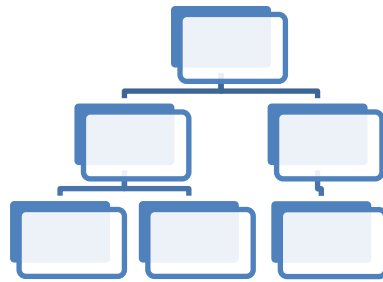
- Concept: "A unit of knowledge abstracted from a set of characteristics attributed to a class of objects, relations, or entities" (Pavel & Nolet, 2001, p. 105).
- Corpus: collection of selected texts assembled for the purpose of performing terminological analysis (The Pavel, Terminology Tutorial, 2011)
- Definition: "A dictionary-style statement that describes the concept designated by a term" (Pavel & Nolet, 2001, p. 107).
  - Defining context: Material from the corpus that provides essential information about fundamental characteristics of the concept (The Pavel, Terminology Tutorial, 2011).
  - Explanatory context: Material from the corpus that provides information about some of the characteristics of the concept (The Pavel, Terminology Tutorial, 2011).
  - Associative context: Material from the corpus that provides demonstration of the use of the concept (The Pavel, Terminology Tutorial, 2011).
- General language: "The set of rules, units and restrictions that form part of the knowledge of most speakers of a language" (Cabr , 1999, p. 59).

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forms of *terminological lexicography* and *special lexicography*", in the International Organization for Standardization publication- a construct that has since been abandoned (Humbley, 1997, p. 14). Humbley continues detailing the controversy ending with the question: "Is there indeed a difference between terminology and specialized lexicography?" (Humbley, 1997, p. 15). Cabr  (1999), Alberts (2006), and (Pavel & Nolet, 2001) also address this confusion between the terms. Obviously all this is beyond the scope of this paper but is being shared to show some of the decision process in choosing the word *terminology*.

- Glossary: "A monolingual list of difficult or specialized terms with their definitions" (Pavel & Nolet, 2001, p. 109).
- Taxonomy: for the purpose of this paper, taxonomy will be narrowly defined as "a hierarchical classification or categorization system" (Hedden, 2010, p. 1).
- Term: "A word (simple term), multiword expression (complex term), symbol or formula that designates a particular concept within a given subject field. Also terminology unit" (Pavel & Nolet, 2001, p. 117).
- Terminology: "The set of special words belonging to a science, an art, an author, or a social entity" (Pavel & Nolet, 2001, p. 119). Like language teaching, language therapy, computational linguistics, and lexicography, terminology is a branch of applied linguistics which is the study of language "in its social function as a structure and a tool for communication, as a system and a way to solve the communicative and informative needs of society" (Cabr , 1999, p. 28). The "process of compiling, describing, processing and presenting the terms of special subject fields in one or more languages...addresses social needs and attempts to optimize communication among specialists and professionals by providing assistance either directly or to translators or to committees concerned with the standardization of a language." (Cabr , 1999, p. 10). Terminology "attempts to provide theoretical constructs and principles governing the choice and order of terms of special subject fields in order to standardize their form and contents" (Cabr , 1999, p. 37).
- Terminology record: a "medium for recording, in a structured set of fields, the terminological data for a specialized concept" (Pavel & Nolet, 2001, p. 119).

- Terminology work: "work concerned with the systematic collection, description, processing, and presentation of concepts and their designations, for the purpose of documenting and promoting correct usage" (Pavel & Nolet, 2001, p. 120).
- Tree diagram: a graphic depiction of a classification structure beginning with a single node, branching to additional nodes showing the hierarchical relationships between terms (Figure 1).



**Figure 1 Example of Tree Diagram**

## Chapter 2: Review of Literature

The specific language used in discussing mental practice in music performance is important. There are two written genres, of interest for this study, where mental practice in music performance is discussed. The first is piano pedagogy material such as textbooks on teaching piano and online resources such as blogs. The second is scientific literature on mental practice in music performance. Although piano pedagogy is the central interest of this thesis, the lack of empirical literature with this narrow focus required the inclusion of studies on mental practice in all areas of music performance. The next section will explore the use of language in the mental practice material related to piano pedagogy.

### 2.1 Mental practice language in piano pedagogy literature

Piano pedagogy literature sometimes includes discussion about mental practice. Twenty-three English language, general piano teaching manuals were examined for their approach to mental practice language (Table 1). Texts were identified using resources such as the Piano Pedagogy Research Laboratory resource centre at the University of Ottawa, the list of pedagogy resources from the piano syllabus of the Royal Conservatory of Music (Royal Conservatory of Music, 2015), online syllabi from piano pedagogy courses at post-secondary institutions such as the University of Western Ontario, University of Arkansas at Little Rock, Baylor University, and Carnegie Mellon University, and a guide to piano pedagogy research (Comeau, 2009). While the review is not completely exhaustive, an attempt was made to include the most well known texts and to include different time periods (there are texts from six decades, 1960s-2010s). All manuals were searched for the following key terms: *analysis*, *imagery*, *mental practice*, *model*, and *recording*. Other related terms were also found; for example, *demonstration* and *audiation*.

**Table 1 Mental Practice Language Presence in 23 Piano Pedagogy Texts**

| <i>Mental Practice Language Presence in 23 Piano Pedagogy Texts</i> |  |      |   |  |
|---|--|------|---|--|
| Author/s  | Publication Title  | Year | Mental Practice Vocabulary Present/Absent | Vocabulary Related to Mental Practice  |
| Agay  | The Art of Teaching Piano  | 2004 | Present                                   | <i>Demonstration, model, recording</i>   |
| Baker-Jordan  | Practical Piano Pedagogy: The Definitive Text for Piano Teachers and Pedagogy Students | 2004 | Absent                                    | —  |
| Bastien   | How to Teach Piano Successfully  | 1995 | Absent                                    | —  |
| Bigler & Lloyd-Watts  | Mastering the Piano Manual   | 2011 | Present                                   | <i>Listening, model, recording</i>   |
| Camp  | Teaching Piano: The Synthesis of Mind, Ear and Body                                    | 1992 | Absent                                    | —  |
| Chronister  | A Piano Teacher's Legacy   | 2005 | Absent                                    | —  |
| Clark   | Questions and Answers: Practical Advice for Piano Teachers                             | 1992 | Absent                                    | —  |
| Coats   | Thinking as You Play: Teaching Piano in Individual and Group Lessons                   | 2006 | Present                                   | <p><i>Analysis:</i> discussed as a way of better understanding the music</p> <p><i>Mental practice:</i> mention only with no discussion p. 24</p> <p><i>Imagery:</i> not really used as part of mental practice, but in the visual sense to help students understand concepts, or develop intuitive thinking for example.</p> <p><i>Model</i> "model the suggestion at the piano and have the student imitate" p. 86</p> <p><i>Recording:</i> "The use of technology may be a strategy to help students evaluate and</p> |

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|                       |  |      |         |  |
|-----------------------|--|------|---------|--|
|                       |  |      |         | find solutions to musical problems...have students listen to recordings" p. 14   |
| Gigante Klingenstein  | The Independent Piano Teacher's Studio Handbook: Everything You Need to Know                                 | 2009 | Present | Recommends an aural approach to practicing; for e.g. teacher <i>modeling</i> musical playing and <i>listening to recordings</i> to gain a better understanding of performance styles |
| Gordon                | Etudes for Piano Teachers: Reflections on the Teacher's Art  | 1995 | Absent  | —  |
| Haroutounian          | Fourth Finger on B-Flat: Effective Strategies for Teaching Piano   | 2012 | Absent  | —  |
| Jacobson              | Professional Piano Teaching: A Comprehensive Piano Pedagogy Textbook for Teaching Elementary-Level Students  | 2006 | Present | <i>Audiation, musical model, teacher performance demonstrations, recording</i>   |
| Jacobson              | Professional Piano Teaching: A Comprehensive Piano Pedagogy Textbook, Volume 2: Intermediate-Advanced Levels | 2015 | Present | <i>Analysis, audiation, mental practice, listening, recording</i> p. 391   |
| Kropf                 | A Symposium for Pianists and Teachers: Strategies to Develop Mind and Body for Optimal Performance           | 2002 | Present | <i>Mental imagery:</i> mention only with no discussion p. 235  |
| Last                  | The Young Pianist: An Approach for Teachers and Students   | 1972 | Absent  | —  |
| Lyke, Enoch, & Haydon | Creative Piano Teaching  | 1996 | Absent  | —  |
| Maier                 | The Piano Teacher's Companion  | 1963 | Present | Description of mental practice technique labeled as "How to Concentrate", "silent method" of practice (p.24)   |
| Moss                  | More Than Teaching: A Manual of  | 1989 | Absent  | —  |

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| Piano Pedagogy                 |  |      |         |   |
|--------------------------------|--|------|---------|---|
| Parker & Sheppard              | Piano Pedagogy: A Practical Approach                 | 2006 | Absent  | —   |
| Suzuki                         | How to Teach Suzuki Piano                            | 1993 | Present | On developing musical sensitivity Suzuki advises "to have children listen every day to <i>recordings</i> of high quality performances." (p. 40) |
| Swinkin                        | Teaching Performance: A Philosophy of Piano Pedagogy | 2015 | Absent  | —   |
| Uzler, Gordon, & McBride Smith | The Well-Tempered Keyboard Teacher                   | 2000 | Absent  | —   |
| Waterman                       | On Piano Teaching and Performing                     | 2006 | Absent  | —   |

Of the 23 publications examined for this study, only one textbook (Jacobson, 2015) formally addressed mental practice by name. Eight texts included language common to mental practice technique discussion (Agay, 2004; Bigler & Lloyd-Watts, 2011; Coats, 2006; Gigante Klingenstein, 2009; Jacobson J. M., 2006; Jacobson J. M., 2015; Kropff, 2002; & Suzuki, 1993), and one book included discussion about mental practice without using this language (Maier, 1963). The majority (14) made no mention of mental practice. When mental practice was referred to in piano pedagogy literature, it was often difficult to identify because the language used was not standardized and differed a lot from that used in the empirical literature. Sometimes aspects of mental practice, such as analysis, were discussed but without naming them as such; for example the suggestion to study the form of a piece of music before beginning to practice (Bastien, 1995; Clark, 1992; Maier, 1963). Another example can be found in an article by Robert, reprinted from *Clavier*, January 1971, with a section titled *demonstration* where Robert



discusses the importance of providing a *model* for the student (Robert, 2004). The term *demonstration* is not clearly associated with mental practice so its use makes the connection more difficult. Robert mentions *teaching by example* as an informal i.e. not explicit definition of the term *demonstration*, and later uses the term *teaching by demonstration*. The term *model* is not explicitly defined, but instead is described using words like *recorded and live versions* and *recordings*. In writing about the benefits of creating a *model* Robert gives examples of *auditory* and *visual imagery* but does so without naming them as such; he describes visual aspects of modeling: "to set up a model for the student to follow; the purpose may be to illustrate the motions required for the desired effect" (p. 459). Bigler and Lloyd-Watts (2011) also discuss *models*, as tools used for learning music through *listening*, in their teaching manual *Mastering the Piano*. Although these two authors address the same topic as Robert, they do not use the terms *mental practice* or *demonstration* but rather *listening*, *recordings* and *models*. As with the term *demonstration* used by Robert, the term *listening* is not obviously associated with mental practice therefore making the connection difficult. Coats (2006) also uses the terms *listen* and *recordings* but without discussing *modeling* or *demonstration*. In *Professional Piano Teaching: A Comprehensive Piano Pedagogy Textbook for Teaching Elementary-Level Students*, Jacobson (2006) examines models in a short section titled "Teacher Performance Demonstrations" where the value of providing a *musical model* is discussed although the term *musical model* is not explicitly defined. Robert, Bigler, Lloyd-Watts, Coats, and Jacobson are all discussing the same teaching activity—teaching the student by providing an example or model, but use slightly different language. Jacobson uses the term *teacher performance demonstration* consistently while Robert uses multiple terms: *demonstration*, *teaching by example*, and *teaching by demonstration* and Bigler and Lloyd-Watts, and Coats use the term *listening*. This lack of term

consistency can cause confusion. Interestingly, in *Volume 2 of Professional Piano Teaching*, Jacobson (2015) uses very specific vocabulary to address mental practice and a lengthy definition is also provided:

*Mental Practice* is musical preparation away from the piano. It involves hearing the music using the inner ear (*audiation*) and mentally "feeling" the piano keys and physical motions (*kinesthesia*). When this kind of practice is alternated with practice at the piano, fatigue, back pain, and other physical ailments associated with long hours spent at the piano are avoided. Mental practice is also effective while listening to a recording of the piece, which can be either a professional recording or a recording of the student. To mark ideas for improvement or interpretation on the score while listening is another form of mental practice. Silent playing can also be considered a form of mental practice. (p. 391)

With regard to the term *model*, Jacobson (2006) uses a variant *musical model*, which she does not define, and associates the term with teacher demonstrations but not with recordings. Robert does not explicitly define *model* either but applies the term to both live demonstrations and recordings (Agay, 2004). Only Bigler and Lloyd-Watts (2011) describe *models* in detail limiting their definition of *model* to the use of recordings. In this example of the definition for the term *model* there is some confusion about whether *models* are live (Jacobson J. M., 2006), recorded (Bigler & Lloyd-Watts, 2011), or both (Agay, 2004).

Mental practice is also discussed in music teaching blogs but the use of language is sometimes not as clear as it might be. The terms *mental practice* and *mental rehearsal* are used interchangeably throughout the article *Does Mental Practice Work?* in *The Bulletproof Musician* blog (Kageyama, 2015); for example, the article title and most subheadings use the term *mental*

*practice*, but the guidelines for use name the concept *mental rehearsal*. Although these terms are most often defined in the same way, this is not known by the reader, who may be unfamiliar with the concept, and therefore it would be better if only one term was used. The Curious Piano Teacher blog post (Cathcart, 2014) *Five Reasons Why We Should "Play" More in Instrumental Lessons* includes aspects of mental practice in a discussion about playing and listening to music. In presenting material from a study by Parncutt and McPherson (2002), the term *mental model* is used without defining it and *mentally rehearsing* is defined as "singing a piece by ear". The inclusion of complete definitions may be helpful here.

In summary, there were issues of clarity in the piano pedagogy literature on mental practice in music performance. One issue was that the language used was often general, rather than technical, language making the topic of mental practice sometimes difficult to recognize in the pedagogy material. For example, the words *demonstration* and *listening* were used rather than *modeling* as might be the case in the academic literature. The main problem was that there was no standardized use of language, making it difficult to find information about the use of mental practice techniques. In the next section, similar issues surrounding the use of language will be examined in the empirical literature on mental practice in music performance.

## **2.2 Mental practice language in empirical literature**

The search for material was rather broadly defined, using several keywords, due to the relatively small amount of scientific literature available on the topic of mental practice in music performance. Material for this review was identified in keyword searches for "mental practice" as well as several synonyms such as "mental imagery", "silent rehearsal", and "covert rehearsal". Because of the special importance of auditory imagery in music performance, the terms

"auditory modeling", "aural modeling", "auditory imagery", and "aural imagery" were also included in addition to the term "music performance". Search for the material was limited to recent literature (21st century). Nine studies were found on mental practice in music performance covering various musical instruments with participants ranging from children to adults and from novices to experienced musicians. These nine studies were reviewed for their use of language about mental practice. Since most terms are introduced in the beginning of articles, language related to mental practice was identified only in the titles, abstracts, keywords, and introductions of the studies (Table 2). Any defining context associated with mental practice vocabulary is also noted in Table 2. The terms that were defined in the literature are marked with an asterisk.

**Table 2** *Mental Practice Language in Empirical Literature*

| <i>Mental Practice Language in Empirical Literature</i>                                  |  |      |   |   |
|--|--|------|---|---|
| Author/s   | Title  | Year | Vocabulary Use  | Defining Context  |
| Bernardi, N.F.;<br>De Buglio, M.;<br>Trimarchi, P.D.;<br>Chielli, A.; and<br>Bricolo, E. | Mental Practice Promotes<br>Motor Anticipation:<br>Evidence from Skilled<br>Music Performance                                    | 2013 | Auditory imagery<br>* Mental practice<br>Mental strategies<br>Imagery abilities<br>Motor imagery<br>Physical practice<br>6  | <i>Mental practice</i> : "the cognitive rehearsal of a task in the absence of overt physical movements (Driskell et al., 1994)" p. 1  |
| Brown, Rachel<br>M. & Palmer,<br>Caroline  | Auditory and Motor<br>Imagery Modulate<br>Learning in Music<br>Performance   | 2013 | Auditory imagery<br>Auditory imagery ability<br>Auditory imagery skills<br>Covert rehearsal<br>Imagery<br>Imagery ability<br>Imagery skill<br>*Mental imagery<br>*Mental practice<br>Motor imagery<br>Motor imagery skills<br>Motor imagery ability<br>Physical practice<br>Visualizing<br>14 | <i>Mental imagery</i> "a subjective experience of the sensory outcomes and/or actions associated with a skill, in the absence of stimulus events or performed actions (Coffman, 1990; Driskell et al., 1994; Roure et al., 1999; Jeannerod, 2001; Zatorre and Halpern, 2005; Hubbard, 2010)." p 1<br><br><i>Mental practice</i> " "the covert rehearsal of a task without physical practice" p 2. |
| Cahn, Dan  | The Effects of Varying<br>Ratios of Physical and<br>Mental Practice, and Task<br>Difficulty on Performance<br>of a Tonal Pattern | 2008 | Auditory imagery<br>Kinesthetic imagery<br>*Mental practice<br>Physical practice<br>Visual imagery  | <i>Mental practice</i> "cognitive rehearsal of a task in the absence of overt physical movement" (Driskell et al. (1994), as cited in Cahn,   |

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|--------------------------------|--|------|--|--|
|                                |  |      | 5  | 2008, p. 179)  |
| Fine, Philip; & Bravo, Anabela | Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis" | 2011 | Imagery<br>Internal mental representations<br>*Mental practice<br>Mental representation<br>Score analysis<br>Silent rehearsal  | <i>Mental practice</i> : "a cognitive strategy conducted prior to performance that complements and enhances physical rehearsal with the instrument (Driskell et al. 1994)." pp 621-622<br>"clearly a strategy to assist learning (whether of an instrument or specific piece) and involves the development and enhancement of internal mental representations of the piece." p 622   |
|                                |  |      | 6  |  |
| Frewen, Katherine Goins        | Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy                       | 2010 | Auditory model<br>Aural model<br>Aural modeling<br>Model (Visual, Auditory)<br>*Modeling<br>Recorded aural model<br>Representation<br>*Teacher approximations<br>*Teacher modeling | <i>Modeling</i> : "Bandura (1977), in his social learning theory, stated that 'most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action' (p. 22)." p 320<br>"the live or recorded presentation of anything that may be imitated later by an observer (Madsen, Greer, & Madson, 1975)." p 321<br>"typically consists of alternations of teacher demonstrations and student imitations, with teachers using their instrument, voice, or electronic media and students responding with their instrument or voice (Dickey, 1992)." p 321<br><i>Teacher approximations</i> : "forms of modeling such as clapping, singing, counting, conducting" p 321<br><i>Teacher modeling</i> : " teacher performance" p 321 |
|                                |  |      | 10   |  |
| Haddon, E.                     | What does mental imagery mean to university music students and their professors?   | 2007 | Imagery<br>Imagery work<br>Mental imagery<br>Mental rehearsal<br>Mental skills<br>*Musical imagery   | <i>Musical imagery</i> : "Musical imagery has been defined as "our mental capacity for imagining sound in the absence of a directly audible sound source" (Godøy and   |

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|---|--|------|--|--|
|   |  |      | Physical practice<br>7   | Jørgensen 2001). The experience may be manifest in multiple ways, including deliberate use (to rehearse musical ideas, to experience a musical work in one's mind, to analyze and imagine a new score, or to compose) and non-deliberate use, such as hearing music in the mind as an involuntary experience." p. 301                              |
| Henley, Paul T.                                       | Effects of Modeling and Tempo Patterns as Practice Techniques on the Performance of High School Instrumentalists | 2001 | Model<br>Modeling<br>Recorded model<br><br>3   | —  |
| Highben, Zebulon; & Palmer, Caroline                  | Effects of Auditory and Motor Mental Practice in Memorized Piano Performance                                     | 2004 | Analytical pre-study<br>Auditory forms of mental practice<br>Auditory image<br>Auditory imagery<br>Auditory mental practice<br>Auditory model<br>*Auditory practice<br>Aural training<br>Covert practice<br>Imagery abilities: auditory<br>imagery ability, motor<br>imagery ability<br>Listening<br>Mental imagery ability<br>*Mental practice<br>Mental practice with an auditory model<br>Motor imagery<br>Motor mental practice<br>*Motor practice<br>Motoric image<br>Physical practice<br>*Silent analysis<br>22 | <i>Auditory practice</i> : a type of mental practice; Abstract<br><i>Mental practice</i> : "the covert or imaginary rehearsal of a skill without muscular movement or sound" (Coffman, 1990) p. 1<br><i>Motor practice</i> : a type of mental practice; Abstract<br><i>Silent analysis</i> : "mental practice, without explicit instructions" p. 2 |
| Morrison, S. J.; Montemayor, M.; and Wiltshire, E. S. | The Effect of a Recorded Model on Band Students' Performance Self-Evaluations, Achievement, and Attitude         | 2004 | Aural example<br>Aural modeling<br>Model<br>Model recording<br>Modeling<br>Recorded aural model<br>Recorded model<br>Self recording<br>Teacher modeling<br>behavior<br>Teacher modeling skills   | There is a description of auditory modeling in a general way but not a specific definition that is attached to a specific term.  |

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There are language-based problems of communication in the empirical literature on mental practice in music performance. Multiple terms are used; for example, three terms *auditory model*, *aural model* and *recorded aural model* are used interchangeably (Frewen, 2010), and so are the six terms *aural example*, *model*, *model recording*, *recorded aural model*, *recorded model*, and *self recording* (Morrison, Montemayor, & Wiltshire, 2004). Sometimes multiple terms are used to provide vocabulary variety or for reasons that are not apparent. For example the terms *aural* and *auditory* are used (Frewen, 2010; Highben & Palmer, 2004) when it would be more effective to choose one term for consistent designation of the hearing concept. Although this synonym use may not be a cause for confusion about meaning, the use of synonyms is nevertheless a cause of dissonance for the reader or listener. Sometimes multiple terms are used interchangeably but may be understood differently by other researchers or readers; for example in an article about imagery there are three terms used synonymously in the title and abstract: *What does mental imagery mean to university music students and their professors?* (Haddon, 2007). The title includes the term *mental imagery*, but in the abstract, the same concept is given a second name, *mental rehearsal*. In addition, also in the abstract, the study participants use a third name for the concept; *musical imagery*. A clear definition of *musical imagery* is provided: "our mental capacity for imagining sound in the absence of a directly audible sound source" (Godøy and Jørgensen, 2001 as cited in Haddon, 2007, p. 1). A problem arises in the study results where the term *musical imagery* is then, in effect, redefined by the inclusion of characteristics not related to sound such as "rehearsing physical movements in your mind" and "visualizing a successful performance" (Haddon, 2007, p. 303). There are really two problems here: the same

term is not used consistently for a key concept, and three different terms, that might designate three different concepts, are used as synonyms; for example *musical imagery* can be a synonym for *auditory imagery* and *mental rehearsal* can be a synonym for *mental practice*. But *mental practice* and *auditory imagery* are two different concepts so this conflation of terms can result in confusion for the reader.

A similar confusion is created when two terms are defined differently but also appear to be used as synonyms. In an article on imagery and music learning, the term *mental imagery* is defined as "a subjective experience of the sensory outcomes and/or actions associated with a skill, in the absence of stimulus events or performed actions" (Brown & Palmer, 2013, p. 1). The term *mental practice* is defined as "the covert rehearsal of a task without physical practice" (Brown & Palmer, 2013, p. 2). The fact that both terms are defined is beneficial for reader comprehension. The difficulty arises when the two terms are used as synonyms in the same paragraph: "Skilled performers can improve their productions using mental imagery....Furthermore, mental practice and physical practice..." (Brown & Palmer, 2013, p. 1). So although the concepts and definitions for *mental imagery* and *mental practice* are similar but different, the terms are used in the example paragraph to designate the same concept.

One of the most problematic issues is the lack of term definitions provided in the literature. Very few (nine of 83) terms are defined: *auditory practice* (defined once), *mental imagery* (defined once), *mental practice* (defined five times), *modeling* (defined once), *motor practice* (defined once), *musical imagery* (defined once), *silent analysis* (defined once), *teacher approximations* (defined once), and *teacher modeling* (defined once). Four articles defined only one term (Bernardi, De Buglio, et al, 2013; Cahn D. , 2008; Fine & Bravo, 2011; Haddon, 2007). Three articles defined two or more terms (Brown & Palmer, 2013; Frewen, 2010; Highben &



Palmer, 2004). Two articles provided no term definitions (Henley, 2001; Morrison, et al., 2004). Even where term definitions were provided, some were vague; for example, *silent analysis* is defined as "mental practice, without explicit instructions" (Highben & Palmer, 2004, p. 2). Although vague definitions were an issue, the most striking and problematic issue was the lack of defining context provided.

In summary, there were issues of readability in the empirical literature on mental practice in music performance. The use of multiple terms was an issue with this literature where synonyms were used interchangeably in all but two studies by Cahn (2008) and Bernardi, De Buglio and colleagues (2013). In addition to the use of vague language, very few terms were provided with definitions (nine of 83) making reading and comprehension more difficult. Together with synonymy, the greatest hindrance to readability was the lack of definitions given for the specialized language used. In reviewing the literature on mental practice it becomes apparent that there is a need for clarification of the language used. Because mental practice is a useful strategy for music performance preparation, it is important to be able to communicate information about it in a clear way. The problem of clarity in the language or terminology used in mental practice literature is explored in the next section.

### **2.3 Research Problem and Purpose of Study**

The issue of readability becomes evident in reviewing the pedagogical and empirical literature on mental practice in music performance. It is the use of language that creates this difficulty. Multiple terms are used and very few are defined. When terms are defined, the definitions are not always consistent (Brown & Palmer, 2013; Frewen, 2010; Highben & Palmer, 2004), and relationships between terms are not always shown effectively (Haddon, 2007). Therefore, the research problem of this thesis can be summarized with the following:

The terminology used in mental practice research is sometimes unclear and creates confusion because of multiple term use, lack of defining context, and unclear term relationships.

In order to address this problem, it is important to recognize that the purpose of writing, specifically academic writing, is to communicate research and ideas to an audience. To ensure maximum readability, it is important for researchers and writers to be familiar with the specialized vocabulary of the topic. Vocabulary, or terminology in the case of specialized vocabulary, is the most important factor affecting readability (Bailin & Grafstein, 2016). The writer can therefore assist the reader by using clearly defined words. To assist with readability of the literature on mental practice in music performance, it is the purpose of this work to identify, record, and analyze the terminology in the empirical literature, and to propose an alphabetical glossary and taxonomy specifically for this language. The purpose is prescriptive rather than descriptive. Although the study design is descriptive, using a combination of documentary analysis and terminology methodologies, the purpose is prescriptive; having the intent to influence use (Cabr e, 1999). The main objective is to achieve "precise and unambiguous professional communication" (Cabr e, 1999, p. 38). To this end, the task of analyzing the terminology in the literature on mental practice in music performance is done both to clarify the language and to produce the following works:

1. A literature based alphabetical glossary of the key simple and complex terms.
2. A literature based taxonomy to show the hierarchical classification of key terms.

At present, there is no known literature based glossary or taxonomy in the discipline of mental practice in music performance. Music researchers, educators, and students rely on language and terms from music and other disciplines such as psychology and education to clarify

concepts related to mental practice due to a lack of standardized terminology. This study may facilitate more effective communication in this field by:

1. providing an analysis of the terminology as identified in the literature on mental practice in music performance;
2. proposing a literature based glossary and taxonomy.

In addition this work may serve as a resource for investigating terminology in other disciplines.

The following chapter will outline the methodology used for this study. A brief review of relevant resources will be followed by a description of the design, corpus, and procedures.

### Chapter 3: Methodology

This study is an examination of mental practice terminology, specifically in the empirical literature on music performance. Empirical, rather than pedagogical, literature is the focus because it is primary source literature and is increasingly a resource for pedagogical writing about mental practice (Cathcart, 2014; Jacobson, 2006, 2015; Kageyama, 2015). The design of this study is based on manual content analysis and methods used in professional terminology work; an established, recognized field of study for the collection, description, quantitative and qualitative analysis, and presentation of concepts and their terms. The products of this work are a glossary and taxonomy. At this time no work has been found on the issue of terminology in the literature on mental practice in music performance although there are two related articles that investigate musicians' understanding of the terms *mental practice* and *score analysis* (Fine & Bravo, 2011; Fine, Wise, Goldemberg, & Bravo, 2015). Four resources were found that examine terminology in other fields but, like this one, were not written by experts in the field of terminology: one, a PhD dissertation examining the terminology in nursing administration (Heyden, 1992), and the others, journal articles with a focus on global software engineering (Šmite, Wohlin, Galviņa, & Prikladnicki, 2014), motivation research (Murphy & Alexander, 2000), and affective response in music (Price, 1986). These papers were used as resources. The methodology and approach to terminology work was influenced by several texts, specific to terminology: *Terminology: Theory, Methods and Applications* by Cabré (1999), the *Handbook of Terminology* by Pavel and Nolet (2001), and *A Short Guide to Terminology Work* by Kaennel Dobbertin and Prüller (Kaennel Dobbertin & Prüller, n.d.). *The Accidental Taxonomist* by Hedden (2010) has also been used for the taxonomy work. In addition, the following websites have been important resources for learning about terminology work: *Terminology Coordination* from the European Parliament (European Parliament: TermCoord Terminology Coordination

Unit, 2015), and especially *The Pavel Terminology Tutorial from the Government of Canada* (The Pavel Terminology Tutorial, 2011).

### **3.1 Frame of Reference**

The introductory review of mental practice and its benefits provides a frame of reference and motivation for the study of terminology which follows. The assumptions upon which the study is based are as follows and have been borrowed from Heyden (1992) and his work on nursing administration terminology and adapted for mental practice in music performance:

1. The empirical literature on mental practice in music performance is a reasonable representation of the important terminology in this discipline;
2. Terminology consists of terms and definitions, and the context of a term provides information that is useful in the development of its definition;
3. Analysis is required to understand the meaning of terms and the relationships between them which are not always apparent.

### **3.2 Corpus**

Terminology and technical documentation have a reciprocal relationship—while the work of terminology is to help clarify technical documents, these documents are also the basis for terminological work (Cabr , 1999). Following established terminography criteria, the analysis of this study is based on a corpus, or sample, of empirical English language literature on mental practice in music performance. Corpus material was located using various keyword terms for search using the uOttawa library Search+ and Google and Google Scholar search engines. Many keywords were used: "covert rehearsal", "mental practice", "mental imagery", "motor imagery", "music performance", "silent rehearsal", as well as keyword combinations such as

"mental practice and music performance". Keywords specific to auditory imagery in music performance were also used: "auditory modeling", "aural modeling", "auditory imagery", and "aural imagery". Google alerts were created using the following keywords: "auditory modeling", "aural modeling", "covert rehearsal", "mental practice", and "motor imagery". The literature selected for the corpus was relatively current covering the period of 10 years prior to the beginning of this study —2004 to present. For this reason, the study by Henley (2001) mentioned in the literature review was omitted from the corpus. Documentation for the corpus was collected over a period of three years (2014-2016). A preliminary review of the mental practice literature had been done at the beginning of the study process leading to this thesis and this is the reason for the greater amount of literature used for the corpus (33) than for the literature review (9). Thirty-three empirical studies on mental practice in music performance were identified and collected for inclusion in the corpus. The items that make up the corpus are listed alphabetically by author, and include the article title, year and name of publication (Table 3).

**Table 3** *Corpus for Terminology of Mental Practice in Music Performance*

| <i>Corpus for Terminology of Mental Practice in Music Performance</i>         |  |      |  |
|---|--|------|--|
| Author/s  | Article Title  | Year | Journal Title                          |
| Bailes, F., Bishop, L. S., & Dean, R. T.                                      | Mental Imagery for Musical Changes in Loudness   | 2012 | <i>Frontiers in Psychology</i>         |
| Bernardi, N. F., De Buglio, M., Trimarchi, P. D., Chielli, A., & Bricolo, E.  | Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance                     | 2013 | <i>Frontiers in Human Neuroscience</i> |
| Bernardi, N. F., Schories, A., Jabusch, H.-C., Colombo, B., & Altenmüller, E. | Mental Practice in Music Memorization: An Ecological-Empirical Study                                     | 2013 | <i>Music Perception</i>                |
| Bishop, L., Bailes, F., & Dean, R. T.   | Performing Musical Dynamics: How Crucial Are Musical Imagery and Auditory Feedback for Expert and Novice | 2014 | <i>Music Perception</i>                |

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| Musicians?   |  |      |   |
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| Brodsky, W., Kessler, Y., Rubenstein, B.-S., Ginsborg, J., & Henik, A. | The Mental Representation of Music Notation: Notational Audiation  | 2008 | <i>Journal of Experimental Psychology: Human Perception and Performance</i> |
| Brown, R. M., & Palmer, C.   | Auditory and Motor Imagery Modulate Learning in Music Performance  | 2013 | <i>Frontiers in Human Neuroscience</i>                                      |
| Cahn, D.   | The Effects of Varying Ratios of Physical and Mental Practice, and Task Difficulty on Performance of a Tonal Pattern     | 2008 | <i>Psychology of Music</i>  |
| Cash, C. D., Allen, S. E., Simmons, A. L., & Duke, R. A.               | Effects of Model Performances on Music Skill Acquisition and Overnight Memory Consolidation                              | 2014 | <i>Journal of Research in Music Education</i>                               |
| Clark, T., & Williamon, A.   | Evaluation of a Mental Skills Training Program for Musicians   | 2011 | <i>Journal of Applied Sport Psychology</i>                                  |
| Clark, T., & Williamon, A.   | Imagining the Music: Methods for Assessing Musical Imagery Ability   | 2011 | <i>Psychology of Music</i>  |
| Fine, P. A., Wise, K. J., Goldemberg, R., & Bravo, A.                  | Performing Musicians' Understanding of the Terms "Mental Practice" and "Score Analysis"                                  | 2015 | <i>Psychomusicology: Music, Mind, and Brain</i>                             |
| Fine, P., & Bravo, A.  | Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis" | 2011 | <i>International Symposium on Performance Science</i>                       |
| Frewen, K. G.  | Effects of Familiarity with a Melody Prior to Instruction on Children's Piano Performance Accuracy                       | 2010 | <i>Journal of Research in Music Education</i>                               |
| Gregg, M. J. & Clark, T. W.  | Theoretical and Practical Applications of Mental Imagery   | 2007 | <i>International Symposium on Performance Science 2007</i>                  |
| Gregg, M. J., Clark, T. W., & Hall, C. R.                              | Seeing the Sound: An Exploration of the Use of Mental Imagery by Classical   | 2008 | <i>Musicae Scientiae</i>  |

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|---|---|------|---|
| Haddon, E.  | Musicians<br>What Does Mental Imagery Mean to University Music Students and their Professors?   | 2007 | <i>Proceedings of International Symposium on Performance Science 2007</i> |
| Highben, Z., & Palmer, C.                                       | Effects of Auditory and Motor Mental Practice in Memorized Piano Performance  | 2004 | <i>Bulletin of the Council for Research in Music Education</i>            |
| Holmes, P.  | Imagination in Practice: A Study of the Integrated Roles of Interpretation, Imagery and Technique in the Learning and Memorisation Processes of Two Experienced Solo Performers | 2005 | <i>British Journal of Music Education</i>                                 |
| Johnson, R.   | Musical Tempo Stability in Mental Practice: A Comparison of Motor and Non-Motor Imagery Techniques  | 2011 | <i>Research Studies in Music Education</i>                                |
| Keller, P. E.   | Mental Imagery in Music Performance: Underlying Mechanisms and Potential Benefits   | 2012 | <i>Annals of the New York Academy of Sciences</i>                         |
| Keller, P. E., Dalla Bella, S., & Koch, I.                      | Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task  | 2010 | <i>Journal of Experimental Psychology</i>                                 |
| Kleber, B., Birbaumer, N., Veit, R., Trevorrow, T., & Lotze, M. | Overt and Imagined Singing of an Italian Aria   | 2007 | <i>NeuroImage</i>   |
| Lahav, A., Boulanger, A., Schlaug, G., & Saltzman, E.           | The Power of Listening: Auditory-Motor Interactions in Musical Training   | 2005 | <i>Annals of the New York Academy of Sciences</i>                         |
| Lotze, M.   | Kinesthetic Imagery of Musical Performance  | 2013 | <i>Frontiers in Human Neuroscience</i>                                    |
| McHugh-Grifa, A.  | A Comparative Investigation of Mental Practice Strategies Used by Collegiate-Level Cello Students   | 2011 | <i>Contributions to Music Education</i>                                   |
| Miksza, P.  | The Effect of Mental Practice on the Performance  | 2005 | <i>Contributions to Music Education</i>                                   |

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| Achievement of High School Trombonists                    |   |      |  |
|---|---|------|--|
| Miksza, P.  | A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation      | 2011 | <i>Bulletin of the Council for Research in Music Education</i> |
| Morrison, S. J.,<br>Montemayor, M., &<br>Wiltshire, E. S. | The Effect of a Recorded Model on Band Students' Performance Self-Evaluations, Achievement, and Attitude                                  | 2004 | <i>Journal of Research in Music Education</i>                  |
| Osborne, M. S.,<br>Greene, D. J., &<br>Immel, D. T.       | Managing Performance Anxiety and Improving Mental Skills in Conservatoire Students through Performance Psychology Training: A Pilot Study | 2014 | <i>Psychology of Well-Being</i>                                |
| O'Shea, H., & Moran,<br>A.                                | Chronometric and Pupil-Size Measurements Illuminate the Relationship between Motor Execution and Motor Imagery in Expert Pianists         | 2015 | <i>Psychology of Music</i>                                     |
| Wöllner, C., &<br>Williamon, A.                           | An Exploratory Study of the Role of Performance Feedback and Musical Imagery in Piano Playing   | 2007 | <i>Research Studies in Music Education</i>                     |
| Wright, D. J.,<br>Wakefield, C. J., &<br>Smith, D.        | Using PETTLEP Imagery to Improve Music Performance: A Review  | 2014 | <i>Musicae Scientiae</i>                                       |
| Zatorre, R. J., &<br>Halpern, A. R.                       | Mental Concerts: Musical Imagery and Auditory Cortex  | 2005 | <i>Neuron</i>  |

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The corpus includes articles from diverse disciplines including music education, neuroscience, performance science, and psychology. Sixty-five authors are represented in the 33 articles with several authors represented in two studies each (Bailes, Bernardi, Bishop, Bravo, Dean, Fine, Gregg, Keller, Lotze, Miksza, and Palmer), and two authors, Clark and Williamon, authors in four and three studies respectively. All publications appeared to be either international, open

access, or had international editorial boards thus presumably lessening the impact of the use of regional language.

### **3.3 Procedure**

Once the corpus was established the material was examined, and terminology work was conducted. The key terms were then presented in a glossary and classified using a hierarchical taxonomy. In order to consider which terms were best suited for inclusion in the glossary and taxonomy, a multi-step process of terminology work was followed. This process of identifying, recording, analyzing and defining the terms is described in this section.

#### **3.3.1 Identifying terms**

Terms are considered to be different from general language because they refer to a concept in a specific subject field (Cabr , 1999); mental practice in music performance in this case. Terms may be simple, consisting of one word, or complex, having two or more words forming a terminological phrase (The Pavel Terminology Tutorial, 2011). The identification of terms is not always straightforward. Where possible, term identification can be guided through the use of a taxonomy but there existed no taxonomy for this field: a taxonomy is one of the end products of this work. It is sometimes difficult to determine whether or not a term belongs to the general language but there are certain guidelines. For instance, a designation of a concept may be a term and not part of general language if it exhibits certain indicators such as having an antonym in the same specific subject field (Cabr , 1999). An example is the term *mental practice* which can be considered to have an antonym in *physical practice*. Frequency of use in the literature may also be an indicator of termhood: if a word or short phrase is much used, it may be a term. With regard to meaning, theoretically, terms should be unambiguous; having only one

meaning and corresponding to only one concept (Cabr , 1999). With all this in mind, the first step in the terminology work was to identify the terms from the corpus.

Hard copies of the 33 items of the corpus were examined manually, in their entirety, and the key simple and complex terms were identified using a highlighter pen as suggested by the Pavel (The Pavel Terminology Tutorial, 2011). All highlighted terms and any relevant information such as the type of defining context, which was marked with pencil, were subsequently recorded in the terminological identification document. The terms and related defining context were also transcribed to the terminological records when the term appeared more than twice in the corpus. The term identification process was also repeated near the end of the study to check accuracy. Terms such as *musician* or *auditory cortex*, which are related to music in general or to other disciplines and are study specific, were excluded from this study. In addition, terms that were related to the methodology rather than to the subject of the study were excluded; for example *modeling condition* (Morrison, et al., 2004, p. 124). An attempt was made to include only those terms that would be used widely in the discussion and/or study of mental practice in music performance.

### **3.3.2 Recording terms**

Once a term was identified, it was recorded in two main documents: an identification document (Microsoft Excel), and a terminological record (Microsoft Word).

#### ***3.3.2.1 Identification document***

Recording of term frequency (the number of times a term appeared in the corpus) and type of defining context (defining, explanatory, associative) in the corpus was done to assist with term analysis. Every term, but not every appearance of every term, from each item in the corpus

| 1  | TERMS                   | Highben & Palmer (2004) | Holmes (2005) | Johnson (2011) | Keller (2012) |
|----|-------------------------|-------------------------|---------------|----------------|---------------|
| 2  | action simulation       |                         |               |                | defining      |
| 3  | anticipatory imagery    |                         |               |                | associative   |
| 4  | analysis                |                         | explanatory   |                |               |
| 5  | analytical study        | associative             |               |                |               |
| 6  | audiation               |                         |               |                |               |
| 7  | auditory                | associative             |               |                |               |
| 8  | auditory feedback       | defining                |               | associative    | associative   |
| 9  | auditory image          | associative             | defining      |                | associative   |
| 10 | auditory imagery        | explanatory             | associative   | associative    | associative   |
| 11 | auditory imagery skill  |                         |               |                |               |
| 12 | auditory learning       |                         |               |                |               |
| 13 | auditory model          | associative             |               |                |               |
| 14 | auditory modeling       |                         |               |                |               |
| 15 | auditory representation |                         | associative   |                |               |
| 16 | aural image             | associative             |               |                |               |

**Figure 2 Example of Term Identification Document Showing Type of Defining Context**

was recorded in a term identification document, created in Microsoft Excel. Repeated appearances of terms were not recorded; so the term use frequency was based, not on the number of times a term was used in one article but rather, on the number of times the term was used in the corpus as a whole (number of articles). The type of defining context (defining, explanatory, associative) was also recorded (Figure 2). Defining context was categorized using the following standard terms: *defining* (essential information about fundamental characteristics of the concept), *explanatory* (information about some, but not all, of the characteristics of the concept), and *associative* (demonstration of use, but not meaning, in the subject field) (The Pavel, Terminology Tutorial, 2011). Once this information was recorded for each item in the corpus, it was transcribed to the terminological records.

### 3.3.2.2 Terminological records

Terminological records (Microsoft Word) were prepared; one for each term appearing more than twice in the corpus (Appendix). The records were created as an aid in the analysis of term usage and therefore to assist with decisions about term inclusion in the glossary. For example, a record was created for the term *visualization* because it appeared three times in the corpus (Fine, Wise, Goldemberg, & Bravo, 2015; Fine & Bravo, 2011; Johnson R. , 2011), but no terminological record was created for the term *visualize* which appeared only once (Brown & Palmer, 2013). The terminological record format was adapted from Cabré (1999) and Kaennel Dobbertin & Prüller, (n.d.) and is shown in Table 4.

**Table 4 Terminological Record Format**

| <i>Terminological Record Format</i>   |
|---|
| <ol style="list-style-type: none"> <li><b>1. auditory imagery</b></li> <li><b>2. Grammatical Function:</b></li> <li><b>3. Synonyms:</b></li> <li><b>4. Variants:</b></li> <li><b>5. Cross-reference:</b></li> <li><b>6. Definition:</b></li> <li><b>7. Definition Context:</b></li> <li><b>8. Sources of Definition:</b></li> <li><b>9. Sources of Term:</b></li> <li><b>10. Comments:</b></li> <li><b>11. Date:</b></li> <li><b>12. Status:</b></li> </ol> |

Twelve fields of information were included in the terminological record. The following is a list of the terminological record information fields with descriptions for each field.

1. Entry term: name of term
2. Grammatical Function: noun, verb, adjective (as the term is used in the corpus)
3. Synonyms: terms with the same or almost the same meaning

4. Variants: terms with similar meaning but not in all contexts, spelling variants, short forms (Kaennel Dobbertin & Prüller, n.d.)
5. Cross reference: link to related terminological record
6. Definition: created using corpus material and/or other reference materials as required
7. Definition context: portion of text in which the term appears in the corpus
8. Sources of definition: references used in the creation of the term definition; corpus and/or other references
9. Sources of term: reference for each item of the corpus where the term appears
10. Comments: notes for assistance with definition, classification, cross reference, etc.
11. Date: of creation and any significant modification
12. Status: either "preferred", "preferred but not recommended for glossary", or "not recommended"

In total, 83 terminological records were created using data from the term identification document (Microsoft Excel) and defining context from the corpus. The name of the term was recorded at the top of each record. References of sources for the synonyms and variants were provided only if the synonym or variant term did not have its own terminological record for reasons of insufficient usage. Otherwise reference was made to the corresponding term record for additional information. Initialisms such as *MP* for *mental practice* were not used because their use was operational or specific to the article in which they appeared. Terms were cross-referenced to another terminological record as required; for example in cases of synonymy the terms that were "not recommended" were cross-referenced to the "preferred" term. Any defining context, the portion of text in which some type of term definition appeared in the literature, was transcribed from the corpus. A definition was either provided or a cross-reference made. Because

the majority of terms were undefined in the corpus, term definitions were created by the author as required using any defining context from the literature in addition to dictionaries and other relevant resources. Sources of the definition were always noted or the indication "n/a" was used in cases of cross-referenced definitions.

Sources where the term appeared were also noted using a reference to author/s and date. These source references were purposely left separated from each other for easier recognition and counting. The total number of sources was also noted to indicate frequency of term use in the corpus. Any relevant comments were noted; for example, if a term showed insufficient usage in the corpus to warrant "preferred" status designation. The date of term creation and any significant modifications was also recorded. After analyzing the terminological records, a status was assigned: either "preferred", "preferred but not recommended for glossary", or "not recommended". "Preferred" meant that the term was included in the glossary as the recommended term. "Preferred but not recommended for glossary" meant that although a term may have been a recommended term, for example, *ability*, it was not included in the glossary. There were a variety of reasons for non inclusion in the glossary despite the value of a term. The term may have been considered to be part of general language rather than terminology (the case for the term *ability*), or useful but not warranted due to insufficient usage in the corpus (the case for the term *subvocalization*). "Not recommended" meant that the term was not desired for use; for example, this was the case for synonyms of "preferred" terms. All information fields in the records were completed in accordance with the list above.

### **3.3.3 Analyzing terms**

Manual content analysis was used to study and discover themes about term usage and meaning. The documents analyzed included the corpus of 33 empirical studies on mental practice

in music performance, the identification document (132 terms), and primarily the terminological records (83 terms). Of the 132 terms recorded in the identification document, 83 were used with enough frequency (more than twice) to warrant the creation of a terminological record. The 83 terminological records were analyzed manually by the author with regard to issues such as the frequency of use, synonym usage, definition context, and relationship between term and concept. The records were examined individually and compared to each other, especially in the case of synonyms. This terminological record analysis was performed in order to make decisions about inclusion in the glossary, to learn about terminology usage in the corpus, to assist in the creation of definitions where none existed, and to examine term relationships to assist in the creation of the taxonomy. An example of a terminological record used for analysis is shown in Table 5. As noted in the "comments" information field, this record was used to decide that the term *auditory model* would be included in the glossary with a cross reference to the term *model*. The decision to include this term was influenced by frequency which could be found in the data on term appearances in the identification document (Excel), and in the "sources of term" information field (six sources) of the terminological record for the term. The synonyms also influenced the decision about inclusion in the glossary and taxonomy. Often the synonym with the most appearances in the corpus was chosen, and in this case, *model/modeling* had a slightly higher frequency (10 sources). Another concern with the synonyms of *auditory model* was an issue of homonymy with the term *aural model*, which made the term *auditory model* preferable. The defining context was also studied carefully to help create definitions; for example, the definition context from Cash, Allen, Simmons, and Duke (2014) was used in the glossary definition for the term *model*. The "defining context" information field also shows the variety of ways the term is



defined in the literature. These issues of frequency, synonymy, homonymy and **meaning** are discussed in greater detail in the following chapter on the results of analysis.

**Table 5 Terminological Record Example**

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*Terminological Record Example*

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auditory model

**Grammatical Function:** noun

**Synonyms:** *aural model; model; recorded model; self-recording; performance model* (Cash, Allen, Simmons, & Duke, 2014)

**Variants:** *auditory modeling*

**Cross-reference:** *model*

**Definition:** *see model*

**Definition Context:**

"external, transitional formats of representation" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 286)

"external auditory models (e.g. recordings of experts' performances)" (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013, p. 9)

"Live and recorded performance models serve an obvious function in this regard, as models provide vivid representations of goals that learners are working to achieve, thus influencing learners' focus of attention and motivation" (Cash, Allen, Simmons, & Duke, 2014, p. 90).

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Cash, Allen, Simmons, & Duke, 2014) (Frewen, 2010) (Highben & Palmer, 2004) (Wright, Wakefield, & Smith, 2014) 6

**Comments:** cross reference to *model* in glossary

**Date:** June 25, 2016

**Status:** preferred

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### 3.3.4 Defining terms

Because clear communication is central to academic writing, it is important to provide unambiguous definitions for any unfamiliar terms. These definitions provide the context for the reader to understand the rest of the text. If the reader does not understand the meaning of terms

used in the text, that text will be difficult for them to read (Bailin & Grafstein, 2016). While the reader is important in academic writing, the researcher is equally important and clearly defined terminology is an essential research tool (Srinagesh, 2006). The end user of the terminology, whose understanding is influenced by the readers and researchers of the literature, is also important; an issue that is investigated in a study about musicians' understanding of the terms mental practice and score analysis (Fine et al., 2015).

For readability and especially for understanding of the terms and text, explicit and unambiguous definitions are important for the terminology used in academic writing (Bailin & Grafstein, 2016). Analysis of the term identification and terminological records showed that although many terms were used in the literature on mental practice in music performance, relatively few were provided with definitions (56 of 132 terms). The purpose of terminological definitions is to provide context and meaning. While explicit and unambiguous definitions are best, it can also be useful to "assign special or restrictive meanings to words (or combinations of words) that otherwise have a colloquial usage" (Srinagesh, 2006, p. 22). Although not exactly colloquial, the term *imagery*, for example, if left undefined may be understood only in the general language sense as a collection of visual images. However, this is not the concept for which the term is used in the literature on mental practice in music performance where the term implies modalities such as auditory and motor in addition to visual. For the term *imagery* to be clearly understood, within the context of mental practice in music performance, an unambiguous and specific definition is required.

Using the terminology records, the terms were studied, with reference to form, semantics, function, and status as they occurred in the literature on mental practice. The corpus of mental practice literature was the intended main resource for defining terms, with materials from other

disciplines sourced as necessary. In other words, the definitions for the terms were empirically based, or based on the literature from which the terms were extracted. Where necessary, as in the case where no definitions were provided in the literature, material such as general language dictionaries, encyclopedia, and specialized dictionaries were also used in the development of definitions for the terms. Terminological texts, as mentioned at the beginning of this chapter, as well as a book chapter on the importance of definitions by Srinagesh, (2006) provided the structure and/or format for the definitions.

### **3.3.5 Developing a glossary**

After identifying, analyzing, and defining the "preferred" terms for inclusion in the glossary of the terminology of mental practice in music performance, the terms and their definitions were listed alphabetically in a glossary. The decision for inclusion in the glossary was based on the following criteria related to terminology and specialized communication: concision, which reduces the possibility of distortion of information; precision, and suitability to the communication situation (Cabr e, 1999, p. 47).

### **3.3.6 Developing a taxonomy**

After developing a glossary of preferred terms, a hierarchical taxonomy was developed to show term relationship. *The Accidental Taxonomist* by taxonomist Hedden (2010) was a main resource for the methodology and development. Due to the number of terms in mental practice related to education and performance, resources on taxonomies from these fields were also used (Crawford & Smith, 2015; Fleishman & Quaintance, 1984). In addition, the same resources used for the terminology work were consulted. To assist with classification and preparation of the hierarchical taxonomy, a document (Microsoft Word) was created to reorganize terms showing

the base term; for example, the term *practice* is the base of the terms *mental practice* and *physical practice* (Table 6).

**Table 6 Terms: Ordered by Final Base Term (used to create taxonomy)**

*Terms: Ordered by Final Base Term (used to create taxonomy)*

| Base Term           | Term                        | Variants of Term  |
|---------------------|-----------------------------|---|
| Ability             | Imagery ability             | Auditory imagery ability<br>Kinesthetic imagery ability<br>Kinesthetic movement imagery ability<br>Mental imagery ability<br>Motor imagery ability<br>Visual imagery ability<br>Visual movement imagery ability |
|                     | Mental practice ability     | Mental practice capability  |
| Analysis            | Abstract-formal analysis    |   |
|                     | Formal analysis             |   |
|                     | Formal /academic analysis   |   |
|                     | Formal /structural analysis |   |
|                     | Harmonic analysis           |   |
|                     | Music analysis              | Formal music analysis   |
|                     | Practical analysis          |   |
| Score analysis      | Formal score analysis       |   |
| Structural analysis |                             |   |
| Feedback            | Auditory feedback           |   |
|                     | Kinesthetic feedback        |   |
|                     | Motor feedback              |   |
|                     | Performance feedback        |   |
|                     | Tactile feedback            |   |
|                     | Visual feedback             |   |
| Image (noun)        | Acoustic image              |   |
|                     | Auditory image              | Auditory imaging  |
|                     | Aural image                 |   |
|                     | Kinesthetic image           |   |
|                     | Mental image                |   |
|                     | Motor image                 | Motor imaging   |
| Image (verb)        | Visual image                | Visual imaging  |
|                     |                             |   |
| Imagery             | Acoustic imagery            |   |
|                     | Auditory imagery            | Anticipatory auditory imagery<br>Musical auditory imagery   |
|                     | Emotional imagery           |   |
|                     | Kinesthetic imagery         | Kinesthetic motor imagery   |
|                     | Mental imagery              |   |
|                     |                             |   |

|             |  |  |
|-------------|--|--|
|             | Motor imagery<br>Movement imagery<br>Multimodal imagery<br>Music imagery<br><br>Non-motor imagery<br>Pitch imagery<br>Visual imagery   | Musical imagery<br>Mental musical imagery  |
| Model       | Auditory model<br>Aural model<br>Internal model<br>Performance model<br>Recorded model<br>Visual model   | External auditory model  |
| Modeling    | Auditory modeling<br>Aural modeling<br>Teacher modeling  |  |
| Performance | Actual performance<br>Executed performance<br>Imagined performance<br>Mental performance<br>Motor performance<br>Motor skill performance<br>Music performance<br>Musical performance   | Imagined mental performance  |
| Practice    | Covert practice<br>Deliberate practice<br>Effective practice<br>Formal practice<br>Imagery practice<br>Informal practice<br>Mental practice<br><br>Motor practice<br>Motor skill practice<br>Musical practice<br>Physical practice | Auditory mental practice<br>Deliberate mental practice<br>Motor mental practice      |
| Strategy    | Imagery strategy<br>Kinesthetic strategy<br>Modeling strategy<br>Mental strategy<br>Practice strategy  | Covert practice strategy<br>Deliberate practice strategy<br>Mental practice strategy |

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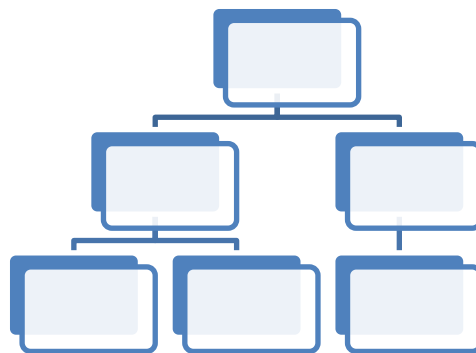
|  | Overt practice strategy |
|--|-------------------------|
|  | Rehearsal strategy      |

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|           |   |
|-----------|---|
| Technique | Imagery technique<br>Mental practice technique<br>Performance psychology technique<br>Practice technique<br>Rehearsal technique |
|-----------|---|

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For the final product, a tree diagram was used to provide a graphic representation of the terminology structure and relationship (Figure 3). Efforts were made to determine the best process and diagram to describe the patterns and relationships in mental practice terminology based on taxonomy research.



**Figure 3 Example of Tree Diagram**

## Chapter 4: Results of Analysis

The purpose of term analysis was to learn about term usage in the corpus of mental practice in music performance in order to make decisions about inclusion in the glossary and taxonomy. From the corpus of 33 articles used for term analysis, 132 different terms were identified and noted in the identification record. In examining the corpus (33 articles), terminological records (83 terms), and identification record (132 terms), two main themes, related to readability, emerged: frequency and meaning. These themes are discussed in this section with examples provided from the corpus. Following discussion of the themes of frequency and meaning is a description of the term defining process.

### 4.1 Frequency

Term frequency was used as a determinant in the decisions made about term inclusion for the glossary. The number of times that each term appeared in the corpus is shown in Table 7. Also shown is the number of times the term did not appear. The word form with the highest frequency, within the list of 132 identified terms from the corpus, was "image". This word form was found in 32 individual terms (marked with an asterisk in the table) used in a total of 209 sources, including the simple terms *image* and *imagery* as well as complex terms such as *mental imagery*. The term *performance* had the highest single term frequency in the corpus; used in 26 sources. The table also shows many terms with only one or two appearances in the corpus; the terms for which no terminological records were created.

In contrast to terms with one or two appearances in the corpus, high term frequency may indicate term familiarity; for example the term *mental practice* appeared 21 times in the corpus, whereas one of its synonyms *covert rehearsal* appeared only twice (Table 7). The high frequency

for the term *mental practice* indicated that it was more familiar than the term *covert rehearsal* which helped make *mental practice* the preferred term. All other qualities being equal, high term frequency in the corpus made a term more likely to be selected for inclusion in the glossary because of its increased familiarity. Because this terminology work is practical or literature based, term familiarity was one of the most important considerations.

**Table 7 Term Frequency in the Corpus of 33 Empirical Articles**

| <i>Term Frequency in the Corpus of 33 Empirical Articles</i> |  |  |
|--|--|--|
| Term Name  | Term use in Corpus                         |  |
| <b>Term</b>  | <b>Number of items where term appeared</b> | <b>Number of items where term did not appear</b> |
| action simulation  | 2  | 31   |
| Analysis   | 1  | 32   |
| analytical study   | 2  | 31   |
| *anticipatory imagery  | 2  | 31   |
| Audiation  | 3  | 30   |
| Auditory   | 5  | 28   |
| auditory feedback  | 14   | 19   |
| *auditory image  | 10   | 23   |
| *auditory imagery  | 22   | 11   |
| *auditory imagery skill                                      | 2  | 31   |
| auditory learning  | 1  | 32   |
| auditory model   | 6  | 27   |
| auditory modeling  | 1  | 32   |
| auditory representation                                      | 7  | 26   |
| *aural image   | 4  | 29   |
| *aural imagery   | 1  | 32   |
| aural model  | 3  | 30   |
| aural modeling   | 3  | 30   |
| aural skill  | 11   | 22   |
| cognitive rehearsal  | 2  | 31   |
| Covert   | 3  | 30   |
| covert practice  | 4  | 29   |
| covert rehearsal   | 2  | 31   |
| deliberate practice  | 5  | 28   |
| effective practice   | 2  | 31   |
| *emotional imagery   | 1  | 32   |



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|  |    |    |
|--|----|----|
| executed movement  | 2  | 31 |
| executed performance                                     | 1  | 32 |
| execution, actual and imagined                           | 1  | 32 |
| external auditory model                                  | 1  | 32 |
| familiarity  | 2  | 31 |
| familiarity with a melody                                | 1  | 32 |
| Feedback   | 3  | 30 |
| formal analysis  | 4  | 29 |
| formal/structural analysis or vice versa                 | 4  | 29 |
| harmonic analysis  | 1  | 32 |
| *image (noun)  | 4  | 29 |
| *image (verb)  | 3  | 30 |
| *imagery   | 25 | 8  |
| *imagery ability: auditory,<br>kinesthetic/motor, visual | 14 | 19 |
| *imagery modality  | 6  | 27 |
| *imagery practice  | 1  | 32 |
| *imagery skill   | 5  | 28 |
| *imagery strategy  | 2  | 31 |
| *imagery technique                                       | 4  | 29 |
| imagination  | 1  | 32 |
| Imagine  | 15 | 18 |
| Imagined   | 9  | 24 |
| imagined movement  | 4  | 29 |
| imagined performance                                     | 4  | 29 |
| informal practice  | 2  | 31 |
| internal (mental) representation                         | 9  | 24 |
| internal model   | 3  | 30 |
| kinesthetic feedback                                     | 4  | 29 |
| *kinesthetic imagery                                     | 10 | 23 |
| *kinesthetic movement imagery ability                    | 2  | 31 |
| kinesthetic representation                               | 1  | 32 |
| kinesthetic strategy                                     | 1  | 32 |
| *mental image  | 8  | 25 |
| *mental imagery  | 19 | 14 |
| mental performance                                       | 2  | 31 |
| mental practice  | 21 | 12 |
| mental practice ability/capability                       | 1  | 32 |
| mental practice skill                                    | 1  | 32 |
| mental practice strategy                                 | 7  | 26 |
| mental practice technique                                | 5  | 28 |
| mental rehearsal   | 14 | 19 |
| mental representation                                    | 11 | 22 |

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|                                |    |    |
|--------------------------------|----|----|
| mental skills                  | 5  | 28 |
| mental skills training         | 4  | 29 |
| mental skills training program | 3  | 30 |
| mental strategy                | 8  | 25 |
| mental training                | 1  | 32 |
| mental visualization           | 2  | 31 |
| Model                          | 7  | 26 |
| Modeling                       | 3  | 30 |
| motor execution                | 2  | 31 |
| motor feedback                 | 5  | 28 |
| *motor image                   | 5  | 28 |
| *motor imagery                 | 16 | 17 |
| *motor imagery skill           | 1  | 32 |
| motor learning                 | 2  | 31 |
| motor mental practice          | 2  | 31 |
| motor performance              | 7  | 26 |
| motor practice                 | 3  | 30 |
| motor representation           | 7  | 26 |
| movement execution             | 3  | 30 |
| *movement imagery              | 5  | 28 |
| movement representation        | 3  | 30 |
| *multimodal imagery            | 1  | 32 |
| music (musical) performance    | 23 | 10 |
| *music imagery                 | 7  | 26 |
| *musical auditory imagery      | 1  | 32 |
| *musical imagery               | 9  | 24 |
| notational audiation           | 5  | 28 |
| Overt                          | 5  | 28 |
| Performance                    | 26 | 7  |
| performance feedback           | 2  | 31 |
| performance model              | 1  | 32 |
| performance preparation        | 2  | 31 |
| physical practice              | 16 | 17 |
| *pitch imagery                 | 2  | 31 |
| Practice                       | 20 | 13 |
| practice behaviour             | 1  | 32 |
| practice method                | 1  | 32 |
| practice routine               | 2  | 31 |
| practice skill                 | 2  | 31 |
| practice strategy              | 11 | 22 |
| practice technique             | 4  | 29 |
| recorded model                 | 3  | 30 |
| Rehearsal                      | 8  | 25 |

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|  |    |    |
|--|----|----|
| rehearsal strategy                           | 3  | 30 |
| rehearsal technique                          | 2  | 31 |
| Rehearse                                     | 5  | 28 |
| representation                               | 10 | 23 |
| score analysis, score study                  | 3  | 30 |
| self-recording                               | 1  | 32 |
| sensorimotor learning                        | 1  | 32 |
| silent rehearsal                             | 1  | 32 |
| skill acquisition                            | 1  | 32 |
| somatosensory representation                 | 1  | 32 |
| structural analysis                          | 1  | 32 |
| subvocal rehearsal, subvocal motor rehearsal | 1  | 32 |
| subvocalization                              | 3  | 30 |
| *verbal imagery                              | 1  | 32 |
| visual feedback                              | 2  | 31 |
| *visual image/imagery                        | 14 | 19 |
| visual model                                 | 2  | 31 |
| *visual movement imagery ability             | 2  | 31 |
| visual representation                        | 1  | 32 |
| Visualization                                | 3  | 30 |
| Visualize                                    | 1  | 32 |

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Note: \* indicates term containing the word form "image"

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Looking at term use by author, of the 132 individual terms identified in the corpus, most authors used a relatively small number in their writing (Table 8). The highest number of terms used was 40 or 30% of the total 132 terms. The fewest terms used (six) represents only 4.5% of the total number of terms. Of the various terms used, the highest number (40) was used by Bernardi, Schories, Jabusch, Colombo, & Altenmüller (2013) and Johnson (2011), and the fewest (six) by Osborne, Greene, and Immel (2014). It might be assumed that the high number of individual terms used by study author/s indicated the usage of a wide variety of terms at the expense of term repetition. However, this did not appear to be the case; for example the article by Bernardi, Schories, and colleagues (2013) demonstrated both variety (40), and repetition through the recurring use (seven) of the specific term *formal analysis*. The significance of this

example of term repetition with regard to readability is explained in detail in the following section on repetition.

**Table 8 Term Use by Author/s (of total 132 terms)**

| <i>Term Use by Author/s (of total 132 terms)</i>                         |                    |                     |
|--|--------------------|---------------------|
| Corpus   | Term use frequency |                     |
| <b>Author/s of corpus items</b>  | <b>Terms used</b>  | <b>Terms unused</b> |
| Bailes, Bishop, & Dean (2012)  | 22                 | 110                 |
| Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo (2013)                | 38                 | 94                  |
| Bernardi, Schories, Jabusch, Colombo, & Altenmüller (2013)               | 40                 | 92                  |
| Bishop, Bailes, & Dean (2014)  | 16                 | 116                 |
| Brodsky, Kessler, Rubenstein, Ginsborg, & Henik (2008)                   | 17                 | 115                 |
| Brown & Palmer (2013)  | 27                 | 105                 |
| Cahn (2008)  | 17                 | 115                 |
| Cash, Allen, Simmons, & Duke (2014)                                      | 9                  | 123                 |
| Clark & Williamon, Evaluation of a Mental Skills Training Program (2011) | 12                 | 120                 |
| Clark & Williamon, Imagining the Music (2011)                            | 31                 | 101                 |
| Fine & Bravo (2011)  | 13                 | 119                 |
| Fine, Wise, Goldemberg, & Bravo (2015)                                   | 26                 | 106                 |
| Frewen (2010)  | 14                 | 118                 |
| Gregg & Clark (2007)   | 14                 | 118                 |
| Gregg, Clark, & Hall (2008)  | 11                 | 121                 |
| Haddon (2007)  | 13                 | 119                 |
| Highben & Palmer (2004)  | 22                 | 110                 |
| Holmes (2005)  | 22                 | 110                 |
| Johnson (2011)   | 40                 | 92                  |
| Keller (2012)  | 24                 | 108                 |
| Keller, Dalla Bella, & Koch (2010)                                       | 10                 | 122                 |
| Kleber, Birbaumer, Veit, Trevorrow, & Lotze (2007)                       | 17                 | 115                 |
| Lahav, Boulanger, Schlaug, & Saltzman (2005)                             | 7                  | 125                 |
| Lotze (2013)   | 28                 | 104                 |
| McHugh-Grifa (2011)  | 23                 | 109                 |
| Mikszá (2005)  | 15                 | 117                 |
| Mikszá (2011)  | 20                 | 112                 |
| Morrison, Montemayor, & Wiltshire (2004)                                 | 9                  | 123                 |
| Osborne, Greene, & Immel (2014)  | 6                  | 126                 |
| O'Shea & Moran (2015)  | 19                 | 113                 |
| Wöllner & Williamon (2007)   | 32                 | 100                 |
| Wright, Wakefield, & Smith (2014)  | 27                 | 105                 |
| Zatorre & Halpern (2005)   | 21                 | 111                 |

With a focus on term identification and definition, rather than on term repetition in isolation, the number of times that a single term was repeated in the corpus as a whole was not recorded or measured for this work. However, repetition is important for readability and was measured looking at frequency in a general way using term appearances in the corpus, and specifically using examples of repetition from items in the corpus.

#### **4.1.1 Repetition**

Writers are often encouraged to use word variety as one way of creating increased reader interest and engagement. However, although writers of academic, specialized, or technical literature may value reader interest and engagement, their main goal is the clear communication of their work and ideas. For this reason, word repetition is an important style element. While word variety or synonymy may positively affect the perceived attractiveness of a text, it has a negative effect on comprehension (Oversteegen & Wijk, 2003). Instead, the repetition of a term is preferable because it increases term familiarity for the reader. Higher word repetition or frequency is associated with both faster reading and better comprehension (Leroy & Kauchak, 2014; Oversteegen & Wijk, 2003). An example of the use of repetition within an item from the corpus can be found below in a discussion section paragraph about *formal analysis* by Bernardi, Schories, and colleagues (2013), where the term is repeated seven times in the text. Also important is the fact that no synonyms are used in the example paragraph.

*Formal analysis* as a MP strategy was expected to be associated with better performance. This was found to be true, but only to a certain degree. We found a significant association between the general habit of using *formal analysis* for music memorization, as reported in the initial questionnaire and performance results. This likely happens because building a

formal structure of the piece allows the performer to use a retrieval, hierarchical scheme that results in a better organization of both practice and memory (Chaffin & Imreh, 1997). In this respect, *formal analysis* would facilitate the organization of the material to be remembered in chunks of information (Miller, 1956), that could be later recalled as units, thus optimizing the encoding and the retrieval of memories. The use of the formal structure of a piece to organize practice and aid memory is a standard recommendation of piano pedagogues (Leimer & Giesecking, 1998; Sandor, 1981); consistently, experts and advanced performers appear to utilize analytical strategies frequently, while inexperienced performers do not (Hallam, 1997; Williamon & Valentine, 2002). However, no direct associations could be found between the actual implementation of *formal analysis* during the experiment and performance outcomes. Three interrelated explanations can be proposed for this unexpected finding: First, particularly for experienced musicians, *formal analysis* may occur as a background, semi-unconscious process that actually shapes the way the pianist reads and practices music without necessarily becoming a deliberate and explicit tactic. As such, it is more likely to be consistently reported as a general attitude in an initial questionnaire as opposed to a TMQ-like formulation. Second, the time constraints we implemented could have further influenced the choice of practice strategies toward implicit *formal analysis*, so the subjects could spare the most time for directly practicing the retrieval from memory. It is possible that in a more relaxed setting, as the one described by Chaffin and Imreh (2002), different choices would have been reported. Third, at a conscious level, the use of *formal analysis* might have been obscured by the use of another, closely connected mental strategy: pitch imagery. (p. 285) [italics added by the author of this thesis]

Another example, seen below, came from Johnson (2011) in a short paragraph on mental practice and music goals where the term *mental practice* is repeated five times and no synonyms are used.

In addition to the possible modes of *mental practice*, it is important to consider the relationship between *mental practice* and specific musical goals. *Mental practice* may mildly improve many aspects of musical performance, or it may have specific benefits to one or more musical goals: memorization, rhythmic accuracy, emotional expression, pitch intonation accuracy, dynamic flexibility, proper phrasing and contrasts of articulation. Assessing specific outcomes of *mental practice* is more likely to identify the precise benefits of *mental practice*. (p. 6) [italics added by the author of this thesis]

While term frequency, or repetition, is beneficial for readability and especially comprehension, synonymy, or term variety, is detrimental. Synonymy is discussed in the following section.

#### **4.1.2 Synonymy**

Synonyms, in the context of this work, are terms that designate the same or almost the same concept. Synonymy works against readability by slowing reading and making comprehension more difficult (Oversteegen & Wijk, 2003). The work of a terminologist is to "search for semantic clarity, the elimination of factors that disturb communication...this leads them to avoid multiple forms, and as a result, to a reduction in the expressive richness of a language" (Cabr , 1999, p. 111). In the corpus, efforts were sometimes made, by the authors, to exclude synonyms; for example, a brief discussion about term consistency and frequency was included in an article favouring the use of the term *mental practice* over *mental rehearsal* (Fine, Wise, Goldemberg, & Bravo, 2015). While it is recommended to keep the use of synonyms to a

minimum, there are instances when the use of synonyms can be useful. Term definition is arguably the only type of synonym use that is helpful for reading comprehension. An example of this use of synonyms as definitions can be seen in an excerpt from Clark and Williamson (2011b) where the authors refer to a study by Repp: "Repp's rationale for this approach was that performances with no auditory feedback would allow insight into pianists' 'internal representations or mental images of the musical sound structure' (1999a, p. 412)" (p. 474). In this example, *internal representation* is used to define *mental image* or perhaps the other way around. In any case, one term is used to clarify the meaning of the other, rather than being used for language variety or expressive richness.

An example of the use of synonyms for the purpose of variety may be found in the abstract of an article by Keller (2012). The term *mental imagery* is used in the article title and the first sentence of the abstract where the synonyms *imagery* and *musical imagery* are also used in the text that follows. Interestingly, although *mental imagery* is the term used in the title, *musical imagery* is the term that is defined. It can be argued that the three terms are not exact synonyms: *imagery* could mean any representation physical or mental, *mental imagery* could involve imagery in general but not specific to music; and, without the definition provided by the author, *musical imagery* is specific to music but not necessarily mental. However, for the reader, the synonyms cause a lack of clarity and impede readability. Using the example of imagery, seven synonyms were found in the literature: *auditory imagery*, *mental imagery*, *mental musical imagery*, *music imagery*, *musical imagery*, *musical auditory imagery*, and *pitch imagery*.

Unintentional synonymy use may be caused by the conflation of language between the study author/s and the language of the studies that they are discussing in literature review sections for example. In these cases there may be a reluctance to reject synonymy, or variety of



terminology, in favour of repetitive terminology in discussions about work by other author/s in the field of mental practice in music performance. Possible causes of this reluctance could be oversight or confusion about what is meant by the terms used by other author/s. An example can be seen in the introduction of an article about mental practice and singing by Kleber, Birbaumer, Veit, Trevorrow, & Lotze (2007): "Pascual-Leone (2003) proved that *mental practice* has....*Motor imagery* can improve... (Yaguez et al., 1998)....Yet *mental music rehearsal*... (Lang, 1979)" (p. 889) [italics added by the author of this thesis]. In this example, the near or exact synonyms *mental practice*, *motor imagery*, and *mental music rehearsal* seem related more to the referenced authors (Pascual-Leone, Yaguez et al., and Lang) than to the authors of the article (Kleber et al.). Another example is from an introductory paragraph of an article by Lotze (2013) about imagery and music performance. In this short paragraph of six sentences, four synonymous terms *mental imagery*, *mental practice*, *mental music rehearsal*, and *mental rehearsal* are all used:

*Mental imagery* of a piece of music in one's mind is commonly used by professional musicians for instance to rehearse difficult parts of an already executed musical passage (Lotze et al., 2003). Famous musicians like Vladimir Horowitz and Walter Gieseking reported frequent use of *mental practice* (Gieseking and Leimer, 1972; Schonberg, 1987). *Mental music rehearsal* includes different images of a musical piece: motor, somatosensory and auditory, but also emotional aspects. Most commonly *mental imagery* in musicians is related to reading the scores of a piece and *mentally rehearsing* predominantly the auditory aspects. However this is only one of several aspects of *mental rehearsal* of a musical piece. In all, three aspects of *mental imagery* used by musicians

have been differentiated (Repp, 2001; Keller, 2012). (p. 1) [italics added by the author of this thesis]

A final example of this problem of synonymy is found in a review section of an article by McHugh-Grifa (2011) comparing mental practice strategies: "Additionally, researchers have examined the influence of *aural* models and presence or removal of *auditory* and motor feedback during mental practice (Brooks, 1995; Coffman, 1990; Highben & Palmer, 2004)" (p. 67) [italics added by the author of this thesis]. The use of the synonyms *aural* and *auditory* in the same sentence, while not necessarily confusing with regard to meaning, does slow the reader down. It is possible that the synonymous terms, used by the referenced authors, were inadvertently retained. In any case the use of synonyms, rather than the repetition of one term, is confusing for the reader who must make a connection between the two synonymous terms and possibly wonder why two different terms were used for the same concept; both activities resulting in decreased readability. As can be seen from these examples, the writing could be made clearer through the use of repetition rather than term variety. Synonymy is detrimental to readability because its use may cause confusion about meaning and it also displaces repetition which is beneficial for comprehension and readability. Another type of word that is detrimental to readability is the homophone which is discussed in the next section.

### **4.1.3 Homonymy**

In the context of terminology, homonyms are terms that have the same form but signify different concepts. Homophones are a specific type of homonym: terms that are pronounced the same but are spelled differently. It is the homophone that is at issue in the case of the term *aural*. A decision was made to use the term *auditory* rather than *aural* as the "preferred" term for inclusion in the glossary in order to avoid the use of homophones. While, in print, the term *aural*

may not be as much of an issue, in spoken language the term can be easily confused with the word *oral* thereby creating confusion for the listener. Since research is often presented orally, at symposiums for example, the decision was made in favour of the term *auditory*. Interestingly, a solution has been proposed for the possible confusion caused by the terms *aural* and *oral*: "A distinctive pronunciation for *aural* has been proposed, with the first syllable rhyming with *cow*, but it has not become standard" (Oxford University Press, 2016). As can be seen in Table 9, the term *auditory*, in various forms, was used with great frequency in the corpus (68 appearances). The term *aural* was used with lesser frequency (22 appearances). The term *auditory*, but not *aural*, is also widely used outside of the corpus; for example in the taxonomy of human performance (Fleishman & Quaintance, 1984). Although term frequency was an important determinant for inclusion in the glossary, in this case, the main reason to favour the term *auditory* was not frequency of use but the desire to avoid the homophone issue with the term *aural*.

**Table 9** *Frequency of the Terms Auditory and Aural in Corpus of 33 Items*

| <i>Frequency of the Terms Auditory and Aural in Corpus of 33 Items</i> |  |  |
|--|--|--|
| Term Name  | Term use in Corpus                         |  |
| <b>Term</b>  | <b>Number of items where term appeared</b> | <b>Number of items where term did not appear</b> |
| Auditory   | 5  | 28   |
| auditory feedback  | 14   | 19   |
| auditory image   | 10   | 23   |
| auditory imagery   | 22   | 11   |
| auditory imagery skill   | 2  | 31   |
| auditory learning  | 1  | 32   |
| auditory model   | 6  | 27   |
| auditory modeling  | 1  | 32   |
| auditory representation  | 7  | 26   |
| aural image  | 4  | 29   |
| aural imagery  | 1  | 32   |
| aural model  | 3  | 30   |

|                |    |    |
|----------------|----|----|
| aural modeling | 3  | 30 |
| aural skill    | 11 | 22 |

## 4.2 Meaning

The following sections address the use of definitions within the corpus and the clarity of these definitions.

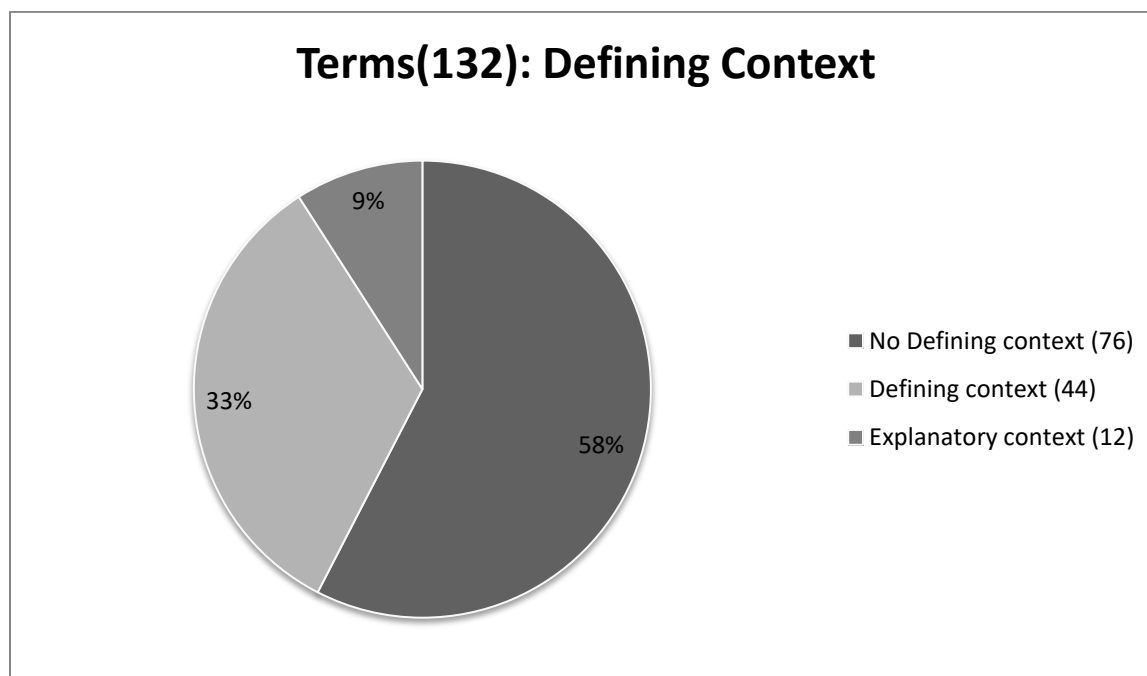
### 4.2.1 Definitions

Of 132 terms that were identified in the corpus, only 44 terms (33.3%) were defined explicitly (Figure 4). Where definitions were provided, they were mostly accurate and unambiguous; for example auditory feedback is defined as: "...the auditory information that performers receive in feedback about their productions..." (Highben & Palmer, 2004, p. 1). Some definitions were specific enough to also provide context and participant function; for example:

In music instruction, modeling has been defined as the live or recorded presentation of anything that may be imitated later by an observer (Madsen, Greer, & Madson, 1975). In music lessons or rehearsal, modeling typically consists of alternations of teacher demonstrations and student imitations, with teachers using their instrument, voice, or electronic media and students responding with their instrument or voice (Dickey, 1992). (Frewen, 2010, p. 321)

In addition to the explicit type of definitions provided, 24 (18.2%) of the 132 terms were given a partial or explanatory type of definition. Of the 24 explanatory definitions, half (12 or 9.1% of the total) represent overlap with the 44 explicitly defined terms, and the remaining half (12) represent explanatory definitions as the only type of definition provided. To summarize, overall

only 42.4% (56 of 132) of the terms used in the literature were provided with some type of definition.



**Figure 4 Terms: Defining Context**

Although some terms were provided with defining and/or explanatory context, most terms were undefined. All undefined terms used in the corpus were designated "associative" meaning that the term was used but not given any type of definition. There was sometimes overlap with all three of the context designations: defining, explanatory, and associative. For example, data for the term *kinesthetic imagery* showed that defining context was provided once (Fine et al., 2015), explanatory context twice (Cahn, 2008; Kleber et al., 2007), and associative context seven times within the corpus. It should also be noted that the term was not mentioned at all in 23 of the total 33 items included in the corpus. As has been shown in the examples, definitions were sometimes provided and were often precise and unambiguous. However, definitions were not always clear and, for more than half the term usage (58%), were not

provided at all. The need for definitions comes from a desire to avoid "vagueness" and "ambiguity" (Srinagesh, 2006, p. 24). The qualities of semantic vagueness and ambiguity, in the context of the corpus for this work, are explored next.

#### 4.2.2 Semantic vagueness

Semantic vagueness occurs when the meaning of a word or term is not clearly stated (Srinagesh, 2006). This vagueness can most obviously occur when a term is left undefined as was the case with most term usage in the corpus. Semantic vagueness may also occur when a term is only partially defined; for example, the various types of strategies, rather than the definition of those strategies, were described for the term *mental strategy*: "mentally hearing the sound of notes, mentally feeling the movement of fingers/hands..." (Bernardi, Schories, et al., 2013, p. 280). Another cause of semantic vagueness is less about the clarity of a definition and more to do with inconsistent definitions; for example *motor imagery* was usually defined as imagining movements (Fine et al., 2015; Johnson, 2011; O'Shea & Moran, 2015). However, it was also defined as imagining the **feeling** of movements (Holmes, 2005); a slightly different meaning that is more related to kinesthetic imagery.

Related to inconsistent definitions is the use of false or mismatched synonyms. This type of semantic vagueness may not cause confusion for the reader of a single item from the literature on mental practice in music performance, but is more problematic for readers of multiple texts. The term *motor imagery* is presented, in this example from O'Shea and Moran (2015), as a synonym of *mental practice*: "The term motor imagery (MI) – also called mental practice (MP); (Driskell, Copper, & Moran, 1994) — refers to the conscious mental simulation of an action without concomitant bodily movement (Debarnot, Sperduti, Di Rienzo, & Guillot, 2014)" (p. 3). This statement itself is unambiguous. However, if the term *motor imagery* has previously been

understood differently by the reader, the statement becomes more difficult to understand. This can happen if the term (*motor imagery*) has been defined differently elsewhere in the literature; for example as a "type [of mental practice] that focuses on the imagination of performance movements (motor imagery)" (Johnson, 2011, p. 4). Now the reader is left wondering if the term *motor imagery* is the same as *mental practice*, or is a type of *mental practice*. A very similar example was found in a corpus item about imagery ability. The authors provided the term *imagery* with an extensive and clear definition, but the authors also stated that *imagery* was "often referred to as mental rehearsal by musicians" (Clark & Williamon, 2011b, p. 472). The introduction of the false synonym *mental rehearsal* has the potential to cause confusion and impair readability.

#### **4.2.3 Semantic ambiguity**

Because terminology principles dictate that one designation (term name) corresponds to one concept, the use of polysemy, a word with more than one definition, is avoided in this field (Cabr , 1999). Semantic ambiguity (two or more meanings) is detrimental to readability and comprehension. As has been illustrated in the preceding examples, much of the semantic ambiguity in this terminology is associated with the terms *imagery* and *mental practice* and their various synonyms (*mental imagery*, *motor imagery*, *mental rehearsal*). For example, definitions for the term *imagery* were inconsistent within the corpus. Sometimes *imagery* was described as an experience (Clark & Williamon, 2011b; Gregg, Clark, & Hall, 2008; Wright, Wakefield, & Smith, 2014), and other times as a collection of mental representations (Bishop, Bailes, & Dean, 2014; Fine et al., 2015). Although both experiential and representational definitions for *imagery* are correct and are frequently used in the same literature (Thomas, 2014), a distinction should be drawn between the two concepts and any definitions should be unambiguous in order to avoid

confusion for the reader. In order to avoid this type of semantic ambiguity, *imagery* was defined in the glossary in accordance with the representational rather than the experiential definition. The previous example on the usage of the term *imagery* is significant because the two meanings of the term (representational and experiential) are relatively similar and are both relevant to the field of mental practice in music performance and are both used in the literature. In this context semantic ambiguity causes a lack of clarity in the mental practice literature. This would not necessarily be as important in a case where a term has two very different meanings as with the word *bat* which may mean either an animal or a stick used in baseball. In the case of the word *bat* though, the meaning would soon be made clear from the context of the surrounding text; a temporary ambiguity (Bailin & Grafstein, 2016, pp. 116-117). In order to avoid semantic ambiguity, the intended meaning of the terminology used must be made clear and may also be restrictive. This may be achieved by qualifying definitions in the text; for example: "Musical imagery is defined here as the conscious experience of music that is not an immediate consequence of its production or perception" (Bishop et al., 2014, p. 52). With the use of the words "is defined here", the authors provide a provisional definition for the term *musical imagery* that is specific to their investigation.

### **4.3 Defining Terms**

Terms are signs that can be analyzed from three points of view: the formal (the designation), the semantic (the concept), and the functional (grammatical category and distribution) (Cabr e, 1999). Using the terminology records, the terms from the literature were studied, with reference to form, semantics, and function, as they occurred in the literature on mental practice in music performance. The corpus of mental practice literature was the main resource for defining terms, with other sources used as necessary. In other words, the terms, for



inclusion in the glossary, and their definitions were empirically based. Using defining context from the terminology found in the literature on mental practice in music performance, and reference materials such as general language dictionaries, specialist dictionaries, and encyclopedia, definitions were created where none existed or were incomplete in the literature. In the case of synonymy, where there existed multiple terms with similar or equivalent meanings, certain terms were designated a "preferred" status and were provided context specific definitions and identified for inclusion in the glossary. Terms that were designated as "not recommended" were not necessarily defined but were cross-referenced to an equivalent defined term wherever possible. Terms that were designated as "preferred but not recommended for the glossary" were terms that were important and preferred but that were either part of general language or not used with enough frequency in the corpus to warrant inclusion in the glossary. After defining the terms from the corpus, especially the terms that were identified for inclusion in the glossary, the term names and definitions were transcribed from the terminological records to the glossary. The glossary items were then organized into a hierarchical taxonomy. The glossary and taxonomy are presented next.

## Chapter 5: Terminology Products

Two groups of users were identified for this terminology work. The first group are subject field specialists in the area of mental practice in music performance; for example researchers and teachers of music pedagogy. For this group terminology is the "formal reflection of the conceptual organization of a special subject and a necessary medium of expression and professional communication" (Cabr , 1999, p. 11). The second group are end users such as music pedagogy students, music teachers, and music students for whom terminology is a "set of useful, practical communication units which are assessed according to criteria of economy, precision, and suitability" (Cabr , 1999, p. 11). The products of this terminology work, a glossary and taxonomy, are presented here with the hope that they will serve as useful references for these users. In addition are the terminological records (Appendix) which provide additional information on terminology issues such as frequency and semantics. The records also include terms that may have been preferred but not recommended for use in the glossary due to insufficient usage for example. Both the glossary and taxonomy are literature-based and therefore not exhaustive representations of the terminology in this field.

### 5.1 Glossary

After analyzing the terminological records and corpus of existing empirical literature, key terms were identified, defined, and selected for inclusion in the glossary of the terminology of mental practice in music performance. Terminology practice stipulates that "terms for a special language glossary must be 'collected' from real texts, and not 'invented' or 'created' by terminologists" (Cabr , 1999, p. 115). In keeping with this terminological practice, the terms selected for the glossary were not invented but rather they were identified and collected from the corpus.

One determining factor for inclusion in the glossary was frequency of use. For example, it could be argued that the term *representation* is not really a term at all but part of general language. Term determination is often complicated but there are some guidelines, one of which is the frequency with which the word appears in the corpus (Cabr , 1999). *Representation* appeared 10 times in the corpus and was therefore well above the delimiting of two appearances to warrant the creation of a terminology record. However, in the final determination, the frequency of use for *representation* did not warrant its inclusion in the glossary. The term *image* was instead chosen because of its greater frequency, alone and in complex terms and variants such as *auditory image*, *mental image*; *imagery*, and *imagery ability* for example. Some terms are included in the glossary, despite relatively lesser frequency of use in the corpus, if they designate a necessary concept in the field. However, terms that designate a necessary concept outside the field and were not frequently used in the corpus, were not included in the glossary. An example is the term *motor learning* which can be found in reference works from other more established fields. *Learning* was an orphan term in the corpus and *motor learning* is a term common to other fields such as psychology, cognitive science, and human kinetics. In addition to frequency of use, terminology standards dictate that one designation or term must represent one concept only and vice versa. Therefore polysemy, synonymy and homonymy were avoided.

Terms selected for the glossary and their definitions were transcribed from the terminological records to an alphabetical glossary. Twenty-one terms are included in the glossary. Nineteen terms are defined and the remaining two are cross-referenced to corresponding base terms which are defined. All entries are defined in the context of music performance and almost all glossary entries mention *music*. There are five simple terms (*feedback*, *image*, *imagery*, *model*, *practice*) which could be argued to belong to general rather

than specialized language. However, for this work, these terms are narrowly defined within the context of mental practice in music performance. Definitions were created using defining context from the corpus and resources such as general language and technical dictionaries as required. An attempt was made to create concise and neutral definitions. The definitions allow for the addition of qualifying material specific to term usage. The goal was to provide definitions that are unambiguous. One way to avoid ambiguity is to be clear with grammatical function: to "distinguish between the noun and verb forms of some words, which can be used in both forms" (Srinagesh, 2006, p. 25). The majority of terms in the corpus for this project were nouns (74 of 83); two thirds of all terms are nouns (Cabr , 1999, p. 112). To be clear about terms having both noun and verb functions, the glossary definitions for *mental practice*, *model*, *physical practice*, and *practice* differentiate between the noun and verb forms. All other terms are nouns. Differentiation was also made between conceptions of the term *imagery* for which both experiential and representational conceptions exist. A definition for the representational concept was preferred in order to avoid confusion between the terms *mental practice* and *imagery*. *Imagery* is a noun, but *practice* is both a noun and a verb; the verb form is preferable to a noun as a music performance preparation term. In addition, *practice* is an established term in the field of music, so the term *mental practice* is preferable because it shares the base term *practice*, and is a symmetrical term to *physical practice*.

As in this text, italics are used for all terms appearing in the text of the glossary. Term entry headings are boldface plain text. References used for definition creation are listed after each entry. Where "See" followed by the term name in boldface is found at the end of a term entry, the reader is referred to the base term in the glossary. Where "See also" followed by the term name in italics is found at the end of a definition, the reader is referred to a related term in

the glossary. Finally, further information such as grammatical function, defining context from the corpus, initialisms and synonyms may be found in the terminological records in the appendix of this work.

## GLOSSARY

### **auditory feedback**

Acoustic information received on the performance of a task, and used to improve music learning and/or performance (Highben & Palmer, 2004; acoustic, 2016; feedback, 2016). See also *feedback*.

### **auditory image**

Acoustic mental representation (Holmes, 2005; acoustic, 2016; image, 2016). See also *image*.

### **auditory imagery**

Collective acoustic mental representations (Cahn, 2008; imagery, 2016; Thomas, mental imagery, 2015). See also *imagery*.

### **auditory model** —See **model**

### **feedback**

Information received on the performance of a task, and used to improve music learning and/or performance. This information may be specific: auditory (information heard as sound and/or music), kinesthetic (information felt in movement), motor (information about movement), and visual (information seen) (Highben & Palmer, 2004; feedback, 2016). See also *auditory feedback*.

### **image**

Cognitive representation of an object, event, or movement in the context of *mental practice* in music (Johnson, 2011; image, 2016; Thomas, mental imagery, 2015). See also *auditory image*.

### **imagery**

Collective cognitive representations of objects, events, or movements in the context of *mental practice*. Imagery may include specific cognitive representations such as auditory, kinesthetic, motor, and visual (imagery, 2016; Thomas, mental imagery, 2015). See also *auditory imagery*, *kinesthetic imagery*, *motor imagery*, and *visual imagery*.

### **imagery ability**

Talent or skill in the use of collective mental representations of objects, events, or movements in the context of *mental practice*. Mental representations may include specific imagery such as auditory, kinesthetic, motor, and visual (ability, 2016; imagery, 2016; Thomas, mental imagery, 2015).

**imagery modality**

Form of sensory perception (auditory, kinesthetic, motor, and visual) related to the collective cognitive representations of objects, events, or movements in the context of *mental practice* (modality, 2016; imagery, 2016; Thomas, mental imagery, 2015).

**kinesthetic imagery**

Collective mental representations related to the feeling of movement without actual movement execution: a type of *motor imagery* (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007; imagery, 2016; Thomas, mental imagery, 2015). See also *imagery*.

**mental practice**

(noun) Repeated cognitive performance of an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

(verb) To repeatedly perform, cognitively, an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

**mental practice technique**

Way of executing the repeated cognitive performance of an activity in order to acquire or maintain proficiency on a musical instrument or the voice. Techniques may include the use of *score analysis*, *imagery*, and *models* (Miksza, 2011; practice, 2016; technique, 2016).

**model/modeling**

(noun) Live or recorded sound or music performance used as an example to follow in the context of music practice and performance. May be specific to auditory, kinesthetic, motor, and visual aspects of music performance (Cash, Allen, Simmons, & Duke, 2014; model, 2016).

(verb) To provide or use a live or recorded sound or music performance as an example to follow in the context of music practice and performance. May be specific to auditory, kinesthetic, motor, and visual aspects (Cash, Allen, Simmons, & Duke, 2014; model, 2016).

**motor feedback—See feedback****motor imagery**

Collective mental representations related to movement but without movement execution (imagery, 2016; Thomas, mental imagery, 2015). See also *imagery*.

**music performance**

Artistic act of presenting vocal and/or instrumental sounds (performance, 2016).

**physical practice**

(noun) Repeated performance of an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

(verb) To repeatedly perform an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

**practice**

(noun) Repeated physical and/or mental performance of an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

(verb) To repeatedly perform, physically and/or mentally, an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

See also *mental practice*; *physical practice*.

**practice strategy**

Method, involving repeated physical and/or mental performance of an activity, used in order to achieve a long term music learning and/or performance goal (Miksza, 2011; practice, 2016; strategy, 2016).

**score analysis**

Study of the elements and/or structure of a written or printed representation of a musical work with the goal of performance enhancement (Fine, Wise, Goldemberg, & Bravo, 2015; analysis, 2016).

**visual imagery**

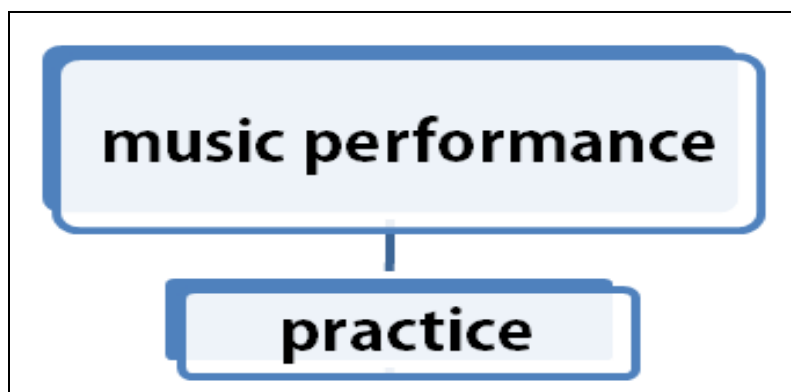
Collective optical mental representations (imagery, 2016; Thomas, 2015). See also *imagery*.



## 5.2 Taxonomy

To assist with classification and preparation of the taxonomy, a document was created in *Microsoft Word* to reorganize all terms showing the base term; for example, the term *practice* is the base of the terms *mental practice* and *physical practice*. A reorganization of the terminology by base terms made the work of classification more understandable. Only the terms selected for the glossary are used in the hierarchical taxonomy. The organizing process was achieved using the term definitions and base forms to understand hierarchical relationships and types of terminology; for example terms related either to mental practice or physical practice activities or experiences. Terms were printed on paper and cut into small pieces that could be manipulated into a tree diagram on a flat surface before being transcribed to the tree diagram at the end of this document. The taxonomy shows the term relationships in a top down fashion where each term is connected to a broader term (except the top term *music performance*) and to one or more narrower terms (Hedden, 2010). In a hierarchical taxonomy, all terms are organized into a single upside-down tree (Hedden, 2010). The purpose of the taxonomy is to classify the language of mental practice in music performance to help clarify the terminology and to illustrate the term relationships.

Beginning with the top term *music performance*, the broad topic of *practice* is the next term to be introduced (Figure 5). These terms provide the broad subject field of practice in a music performance context.



**Figure 5 Tree Diagram Segment: *music performance, practice***

*Practice* involves repeated performance in order to acquire or maintain skills in musical instrument or voice performance. In order to achieve musical performance goals, *practice strategies* may be used. These *practice strategies* may involve both *mental* and *physical practice* (Figure 6).



**Figure 6 Tree Diagram Segment: *practice, practice strategy, mental practice, physical practice***

Although *physical practice* is not the main focus of this work, it is discussed frequently in the literature as it compares to and complements *mental practice*. *Feedback*, or the information received and used to guide practice towards improvement, is an important component of *physical practice*. Two aspects of *feedback* are discussed in the literature: *motor* and *auditory feedback* (Figure 7).

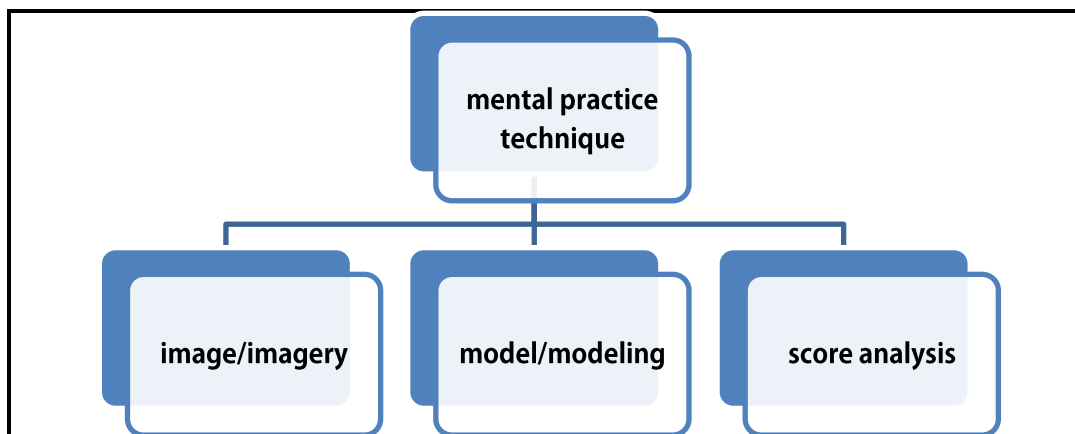


**Figure 7 Tree Diagram Segment: *physical practice, feedback, motor feedback, auditory feedback***  
*Mental practice* and the terminology used to describe it, is the focus of this work. There are different approaches to the use of *mental practice* and these are *mental practice techniques* (Figure 8).



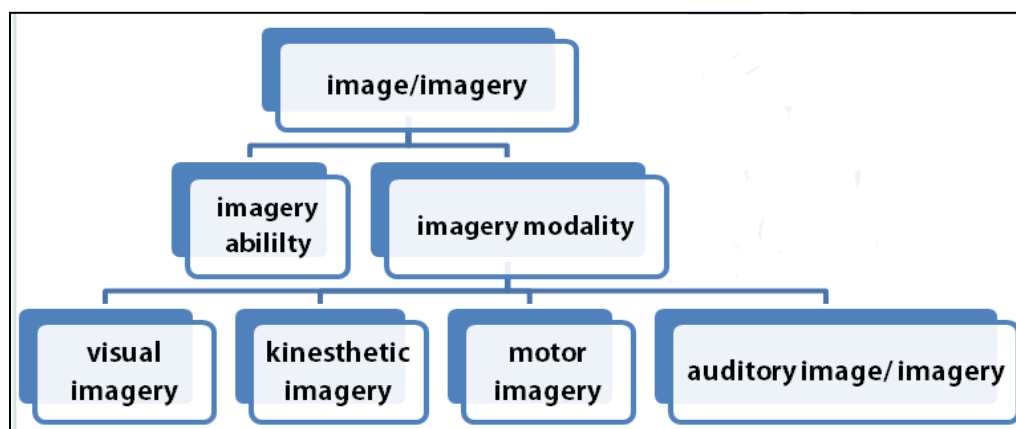
**Figure 8 Tree Diagram Segment: *mental practice, mental practice technique***

As with *physical practice*, there are many types of *mental practice techniques*, but the main types discussed in the literature are: *images* and *imagery*; *models* and *modeling*; and *score analysis* (Figure 9). *Imagery* refers to the mental representations of physical objects or events such as physical practice. *Models* refer mainly to the use of live or recorded sound used as examples to follow in practice. *Score analysis* refers to score study as a way of improving performance rather than in the musicology context.



**Figure 9** Tree Diagram Segment: *mental practice technique, image/imagery, model/modeling, score analysis*

One of the main *mental practice techniques* discussed in the literature is the use of *imagery*. In order to benefit from mental practice, the ability to imagine objects and events, such as a melody line, is important. Because of its value, discussion about *imagery ability* appears in the literature. As a way of describing *imagery* more specifically, the term *imagery modality* is used. This refers to the various forms of *imagery*: *visual imagery*, *kinesthetic imagery*, *motor imagery*, and *auditory images and imagery* (Figure 10).



**Figure 10** Tree Diagram Segment: *image/imagery, imagery ability, imagery modality, visual, kinesthetic, and motor imagery, auditory image/imagery*

The taxonomy, like the glossary, is literature-based. Beginning with the top term *music performance*, the 21 terms of the glossary have been organized into a hierarchical tree diagram to illustrate the term relationships uncovered during the process of this work of the terminology of mental practice (Figure 11). The fact that only the glossary terms are included in the taxonomy means that the taxonomy is not exhaustive. For example the term *feedback* includes *kinesthetic* and *visual* forms in addition to *auditory* and *motor*, but the terms *kinesthetic feedback* and *visual feedback* were not used enough in the literature to warrant inclusion in the glossary and are therefore absent from the taxonomy.

## TAXONOMY

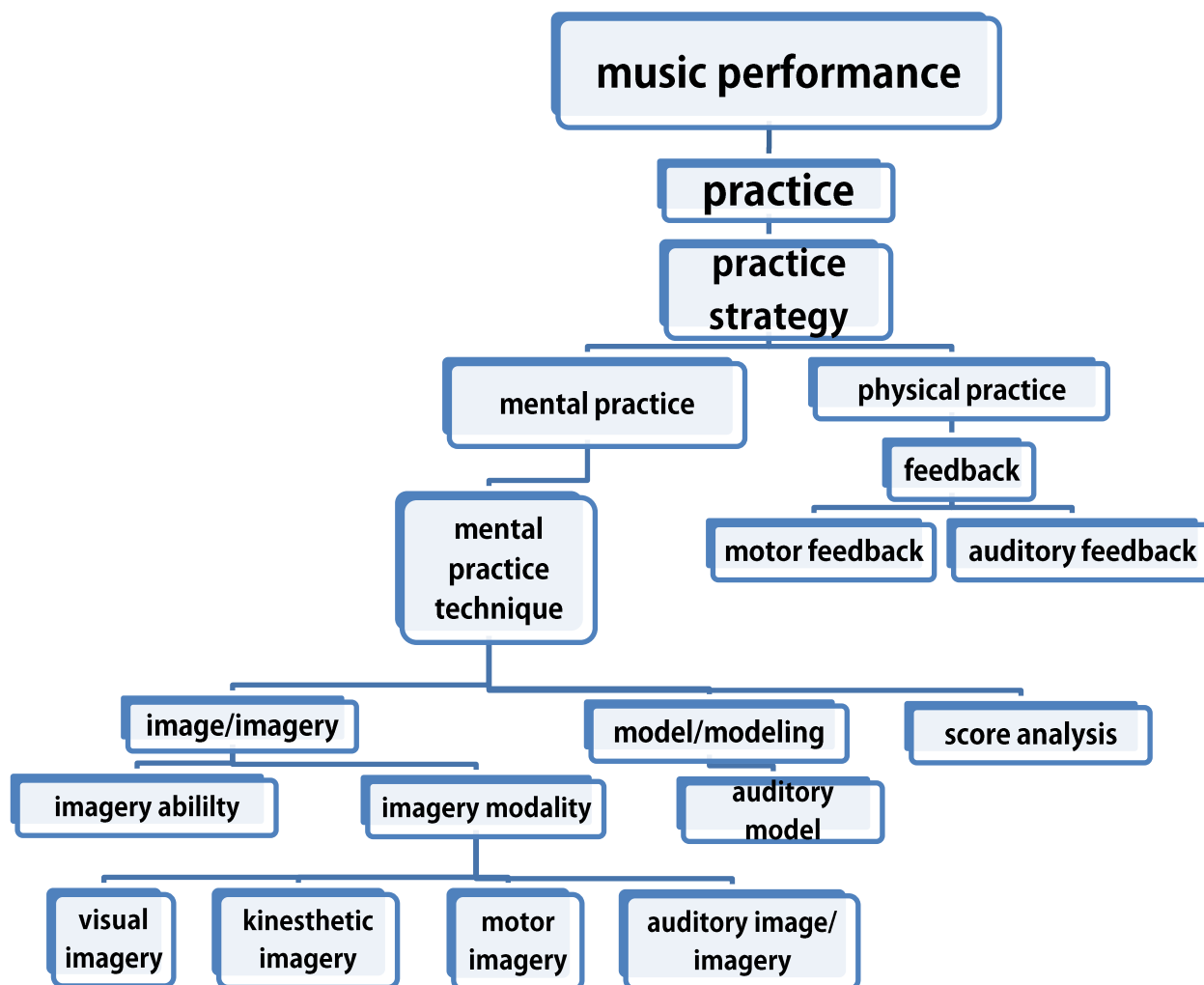


Figure 11 Complete Tree Diagram of the Taxonomy of Mental Practice in Music Performance

## Conclusion

Through a process of both quantitative and qualitative analysis, the terminology of mental practice in music performance was explored and recorded. A glossary and taxonomy were developed to help clarify this terminology and benefit readability in this field. The detail oriented nature of this work may seem inconsequential and appear to place undue emphasis on language with readability as the main objective, but a "better point of view is that readable writing is desirable and important for the reader's sake. If it is not readable to an intended reader it is not readable" (Klare, 2000, p. 11). In addition to the intended reader, terminology and readability can affect the work itself; for example where surveys and questionnaires are used in methodology, it is important that the researchers and participants all understand each term in the same way in order to achieve accurate results. Specifically, practice could be improved if key terms are always defined in the introduction section of research articles. The example seen here is taken from the first two sentences of a non music article about motor imagery by Di Rienzo, Debarnot, Daligault, Saruco, Delpuech, Doyon, Collet, and Guillot (2016): "Motor imagery (MI) is the mental representation of an action without engaging its actual execution. MI practice (MIP) refers to the repetitive use of MI to improve performance (Jackson et al., 2001)" (p. 1). This example of two short defining sentences shows recognition of the importance of clarity and readability in writing; especially academic writing.

This work represents an initial attempt to organize and clarify the terminology in the field of mental practice in music performance. Regarding methodology, it is possible that a digital search may have been beneficial in addition to the manual search and highlighting of terms; a procedure used in the field of terminology. With regard to language regionalism, it was beyond the scope of this work to address this issue in depth although there was an awareness of the

possibility of regional differences in term usage and the geographical scope of corpus items was investigated for this reason. Finally, consultation with experts in the field would have been helpful both in the identification of terminology and in the review of the glossary and taxonomy. In order to offer a measure of validity and encourage acceptance of the proposed glossary and taxonomy, it would be valuable to ask experts in the research area of mental practice in music performance to review the results (Šmite, Wohlin, Galviņa, & Prikladnicki, 2014). This involvement of experts might also work towards possible standardization of the terminology. In addition to the participation of experts in the field of mental practice in music performance, future research might also benefit from interdisciplinary work with experts in the field of terminology.

Because this terminology work is literature based, periodic updating of the terminology information and products (glossary and taxonomy) is recommended. Periodic review of the terminology work might address the evolving nature of the literature, which is the source of the terminology in the field of mental practice in music performance. This process could address issues such as term inclusion; for example terms such as *subvocalization*, *mental skills training*, and *notational audiation* are important and may be emerging terms but were not used with enough frequency in the current literature to warrant inclusion in the glossary. Future inclusion could be considered for such terms if it is found that their usage increases in frequency for example. Review of the terminology work will also allow for revision of the terminology records as necessary to ensure continued accuracy of relevant information such as frequency of use and defining context. In addition, a literature review could be conducted at a future date to see if there has been any improvement in the use of terminology or adoption of the glossary. The terminology work presented here will be considered a success if it has helped to increase



awareness about the importance of readability and the central role that terminology plays in the communication of information in the field of mental practice in music performance. The possibility of future adoption of the glossary and taxonomy as they might evolve with increased knowledge and interdisciplinary work in this field is also welcome.

## References

- Agay, D. (Ed.). (2004). *The Art of Teaching Piano*. New York: Yorktown Music Press, Inc.
- Alan Baddeley: *Introduction of the Phonological Loop* (2010). [Motion Picture]. Retrieved from <https://www.youtube.com/watch?v=2zF15C3vnIw>
- Alberts, M. (2006). *Lexicography versus Terminography*. Retrieved from [http://student.sun.ac.za/aegus/SU\\_CLAST/Presentation.htm](http://student.sun.ac.za/aegus/SU_CLAST/Presentation.htm)
- Allsop, L., & Ackland, T. (2010). The prevalence of playing-related musculoskeletal disorders in relation to piano players' playing techniques and practising strategies. *Music Performance Research* 3 (1), 61-78.
- Baddeley, A. (1992). Working Memory. *Science*, 255, 556-559.
- Bailes, F., Bishop, L. S., & Dean, R. T. (2012, December). Mental imagery for musical changes in loudness. *Frontiers in Psychology*, 3, 1-9. doi:10.3389/fpsyg.2012.00525
- Bailin, A., & Grafstein, A. (2016). *Readability: Text and Context*. Palgrave Macmillan UK. doi:10.1057/9781137388773
- Baker-Jordan, M. J. (2004). *Practical Piano Pedagogy: The Definitive Text for Piano Teachers and Pedagogy Students*. Miami: Alfred Publishing Co.
- Bastien, J. W. (1995). *How to Teach Piano Successfully*. San Diego: Neil A. Kjos Music Company.
- Bernardi, N. F., De Buglio, M., Trimarchi, P. D., Chielli, A., & Bricolo, E. (2013, August 20). Mental practice promotes motor anticipation: Evidence from skilled music performance. *Frontiers in Human Neuroscience*, 7, 1-14. doi:10.3389/fnhum.2013.00451
- Bernardi, N. F., Schories, A., Jabusch, H.-C., Colombo, B., & Altenmüller, E. (2013). Mental practice in music memorization: An ecological-empirical study. *Music Perception*, 30(3), 275-290. doi:10.1525/MP.2012.30.3.275
- Bigler, C. L., & Lloyd-Watts, V. (2011, June 13). *Bigler~Lloyd-Watts Mastering the Piano Manual*. Retrieved from <http://valerylloydwatts.com/books/mastering-the-piano-manual/#comment-694>
- Bishop, L., Bailes, F., & Dean, R. T. (2014). Performing musical dynamics: How crucial are musical imagery and auditory feedback for expert and novice musicians? *Music Perception*, 32(1), 51-66. doi:10.1525/MP.2014.32.1.51
- Brodsky, W., Kessler, Y., Rubenstein, B.-S., Ginsborg, J., & Henik, A. (2008). The mental representation of music notation: Notational audiation. *Journal of Experimental*

- Psychology: Human Perception and Performance*, 34(2), 427-445. doi:10.1037/0096-1523.34.2.427
- Brown, R. M., & Palmer, C. (2013, July 1). Auditory and motor imagery modulate learning in music performance. *Frontiers in Human Neuroscience*, 7 (320), 7, 1-13. doi:10.3389/fnhum.2013.00320
- Cabré, M. T. (1999). *Terminology: Theory, Methods and Applications*. (J. C. Sager, Ed., & J. A. DeCesaris, Trans.) Amsterdam: John Benjamins Publishing Co.
- Cahn, D. (2008). The effects of varying ratios of physical and mental practice, and task difficulty on performance of a tonal pattern. *Psychology of Music*, 36(2), 179-191. doi:10.1177/0305735607085011
- Camp, M. W. (1992). *Teaching Piano: The Synthesis of Mind, Ear and Body*. Los Angeles: Alfred Publishing Co., Inc.
- Cash, C. D., Allen, S. E., Simmons, A. L., & Duke, R. A. (2014). Effects of model performances on music skill acquisition and overnight memory consolidation. *Journal of Research in Music Education*, 62(1), 89-99. doi:10.1177/0022429413520409
- Cathcart, S. (2014, February 6). *Five Reasons Why We Should "Play" More in Instrumental Lessons*. Retrieved from <http://www.thecuriouspianoteacher.org/home/five-reasons-why-we-should-play-more-in-instrumental-lessons>
- Chaffin, R., Imreh, G. L., & Chen, C. (2003). "Seeing the big picture": Piano practice as expert problem solving. *Music Perception: An Interdisciplinary Journal*, 20 (4), 465-490.
- Chronister, R. (2005). *A Piano Teacher's Legacy*. (E. Darling, Ed.) Kingston: Frances Clark Center for Keyboard Pedagogy.
- Clark, F. (1992). *Questions and Answers: Practical Advice for Piano Teachers*. Northfield: The Instrumentalist Company.
- Clark, L. V. (1960). Effect of mental practice on the development of a certain motor skill. *Research Quarterly: American Association for Health, Physical Education and Recreation*, 31 (4), 560-569.
- Clark, T., & Williamon, A. (2011a). Evaluation of a mental skills training program for musicians. *Journal of Applied Sport Psychology*, 23, 342-359. doi:10.1080/10413200.2011.574676
- Clark, T., & Williamon, A. (2011b). Imagining the music: Methods for assessing musical imagery ability. *Psychology of Music*, 40(4), 471-493. doi:10.1177/0305735611401126

- Coats, S. (2006). *Thinking as You Play: Teaching Piano in Individual and Group Lessons*. Bloomington: Indiana University Press.
- Comeau, G. (2009). *Piano Pedagogy: A Research and Information Guide*. New York, Oxon: Routledge.
- Crawford, C. M., & Smith, M. S. (2015). Rethinking Bloom's Taxonomy: Implicit cognitive vulnerability as an impetus towards higher order thinking skills. In Z. Jin (Ed.), *Exploring Implicit Cognition: Learning, Memory, and Social Cognitive Processes* (pp. 86-103). Hershey: IGI Global. Retrieved July 11, 2016
- Di Rienzo, F., Debarnot, U., Daligault, S., Saruco, E., Delpuech, C., Doyon, J., . . . Guillot, A. (2016, June 28). Online and offline performance gains following motor imagery practice: A comprehensive review of behavioral and neuroimaging studies. *Frontiers in Human Neuroscience, 10*, 1-15. doi:10.3389/fnhum.2016.00315
- Driskell, J., Copper, C., & Moran, A. (1994). Does mental practice enhance performance? *Journal of Applied Psychology, 79*, 481-492.
- Ely, M. C., & Rashkin, A. E. (2004). *Dictionary of Music Education: A Handbook of Terminology*. Chicago: GIA Publications, Inc.
- European Parliament: TermCoord Terminology Coordination Unit. (2015). Retrieved from <http://termcoord.eu/>
- Facebook. (2015, April 28). *The Art of Piano Pedagogy*. Retrieved from [www.facebook.com/groups/123963944408115/search/?query=%22mental%20practice%22](http://www.facebook.com/groups/123963944408115/search/?query=%22mental%20practice%22)
- Fine, P. A., Wise, K. J., Goldemberg, R., & Bravo, A. (2015, March). Performing musicians' understanding of the terms "mental practice" and "score analysis". *Psychomusicology: Music, Mind, and Brain, 25*(1), 69-82. doi:10.1037/pmu0000068
- Fine, P., & Bravo, A. (2011). Rehearsal away from the instrument: What expert musicians understand by the terms "mental practice" and "score analysis". *International Symposium on Performance Science, 621-626*.
- Fleishman, E. A., & Quaintance, M. K. (1984). *Taxonomies of Human Performance: The Description of Human Tasks*. Orlando: Academic Press, Inc.
- Frenkel, M. O., Herzig, D. S., Gebhard, F., Mayer, J., Becker, C. B., & Einsiedel, T. (2014). Mental practice maintains range of motion despite forearm immobilization: A pilot study in healthy persons. *Journal of Rehabilitation Medicine, 46* (3), 225-232.

- Frewen, K. G. (2010). Effects of familiarity with a melody prior to instruction on children's piano performance accuracy. *Journal of Research in Music Education*, 57(4), 320-333. doi:10.1177/0022429409351178
- Freymuth, M. (1993). Mental practice for musicians: Theory and application. *Medical Problems of Performing Artists*, 8(4), 141.
- Gigante Klingenstein, B. (2009). *The Independent Piano Teacher's Studio Handbook*. Milwaukee: Hal Leonard Corporation.
- Godøy, R. I., & Jorgensen, H. (Eds.). (2001). *Musical Imagery*. New York: Taylor & Francis.
- Gordon, S. (1995). *Etudes for Piano Teachers: Reflections on the Teacher's Art*. New York: Oxford University Press.
- Gregg, M. J., & Clark, T. (2007). Theoretical and practical applications of mental imagery. *Proceedings of International Symposium on Performance Science 2007* (pp. 295-300). Utrecht: European Association of Conservatoires (AEC).
- Gregg, M. J., Clark, T. W., & Hall, C. R. (2008, Fall). Seeing the sound: An exploration of the use of mental imagery by classical musicians. *Musicae Scientiae*, XII(2), 231-247.
- Guillot, A., Collet, C., Nguyen, V. A., Malouin, F., Richards, C., & Doyon, J. (2009). Brain activity during visual versus kinesthetic imagery: An fMRI study. *Human Brain Mapping*, 30, 2157-2172.
- Haddon, E. (2007). What does mental imagery mean to university music students and their professors? *Proceedings of International Symposium on Performance Science 2007* (pp. 301-306). Utrecht: European Association of Conservatoires (AEC).
- Hallam, S. (1997). What do we know about practising? Towards a model synthesising the research literature. In H. Jorgensen, & A. C. Lehmann, *Does Practice Make Perfect? Current Theory and Research on Instrumental Music Practice* (pp. 179-218). Norges musikkhøgskole.
- Haroutounian, J. (2012). *Fourth Finger on B-Flat: Effective Strategies for Teaching Piano*. San Diego: Neil A. Kjos Music Company.
- Hedden, H. (2010). *The Accidental Taxonomist*. Medford: Information Today, Inc.
- Henley, P. T. (2001). Effects of modeling and tempo patterns as practice techniques on the performance of high school instrumentalists. *Journal of Research in Music Education* 49 (2), 169-180.

- Heyden, R. F. (1992). A literature-based lexicon and taxonomy of key nursing administration terminology. *Doctoral Dissertation*. Ann Arbor: University Microfilms International.
- Highben, Z., & Palmer, C. (2004). Effects of auditory and motor mental practice in memorized piano performance. *Bulletin of the Council for Research in Music Education, 159*, 58-65.
- Holmes, P. (2005). Imagination in practice: A study of the integrated roles of interpretation, imagery and technique in the learning and memorisation processes of two experienced solo performers. *British Journal of Music Education, 22*(3), 217-235.  
doi:10.1017/S0265051705006613
- Hubbard, T. L. (2010). Auditory imagery: Empirical findings. *Psychological Bulletin, 136* (2), 302-329.
- Humbley, J. (1997). Is terminology specialized lexicography? The experience of French-speaking countries. *Hermes, Journal of Linguistics, 18*, 13-31.
- Jackson, P., Lafleur, M. F., Malouin, F., Richards, C., & Doyon, J. (2001). Potential role of mental practice using motor imagery in neurologic rehabilitation. *Archives of Physical Medicine and Rehabilitation, 82*, 1133-41.
- Jacobson, E. (1932). Electrophysiology of mental activities. *The American Journal of Psychology, 44*(4), 677-694.
- Jacobson, J. M. (2006). *Professional Piano Teaching: A Comprehensive Piano Pedagogy Textbook for Teaching Elementary-Level Students*. (E. Lancaster, Ed.) Los Angeles: Alfred Publishing Co., Inc.
- Jacobson, J. M. (2015). *Professional Piano Teaching: A Comprehensive Piano Pedagogy Textbook* (Vol. II). (E. Lancaster, & A. Mendoza, Eds.) Los Angeles: Alfred Music.
- Jeannerod, M. (2006). *Motor Cognition: What Actions Tell the Self*. New York: Oxford University Press Inc.
- Johnson, R. (2011). Musical tempo stability in mental practice: A comparison of motor and non-motor imagery techniques. *Research Studies in Music Education, 33*(1), 3-30.  
doi:10.1177/1321103X11400501
- Kaennel Dobbertin, M., & Prüller, R. (n.d.). *A Short Guide to Terminology Work*. Retrieved from <http://www.iufro.org/science/special/silvavoc/archives/#c828>
- Kageyama, N. (2015). *Does Mental Practice Work?* Retrieved January 31, 2015, from The Bulletproof Musician: <http://www.bulletproofmusician.com/does-mental-practice-work/>

- Keller, P. E. (2012). Mental imagery in music performance: Underlying mechanisms and potential benefits. *Annals of the New York Academy of Sciences*, 1252, 206-213. doi:10.1111/j.1749-6632.2011.06439.x
- Keller, P. E., Dalla Bella, S., & Koch, I. (2010). Auditory imagery shapes movement timing and kinematics: Evidence from a musical task. *Journal of Experimental Psychology*, 36(2), 508-513. doi:10.1037/a0017604
- Kent, M. (2007). *The Oxford Dictionary of Sports Science & Medicine (3 ed.)*. <http://www.oxfordreference.com.proxy.bib.uottawa.ca/view/10.1093/acref/9780198568506.001.0001/acref-9780198568506-e-4297>: Oxford University Press.
- Klare, G. R. (2000, August). The measurement of readability: Useful information for communicators. *ACM Journal of Computer Documentation*, 24(3), 107-121.
- Kleber, B., Birbaumer, N., Veit, R., Trevorrow, T., & Lotze, M. (2007). Overt and imagined singing of an Italian aria. *NeuroImage*, 36, 889-900. doi:10.1016/j.neuroimage.2007.02.053
- Kochevitsky, G. A. (1967). *The Art of Piano Playing*. Secaucus: Summy Birchard Inc.
- Kropff, K. (Ed.). (2002). *A Symposium for Pianists and Teachers: Strategies to Develop the Mind and Body for Optimal Performance*. Dayton: Heritage Music Press.
- Lahav, A., Boulanger, A., Schlaug, G., & Saltzman, E. (2005). The power of listening: Auditory-motor interactions in musical training. *Annals of the New York Academy of Sciences*, 1060, 189-194. doi:10.1196/annals.1360.042
- Last, J. (1972). *The Young Pianist: An Approach for Teachers and Students*. Bristol: Oxford University Press.
- Lau, E. (2015, January). Using recordings to enhance the study of repertoire. *The Canadian Music Teacher*, 65(2), 34.
- Leroy, G., & Kauchak, D. (2014, February). The effect of word familiarity on actual and perceived text difficulty. *Journal of the American Medical Informatics Association*, 21(e1), e169-e172. doi:10.1136/amiajnl-2013-002172
- London, J. (2007). *Temporal Complexity in Modern and Post-Modern Music*. Retrieved from <http://people.carleton.edu/~jlondon/Temporal%20Complexity%20Dreamweaver.htm>
- London, J. (2012). *Hearing in Time: Psychological Aspects of Musical Meter*. New York: Oxford University Press, Inc.

- Lotto, A. J., & Holt, L. (2010). Psychology of auditory perception (pdf). *Wiley Interdisciplinary Reviews: Cognitive Science*, 1-11.
- Lotze, M. (2013, June 13). Kinesthetic imagery of musical performance. *Frontiers in Human Neuroscience*, 7, 1-9. doi:10.3389/fnhum.2013.00280
- Lyke, J., Enoch, Y., & Haydon, G. (1996). *Creative Piano Teaching*. Champaign: Stipes Publishing L.L.C.
- Maier, G. (1963). *The Piano Teacher's Companion*. Melville: Belwin Mills Publishing Corp.
- McHugh-Grifa, A. (2011). A comparative investigation of mental practice strategies used by collegiate-level cello students. *Contributions to Music Education*, 38(1), 65-79.
- Mielke, S., & Comeau, G. (2015, May). Away from the piano: Literature review of the role of mental practice. *The Canadian Music Teacher*, 65(3).
- Miksza, P. (2005). The effect of mental practice on the performance achievement of high school trombonists. *Contributions to Music Education*, 32(1), 75-93.
- Miksza, P. (2011, Fall). A review of research on practicing: Summary and synthesis of the extant research with implications for a new theoretical orientation. *Bulletin of the Council for Research in Music Education*(190), 51-92. Retrieved from <http://www.jstor.org/stable/10.5406/bulcoursmusedu.190.0051>
- Morrison, S. J., Montemayor, M., & Wiltshire, E. S. (2004). The effect of a recorded model on band students' performance self-evaluations, achievement, and attitude. *Journal of Research in Music Education*, 52 (2), 116-129.
- Moss, E. (1989). *More Than Teaching: A Manual of Piano Pedagogy*. Toronto: G.V. Thompson Music.
- Murphy, P. K., & Alexander, P. A. (2000). A motivated exploration of motivation terminology. *Contemporary Educational Psychology*, 25, 3-53. doi:10.1006/ceps.1999.1019
- Osborne, M. S., Greene, D. J., & Immel, D. T. (2014). Managing performance anxiety and improving mental skills in conservatoire students through performance psychology training: A pilot study. *Psychology of Well-Being*, 4(18), 1-17. Retrieved from <http://www.psywb.com/content/4/1/18>
- O'Shea, H., & Moran, A. (2015). Chronometric and pupil-size measurements illuminate the relationship between motor execution and motor imagery in expert pianists. *Psychology of Music*. doi:10.1177/0305735615616286



- Oversteegen, L., & Wijk, C. v. (2003, June). Lexical alternation versus word repetition: The effects of synonyms on reading time, text appreciation, and persuasiveness. *Document Design*, 4(2), 150-167. doi:10.1075/dd.4.2.05ove
- Oxford University Press. (2014). *model*. Retrieved March 3, 2014, from <http://www.oxforddictionaries.com/definition/english/model>
- Oxford University Press. (2014). *practise*. (O. U. Press, Ed.) Retrieved March 14, 2014, from <http://www.oxforddictionaries.com/definition/english/practise>
- Oxford University Press. (2016, June). *ability, n*. Retrieved June 22, 2016, from <http://www.oed.com.proxy.bib.uottawa.ca/view/Entry/313?rskey=4yRRB2&result=1#eid>
- Oxford University Press. (2016). *acoustic*. Retrieved July 2, 2016, from <http://www.oxforddictionaries.com/definition/english/acoustic>
- Oxford University Press. (2016). *analysis*. Retrieved June 26, 2016, from <https://www.oxforddictionaries.com/definition/english/analysis>
- Oxford University Press. (2016). *feedback*. Retrieved July 2, 2016, from <https://www.oxforddictionaries.com/definition/english/feedback>
- Oxford University Press. (2016). *image*. Retrieved July 2, 2016, from <https://www.oxforddictionaries.com/definition/english/image>
- Oxford University Press. (2016). *imagery*. Retrieved July 2, 2016, from <http://www.oxforddictionaries.com/definition/english/imagery>
- Oxford University Press. (2016). *modality*. Retrieved July 7, 2016, from <http://www.oxforddictionaries.com/definition/english/modality>
- Oxford University Press. (2016). *model*. Retrieved July 4, 2016, from <http://www.oxforddictionaries.com/definition/english/model>
- Oxford University Press. (2016). *performance*. Retrieved July 6, 2016, from <http://www.oxforddictionaries.com/definition/english/performance>
- Oxford University Press. (2016). *practice*. Retrieved July 6, 2016, from <http://www.oxforddictionaries.com/definition/english/practice?q=+practice>
- Oxford University Press. (2016). *strategy*. Retrieved July 6, 2016, from <http://www.oxforddictionaries.com/definition/english/strategy>
- Oxford University Press. (2016, July 6). *technique*. Retrieved from <http://www.oxforddictionaries.com/definition/english/technique>

- Parker, E., & Sheppard, L. (2006). *Piano Pedagogy: A Practical Approach*. Surrey: Longbow Publishing Ltd.
- Pavel, S., & Nolet, D. (2001). *Handbook of Terminology*. (C. Leonhardt, Trans.) Gatineau: Minister of Public Works and Government Services Canada.
- Price, H. E. (1986, Fall). A proposed glossary for use in affective response literature in music. *Journal of Research in Music Education*, 34(3), 151-159. doi:10.2307/3344745
- Repp, B. H., & Penel, A. (2004). Rhythmic movement is attracted more strongly to auditory than to visual rhythms. *Psychological Research*, 252-270.
- Robert, W. (2004). Four-way piano teaching: Criticism, demonstration, analysis, inspiration. In D. Agay (Ed.), *The Art of Teaching Piano* (pp. 457-462). New York: Yorktown Music Press, Inc.
- Rosenthal, R. K., Wilson, M., Evans, M., & Greenwalt, L. (1988). Effects of different practice conditions on advanced instrumentalists' performance accuracy. *Journal of Research in Music Education*, 36 (4), 250-257.
- Ross, S. L. (1985). The effectiveness of mental practice in improving the performance of college trombonists. *Journal of Research in Music Education*, 33 (4), 221-230.
- Royal Conservatory of Music. (2015). Resources: An addendum to the piano syllabus. In *Piano Syllabus* (Online ed., pp. 1-7). Toronto: Frederick Harris Music. Retrieved from <https://examinations.rcmusic.ca/sites/default/files/files/RCM-Piano-Resources-2015.pdf>
- Rubin-Rabson, G. (1941). Studies in the psychology of memorizing piano music: VI: A comparison of two forms of mental rehearsal and keyboard overlearning. *The Journal of Educational Psychology*, 32 (8), 593-602.
- Rutman, N., Schorr, T., & Talley, B. (2003). What "away-from-the piano" practice techniques do you use for young students? *Clavier Companion*, 14(2). Retrieved from <http://www.claviercompanion.com/Samps/Sum03/Technique.html>
- Sandor, G. (1995). *On Piano Playing: Motion, Sound and Expression*. Boston: Schirmer, Cengage Learning.
- Shepard, R. N. (1978). The mental image. *American Psychologist*, 33 (2), 125-137.
- Šmite, D., Wohlin, C., Galviņa, Z., & Prikladnicki, R. (2014). An empirically based terminology and taxonomy for global software engineering. *Empirical Software Engineering*, 19, 105-153.

- Smith, J. D., Wilson, M., & Reisberg, D. (1995). The role of subvocalization in auditory imagery. *Neuropsychologia*, *33*(11), 1433-1454.
- Srinagesh, K. (2006). *Principles of Experimental Research*. Amsterdam: Butterworth-Heinemann.
- Strobbe, L., & Regenmortel, H. v. (2012). Music theory and musical practice: Dichotomy or entwining? *Dutch Journal of Music Theory*, *17*(1), 19-30.
- Suzuki, S. (1993). *How to Teach Suzuki Piano*. Miami: Summy-Birchard Music.
- Swinkin, J. (2015). *Teaching Performance: A Philosophy of Piano Pedagogy*. Springer International Publishing. doi:10.1007/978-3-319-12514-5
- The Pavel Terminology Tutorial. (2011, 08 31). *ARCHIVED 1.2.5 Simple Terms and Complex Terms*. Retrieved from <http://www3.crtl.ca/www.bt-tb.tpsgc-pwgsc.gc.ca/btb-pavel151b.html?page=chap1-2-5&lang=eng&contlang=eng>
- The Pavel Terminology Tutorial. (2011, 08 31). *ARCHIVED 3.3.3 Scanning for Terms*. Retrieved from <http://www3.crtl.ca/www.bt-tb.tpsgc-pwgsc.gc.ca/btb-pavelf8ae.html?page=chap3-3-3&lang=eng&contlang=eng>
- The Pavel, Terminology Tutorial. (2011, August 31). *ARCHIVED 3.5.6 Elements of Good Contexts*. Retrieved from <http://www3.crtl.ca/www.bt-tb.tpsgc-pwgsc.gc.ca/btb-pavelf9d0.html?page=chap3-5-6&lang=eng&contlang=eng>
- The Pavel, Terminology Tutorial. (2011, August 31). *ARCHIVED Corpus*. Retrieved from <http://www3.crtl.ca/www.bt-tb.tpsgc-pwgsc.gc.ca/btb-pavelf66d.html?page=corpus&lang=eng&contlang=eng>
- Theiler, A., & Lippman, L. (1995). Effects of mental practice and modeling on guitar and vocal performance. *Journal of General Psychology*, *122* (4), 329-343.
- Thomas, N. J. (2014). *mental imagery*. Retrieved from <http://plato.stanford.edu/entries/mental-imagery/#ExpRep>
- Uszler, M., Gordon, S., & McBride Smith, S. (2000). *The Well-Tempered Keyboard Teacher* (2nd ed.). Belmont: Schirmer Books.
- Washburn, M. F. (1916). *Movement and Mental Imagery: Outlines of a Motor Theory of the Complexer Mental Processes*. Boston: Houghton Mifflin.
- Waterman, F. (2006). *On Piano Teaching and Performing* (Revised ed.). London: Faber Music Ltd.

- Weinberg, R. S. (1982). The relationship between mental preparation strategies and motor performance: A review and critique. *Quest*, 33 (2), 195-213.
- Whiteside, A. (1997). *Abby Whiteside on Piano Playing* (Anthology Reprint: Indispensables of Piano Playing, 1955; Mastering the Chopin Etudes and Other Essays, 1969 ed.). Montclair: Amadeus Press.
- Williamon, A. (2004). Mental skills training. In A. Williamon (Ed.), *Musical Excellence: Strategies and Techniques to Enhance Performance* (pp. 222-245). New York: Oxford University Press.
- Wöllner, C., & Williamon, A. (2007). An exploratory study of the role of performance feedback and musical imagery in piano playing. *Research Studies in Music Education*, 29, 39-54.
- Wright, D. J., Wakefield, C. J., & Smith, D. (2014). Using PETTLEP imagery to improve music performance: A review. *Musicae Scientiae*, 18(4), 448-463.  
doi:10.1177/1029864914537668
- Zatorre, R. J., & Halpern, A. R. (2005). Mental concerts: Musical imagery and auditory cortex. *Neuron*, 47, 9-12.

## Appendix

### TERMINOLOGICAL RECORDS

The terminological records are provided here as a supplement to the glossary in order to provide a detailed account of each term. A full description of the terminological record format is provided in the methodology section, chapter three 3.3.2.2. Terminological Records. The bold number given at the end of the listing 'Sources of Term' refers to the number of corpus items in which the term was found.

#### **ability**

**Grammatical Function:** noun

**Synonyms:** *skill*

**Variants:** *abilities*

**Cross-reference:** n/a

**Definition:** "A natural faculty; a particular power of the body or mind; a personal talent or skill" (Oxford University Press, 2016).

"In the context of skill acquisition, a relatively stable, largely inherited characteristic or trait that underpins and contributes to proficiency in a number of skills. Abilities can be perceptual, motor, or a combination of both. The latter are known as psychomotor abilities. Although they are not learned, abilities can be developed and extended by experience" (Kent, 2006).

**Definition Context:** none

**Sources of Definition:** (Kent, 2006) (Oxford University Press, 2016)

**Sources of Term:** in the literature, this term is used in complex terms; for example, *imagery ability*.

**Comments:** general language rather than terminology

**Date:** June 22, 2016

**Status:** preferred but not recommended for glossary

## action simulation

**Grammatical Function:** noun

**Synonyms:** *motor imagery; movement representation*

**Variants:** n/a

**Cross-reference:** *motor imagery*

**Definition:** "Action simulation occurs when sensorimotor brain processes that resemble those associated with executing an action are engaged in the absence of overt movement" (Decety, J. & Grezes, J., 2006; Gallese, V., Keysers, C., & Rizzolatti, G., 2004; and Jeannerod, M., 2006 as cited in (Keller, 2012, p. 208).

**Definition Context:** "Action simulation occurs when sensorimotor brain processes that resemble those associated with executing an action are engaged in the absence of overt movement" (Decety, J. & Grezes, J., 2006; Gallese, V., Keysers, C., & Rizzolatti, G., 2004; and Jeannerod, M., 2006 as cited in (Keller, 2012, p. 208).

"Action simulation during music performance entails running internal models that trigger auditory and motor images of one's own upcoming actions [Keller, P.E., 2008]. Thus, anticipatory imagery facilitates the planning and execution of musical actions [Keller, P.E. & Appel, M., 2010]" (Keller, 2012, p. 209).

**Sources of Definition:** (Keller, *Mental Imagery in Music Performance: Underlying Mechanisms and Potential Benefits*, 2012)

**Sources of Term:** (Keller, 2012) (Lotze, *Kinesthetic Imagery of Musical Performance*, 2013) **2**

**Comments:** insufficient usage in corpus

**Date:** June 21, 2016

**Status:** not recommended

**analysis**

**Grammatical Function:** noun

**Synonyms:** *analytical study; formal analysis; formal/structural analysis; harmonic analysis* (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013); *score analysis; score study; structural analysis; structural/formal analysis*

**Variants:** *score analysis*

**Cross-reference:** *score analysis*

**Definition:** *see score analysis*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Holmes, 2005) In the literature, this term is used in complex terms; for example, *score analysis*.

**Comments:** The term *analysis* is widely used in the field of music mainly as part of a complex term. It was decided that *score analysis* would be the most precise term for this concept.

**Date:** June 25, 2016; February 20, 2017

**Status:** not recommended

**anticipatory imagery**

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *anticipatory auditory imagery* (Keller, 2012, p. 209)

**Cross-reference:** *imagery*

**Definition:** see *imagery; mental imagery*

**Definition Context:** "Action simulation during music performance entails running internal models that trigger auditory and motor images of one's own upcoming actions [Keller, P.E., 2008]. Thus, anticipatory imagery facilitates the planning and execution of musical actions [Keller, P.E. & Appel, M., 2010]" (Keller, 2012, p. 209).

**Sources of Definition:** n/a

**Sources of Term:** (Keller, 2012) (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) **2**

**Comments:** insufficient usage in corpus

**Date:** June 20, 2016

**Status:** not recommended



## audiation

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *audiate* (verb) (McHugh-Grifa, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005, p. 76)

**Cross-reference:** *notational audiation*

**Definition:** "Audiation is the foundation of musicianship. It takes place when we hear and comprehend music for which the sound is no longer or may never have been present...Audiation is not the same as aural perception, which occurs simultaneously with the reception of sound through the ears. It is a cognitive process by which the brain gives meaning to musical sounds. Audiation is the musical equivalent of thinking in language" (The Gordon Institute for Music Learning, 2008-2016).

"A term devised by Edwin E. Gordon for the process of hearing and comprehending music internally when no physical sound is present. According to Gordon, audiation is fundamental to music aptitude and music achievement, and it is the basis of his music learning theory" (Collins, 2013, p. 18).

**Definition Context:**

"...audiation, hearing the music internally in the absence of actual sound;...." (Fine, Wise, Goldemberg, & Bravo, 2015, p. 2).

"Gordon (1993) has defined audiation as"...when one hears *and comprehends* music for which the sound is no longer or may never have been physically present" (p. 3)" (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005, p. 76).

**Sources of Definition:** (The Gordon Institute for Music Learning, 2008-2016) (Collins, 2013)

**Sources of Term:** (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Fine, Wise, Goldemberg, & Bravo, 2015) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) **3**

**Comments:** insufficient usage in corpus. As described above, this term is specific to Gordon and not widely used otherwise. There is no exact equivalent term although *auditory imagery* is similar.

**Date:** June 19, 2016

**Status:** preferred but not recommended for glossary

**auditory**

**Grammatical Function:** adjective

**Synonyms:** *aural*

**Variants:** n/a

**Cross-reference:** n/a

**Definition:** "Pertaining to the sense or organs of hearing; received by the ear" (Oxford University Press, 2016)

**Definition Context:** none

**Sources of Definition:** (Oxford University Press, 2016)

**Sources of Term:** (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Lahav, Boulanger, Schlaug, & Saltzman, 2005) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (Wöllner & Williamon, 2007) (Zatorre & Halpern, 2005) **5**

**Comments:** general language rather than terminology

**Date:** June 22, 2016

**Status:** preferred but not recommended for glossary

## auditory feedback

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *feedback*

**Cross-reference:** see also *feedback* entry in glossary

**Definition:** Acoustic information received on the performance of a task, and used to improve music learning and/or performance. (Highben & Palmer, 2004; acoustic, 2016; feedback, 2016) See also *feedback*.

**Definition Context:** "...the auditory information that performers receive in feedback about their productions,..." (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004, p. 1)

**Sources of Definition:** (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Oxford University Press, 2016) (Oxford University Press, 2016)

"Information about reactions to a product, a person's performance of a task, etc. which is used as a basis for improvement" (Oxford University Press, 2016).

**Sources of Term:** (Bishop, Bailes, & Dean, 2014) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Johnson, 2011) (Keller, 2012) (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lahav, Boulanger, Schlaug, & Saltzman, 2005) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (McHugh-Grifa, 2011) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **14**

**Comments:** the term *feedback* has been added to the glossary to include the terms *auditory*, *kinesthetic*, *motor*, and *visual feedback*. This was done because there was insufficient usage of the terms *kinesthetic*, *motor*, and *visual feedback* to warrant their inclusion in the glossary.

**Date:** July 2, 2016

**Status:** preferred

## auditory image

**Grammatical Function:** noun

**Synonyms:** *auditory template* (Cash, Allen, Simmons, & Duke, 2014, p. 95); *acoustic image/imagery* (Bailes, Bishop, & Dean, 2012); *aural image*

**Variants:** *auditory imaging* (Holmes, 2005)

**Cross-reference:** *auditory imagery*

**Definition:** Acoustic mental representation. (Holmes, 2005; acoustic, 2016; image, 2016) See also *image*.

**Definition Context:**

"From quotations relating to auditory imaging it can be assumed that he has an auditory representation of the music that is triggered by the sight of the score" (Holmes, 2005, p. 228).

**Sources of Definition:** (Holmes, 2005) (Oxford University Press, 2016) (Oxford University Press, 2016)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bishop, Bailes, & Dean, 2014) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Holmes, 2005) (Keller, 2012) (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) (Wöllner & Williamon, 2007) (Zatorre & Halpern, 2005) **10**

**Comments:** *aural image* is not recommended

**Date:** July 3, 2016

**Status:** preferred

## auditory imagery

**Grammatical Function:** noun

**Synonyms:** *music imagery; musical imagery; pitch imagery; auditory mental practice* (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004, p. 1) (Johnson, 2011)

**Variants:** *musical auditory imagery* (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (Zatorre & Halpern, 2005)

**Cross-reference:** *imagery*

**Definition:** Collective acoustic mental representations. (Cahn D. , 2008; imagery, 2016; Thomas, mental imagery, 2015). See also *imagery*.

**Definition Context:** "...mentally hearing the notes (auditory imagery)..." (Cahn D. , 2008, p. 182).

"On each trial, pianists listened to short sequences presented over headphones while reading music from notation..." (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004, p. 4)

**Sources of Definition:** (Cahn D. , 2008) (Oxford University Press, 2016) (Thomas, mental imagery, 2015)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Bishop, Bailes, & Dean, 2014) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Cahn D. , 2008) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Gregg, Clark, & Hall, 2008) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Holmes, 2005) (Johnson, 2011) (Keller, 2012) (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (McHugh-Grifa, 2011) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **22**

**Comments:** the contextual definitions above describe *auditory imagery* as experience rather than representation. The representational conception of *auditory imagery* is preferred in keeping with the representational conception for the definition of *imagery*.

*pitch imagery* appears to be used as a synonym for *auditory imagery* (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 285); or *pitch imagery* is a specific type of *auditory imagery* in (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013, p. 9) i.e. pitch but not note duration, therefore auditory imagery is a weak synonym

**Date:** July 2, 2016

**Status:** preferred

**auditory imagery skill**

**Grammatical Function:** noun

**Synonyms:** *aural skill*

**Variants:** *auditory skill*

**Cross-reference:** *imagery ability*

**Definition:** see *imagery ability*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Zatorre & Halpern, 2005) 2

**Comments:** insufficient usage in corpus

**Date:** June 25, 2016

**Status:** not recommended

## auditory model

**Grammatical Function:** noun

**Synonyms:** *aural model; model; recorded model; self-recording; performance model* (Cash, Allen, Simmons, & Duke, 2014)

**Variants:** *auditory modeling*

**Cross-reference:** *model*

**Definition:** *see model*

**Definition Context:**

"external, transitional formats of representation" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 286)

"external auditory models (e.g. recordings of experts' performances)" (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013, p. 9)

"Live and recorded performance models serve an obvious function in this regard, as models provide vivid representations of goals that learners are working to achieve, thus influencing learners' focus of attention and motivation" (Cash, Allen, Simmons, & Duke, 2014, p. 90).

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Cash, Allen, Simmons, & Duke, 2014) (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Wright, Wakefield, & Smith, 2014) **6**

**Comments:** cross reference to *model* in glossary

**Date:** June 25, 2016

**Status:** preferred



**auditory modeling**

**Grammatical Function:** verb

**Synonyms:** *aural modeling; model; modeling*

**Variants:** *auditory model*

**Cross-reference:** *model*

**Definition:** *see model*

**Definition Context:** "...auditory modeling (e.g., listening to expert performances as a way to improve one's own performance) tends to..." (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013, p. 12).

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013)

**Comments:** insufficient usage in corpus

**Date:** June 25, 2016

**Status:** preferred but not recommended for glossary

## auditory representation

**Grammatical Function:** noun

**Synonyms:** *auditory image; aural image*

**Variants:** *auditory mental representation* (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007, p. 890)

**Cross-reference:** *auditory image*

**Definition:** see *auditory image*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Holmes, 2005) (Wöllner & Williamon, 2007) **6**

**Comments:** *auditory image* is used more in the corpus, and has an association with the term *imagery* which is preferred

**Date:** June 24, 2016

**Status:** not recommended

**aural image**

**Grammatical Function:** noun

**Synonyms:** *auditory image; auditory representation*

**Variants:** *aural imagery* (Gregg, Clark, & Hall, 2008)

**Cross-reference:** *auditory image*

**Definition:** see *auditory image*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) (Wright, Wakefield, & Smith, 2014) **4**

**Comments:** homophone of *oral* which causes confusion especially when read aloud; in addition to its association with the ear and hearing, *aural* is also associated with the term *aura*; term is used with less frequency in the literature than the preferred synonym *auditory image*

**Date:** June 24, 2016

**Status:** not recommended

**aural model**

**Grammatical Function:** noun

**Synonyms:** *auditory model; model; recorded model; self-recording*

**Variants:** *recorded aural model* (Morrison, Montemayor, & Wiltshire, 2004)

**Cross-reference:** *model*

**Definition:** *see model*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010) (McHugh-Grifa, 2011) (Morrison, Montemayor, & Wiltshire, 2004) **3**

**Comments:** homophone of *oral* which causes confusion especially when read aloud; in addition to its association with the ear and hearing, *aural* is also associated with the term *aura*; term is used with less frequency in the literature than the preferred synonym *auditory model*

**Date:** June 24, 2016

**Status:** not recommended

**aural modeling**

**Grammatical Function:** noun

**Synonyms:** *auditory modeling; modeling*

**Variants:** n/a

**Cross-reference:** *model*

**Definition:** *see model*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Morrison, Montemayor, & Wiltshire, 2004) **3**

**Comments:** homophone of *oral* which causes confusion especially when read aloud; in addition to its association with the ear and hearing, *aural* is also associated with the term *aura*; although the term *aural modeling* is used more, in the literature, than preferred synonym *auditory modeling*, it is not recommended for use for the reasons given and in order to maintain consistency with the use of the term *auditory* rather than *aural*

**Date:** June 24, 2016

**Status:** not recommended

## aural skill

**Grammatical Function:** noun

**Synonyms:** *auditory skill* (Wöllner & Williamon, 2007)

**Variants:** n/a

**Cross-reference:** *imagery ability*

**Definition:** see *imagery ability*

**Definition Context:** "aural skills (e.g. the ability to perceive melodic differences)" (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007, p. 889)

**Sources of Definition:** (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007)

**Sources of Term:** (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Bishop, Bailes, & Dean, 2014) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Fine, Wise, Goldemberg, & Bravo, 2015) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (McHugh-Grifa, 2011) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Wöllner & Williamon, 2007) (Zatorre & Halpern, 2005)

**11**

**Comments:** the term *auditory* is preferred over *aural* which is a homophone of *oral* causing confusion especially when read aloud; in addition to its association with the ear and hearing, *aural* is also associated with the term *aura*

It appears as if the term *aural skill* is sometimes used to mean *auditory imagery ability*: "Two posttests were used to provide independent measures of auditory and motor imagery abilities. The auditory posttest was adapted from Wing's (1968) tests of aural skills" (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004, p. 2).

**Date:** June 24, 2016

**Status:** not recommended

**cognitive rehearsal**

**Grammatical Function:** noun

**Synonyms:** *mental practice; mental rehearsal; covert rehearsal; covert practice*

**Variants:** n/a

**Cross-reference:** *mental practice*

**Definition:** *see mental practice*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (McHugh-Grifa, 2011) 2

**Comments:** insufficient usage in corpus

**Date:** June 24, 2016

**Status:** not recommended

**covert**

**Grammatical Function:** adjective

**Synonyms:** n/a

**Variants:** *overt* (antonym)

**Cross-reference:** n/a

**Definition:** "not openly acknowledged or displayed" (Stevenson, Oxford Dictionary of English, 2015)

**Definition Context:** none

**Sources of Definition:** (Stevenson, Oxford Dictionary of English, 2015)

**Sources of Term:** (Keller, Mental Imagery in Music Performance: Underlying Mechanisms and Potential Benefits, 2012) (Mikszta, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Zatorre & Halpern, 2005) **3**

**Comments:** term *covert* implies *secret* or *hidden* which is incorrect for the purpose of this work; term *mental* is preferred (*mental practice*); insufficient use in corpus

**Date:** June 27, 2016

**Status:** not recommended



**covert practice**

**Grammatical Function:** noun

**Synonyms:** *mental practice; silent rehearsal; covert rehearsal; mental rehearsal; mental performance*

**Variants:** *covert practice strategy* (Bernardi et al, 2013);

**Cross-reference:** *mental practice*

**Definition:** *see mental practice*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) **4**

**Comments:** The term *covert* implies *secret* or *hidden* which is incorrect for the purpose of this work.

**Date:** June 25, 2016

**Status:** not recommended

**covert rehearsal**

**Grammatical Function:** noun

**Synonyms:** *mental practice; silent rehearsal; covert practice; mental rehearsal; mental performance*

**Variants:** *covert mental rehearsal*

**Cross-reference:** *mental practice*

**Definition:** *see mental practice*

**Definition Context:**

"Coffman (1990) defines mental practice as "the covert or imaginary rehearsal of a skill without muscular movement or sound" (p. 187). Other definitions similarly describe mental practice as a technique that is carried out exclusively within the imagination (Grouios, 1992; Highben & Palmer, 2004; Miksza, 2005; Ross, 1985)" (McHugh-Grifa, 2011, p. 65).

**Sources of Definition:** (McHugh-Grifa, 2011)

**Sources of Term:** (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (McHugh-Grifa, 2011) 2

**Comments:** insufficient usage in corpus

**Date:** June 25, 2016

**Status:** not recommended

## deliberate practice

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *deliberate practice strategy* (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007); *deliberate mental practice* (Wöllner & Williamon, 2007, p. 51)

**Cross-reference:** *practice*

**Definition:** see *practice*

**Definition Context:** "...deliberate practice includes expending a great deal of effort, and receiving consistent and detailed feedback from others" (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005, p. 76)

**Sources of Definition:** n/a

**Sources of Term:** (Fine & Bravo, Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis", 2011) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) (Wöllner & Williamon, 2007)

**5**

**Comments:** insufficient usage in corpus

**Date:** July 4, 2016

**Status:** not recommended

## familiarity

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *familiarity with a melody* (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010)

**Cross-reference:** n/a

**Definition:** "close acquaintance with or knowledge of something" (Stevenson, Oxford Dictionary of English, 2015)

**Definition Context:**

"Familiarity refers to having knowledge of the material in long-term memory. Thus familiarizing participants with novel material such as gestures within an experiment is one way in the future that could strengthen task comparability" (Bailes, Bishop, & Dean, 2012, p. 7)

"Before learning to play the melody, half of the children listened to a model of the melody repeatedly in music class to become familiar with the music" (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010, p. 320).

**Sources of Definition:** (Stevenson, Oxford Dictionary of English, 2015)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010) **2**

**Comments:** insufficient usage in corpus; general language rather than terminology

**Date:** June 25, 2016

**Status:** not recommended

**feedback**

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *performance feedback* (Johnson, 2011) (Wöllner & Williamon, 2007)

**Cross-reference:** n/a

**Definition:** Information received on the performance of a task, and used to improve music learning and/or performance. This information may be specific: auditory (information heard as sound and/or music ), kinesthetic (information felt in movement), motor (information about movement), and visual (information seen) (Highben & Palmer, 2004; feedback, 2016). See also *auditory feedback*.

**Definition Context:** n/a

**Sources of Definition:** (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Oxford University Press, 2016)

**Sources of Term:** (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Johnson, 2011) (Wöllner & Williamon, 2007) **3**

**Comments:** recommended for glossary - base term for all types of feedback

**Date:** July 31, 2016

**Status:** preferred

## formal analysis

**Grammatical Function:** noun

**Synonyms:** *analysis; formal/structural analysis; harmonic analysis; score analysis; score study*

**Variants:** *abstract-formal analysis; formal score analysis*, "formal/academic analysis, much more the realm of musicologists"; "practical analysis (i.e. mental practice)" (Fine & Bravo, Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis", 2011, p. 624)

**Cross-reference:** *score analysis*

**Definition:** see *score analysis*

**Definition Context:** "...building a formal structure of the piece allows the performer to use a retrieval, hierarchical scheme that results in a better organization of both practice and memory (Chaffin & Imreh, 1997). In this respect, formal analysis would facilitate the organization of the material to be remembered in chunks of information (Miller, 1956), that could be later recalled as units, thus optimizing the encoding and the retrieval of memories" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 285).

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Fine, Wise, Goldemberg, & Bravo, 2015) (Holmes, 2005) **4**

**Comments:** *formal analysis* is associated with art criticism and writing about art, and therefore not recommended for use

**Date:** June 25, 2016

**Status:** not recommended

**formal/structural analysis;structural/formal analysis**

**Grammatical Function:** noun

**Synonyms:** *analysis; formal analysis; harmonic analysis* (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013); *score analysis; score study*

**Variants:** n/a

**Cross-reference:** *score analysis*

**Definition:** see *score analysis*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Fine, Wise, Goldemberg, & Bravo, 2015) (Holmes, 2005) **4**

**Comments:** see *formal analysis*

**Date:** June 25, 2016

**Status:** not recommended

## image

**Grammatical Function:** noun; verb

**Synonyms:** *mental image; mental representation*

**Variants:** *imaged* (adjective) (Wright, Wakefield, & Smith, 2014, p. 454)

**Cross-reference:** *mental image*

**Definition:** Cognitive representation of an object, event, or movement in the context of *mental practice* in music. (Johnson, 2011; image, 2016; Thomas, mental imagery, 2015) See also *auditory image*.

**Definition Context:** "..., although images are representations of perceptions and subject to information loss, images preserve perceptions and allow intentional transformation of perceptual content (Denis, 1989/1991)" (Johnson, 2011, p. 4).

**Sources of Definition:** (Johnson, 2011, p. 4) (Oxford University Press, 2016) (Thomas, mental imagery, 2015)

**Sources of Term:** as noun (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Johnson, 2011) (Keller, 2012) (Zatorre & Halpern, 2005); as verb (Holmes, 2005) (Johnson, 2011) (Wright, Wakefield, & Smith, 2014, p. 455) 7

**Comments:** *image* (noun) is preferred because *mental image* does not work as well with complex terms; for example *auditory image* (preferred term) not *auditory mental image* (term that does not appear in the corpus)

**Date:** June 24, 2016, July 2, 2016

**Status:** preferred



## imagery

**Grammatical Function:** noun

**Synonyms:** *mental imagery*;

**Variants:** n/a

**Cross-reference:** *mental imagery*

**Definition:** Collective cognitive representations of objects, events, or movements in the context of *mental practice*. Imagery may include specific cognitive representations such as auditory, kinesthetic, motor, and visual (imagery, 2016; Thomas, mental imagery, 2015). See also *auditory imagery*, *kinesthetic imagery*, *motor imagery*, and *visual imagery*.

### Definition Context:

"Descriptive imagery, or the mental representation of objects and events using a symbolic, language-like system, has been contrasted to depictive imagery, in which represented entities are similar in form to their physical analogues and spatial and temporal relationships are preserved (Pylyshyn, 1981; Thopson, Kosslyn, Hoffman, & Van der Kooij, 2008). In many musical contexts, it is likely that depictive and descriptive imagery are used in combination" (Bishop, Bailes, & Dean, 2014, p. 62).

"...cognitive or imaginary rehearsal of a physical skill without overt muscular movement. The basic idea is that the senses—predominantly aural, visual, and kinesthetic for the musician—should be used to create or recreate an experience that is similar to a given physical event. (Connolly and Williamon 2004, p. 224)" (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011).

"There is a clear relationship between mental practice and imagery, and most researchers agree that several forms of imagery are involved in musical mental practice (Clark et al., 2012; Holmes, 2005; Lehmann, 1997). These include audiation, hearing the music internally in the absence of actual sound; visualization, seeing the score or the performance situation in one's mind; kinesthetic imagery, imagining the feel of the instrument under one's hand, for instance; motor imagery, imagining the movements required, such as fingering for pianists; and emotional imagery, imagining the expressive aspects of a performance" (Fine, Wise, Goldemberg, & Bravo, 2015, p. 2).

"White and Hardy's (1998) operational definition formed the basis of this exploration of classical musicians' use of imagery: "Imagery is an experience that mimics real experience. We can be aware of "seeing" an image, feeling movements as an image, or experiencing an image of smell, tastes or sounds without actually experiencing the real thing [...]. It differs from dreams in that

we are awake and conscious when we form an image"(p. 389) as cited in (Gregg, Clark, & Hall, 2008, p. 232).

"Imagery is the process of using multiple senses to simulate an experience in the mind (Vealey & Greenleaf, 2010), typically in the absence of overt physical movement" (Wright, Wakefield, & Smith, 2014, p. 448)

"Imagery can be performed from either a first-person perspective (1PP; i.e., individuals view themselves performing through their own eyes) or a third-person perspective (3PP; i.e., individuals view themselves performing from the viewpoint of someone else, as if seeing themselves performing on a video)" (Wright, Wakefield, & Smith, 2014, p. 457).

**Sources of Definition:** (Oxford University Press, 2016) (Thomas, mental imagery, 2015).

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Bishop, Bailes, & Dean, 2014) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011)(Fine, Wise, Goldemberg, & Bravo, 2015) (Fine & Bravo, Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis", 2011) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Gregg, Clark, & Hall, 2008) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Holmes, 2005) (Johnson, 2011) (Keller, 2012) (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (O'Shea & Moran, 2015) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **25**

**Comments:** *imagery* is preferred because *mental imagery* does not work as well with complex terms; for example *auditory imagery* (preferred term) not *auditory mental imagery* (term that does not appear in the corpus); the representational concept rather than the experiential concept is preferred - see thesis analysis section

**Date:** July 4, 2016

**Status:** preferred

## imagery ability

**Grammatical Function:** noun

**Synonyms:** *imagery skill*

**Variants:** *mental imagery ability* (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004, p. 2); *mental practice ability* (Cahn D. , 2008); *kinesthetic movement imagery ability* (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) *visual movement imagery ability* (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013)

**Cross-reference:** n/a

**Definition:** Talent or skill in the use of collective mental representations of objects, events, or movements in the context of *mental practice*. Mental representations may include specific imagery such as auditory, kinesthetic, motor, and visual (ability, 2016; imagery, 2016; Thomas, mental imagery, 2015).

**Definition Context:** "...ability to imagine the sensory outcomes and actions associated with their skill" (Brodsky et al., 2003; Highben and Palmer, 2004; Brown and Palmer, 2012 as cited in Brown & Palmer, 2013, p. 1).

"Musicians' auditory imagery abilities (as measured by the ability to imagine single pitches or continuations of pitch or temporal sequences)..." (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013, p. 3).

"Imagery ability, the quality of one's imagery, is one variable that influences this relationship" (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007).

**Sources of Definition:** (Oxford University Press, 2016) (Oxford University Press, 2016) (Thomas, mental imagery, 2015)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Bishop, Bailes, & Dean, 2014) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Gregg, Clark, & Hall, 2008) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Johnson, 2011) (Keller, 2012)

(Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) (O'Shea & Moran, 2015) **14**

**Comments:** the term *capability* is used in (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013)

**Date:** July 4, 2016

**Status:** preferred

## imagery modality

**Grammatical Function:** noun

**Synonyms:** *representation modality* (Bailes, Bishop, & Dean, 2012)

**Variants:** *imagery mode* (Keller, 2012, p. 206), see also p. 207 for description of modes (offline/prior to performance; and online/during performance)

**Cross-reference:** n/a

**Definition:** Form of sensory perception (auditory, kinesthetic, motor, and visual) related to the collective cognitive representations of objects, events, or movements in the context of *mental practice* (modality, 2016; imagery, 2016; Thomas, mental imagery, 2015).

**Definition Context:** "These different modes of imagery may also take place in different modalities—auditory, motor (proprioceptive, kinesthetic, and tactile), and visual..." (Keller, 2012, p. 207).

"This skill involves imagery in several modalities: visual (pianists "see" their hands on the keyboard), motor/kinesthetic (they "feel" the keyboard and finger motions), as well as auditory" (Zatorre & Halpern, 2005, p. 11).

*imagery*: Collective cognitive representations of objects, events, or movements in the context of *mental practice*. (from *imagery* term record)

*modality* definition: "Particular form of sensory perception:" (Oxford University Press, 2016)

**Sources of Definition:** (Oxford University Press, 2016) (Oxford University Press, 2016) (Thomas, mental imagery, 2015)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Gregg, Clark, & Hall, 2008) (Keller, 2012) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **6**

**Comments:** insufficient usage in corpus but there is no suitable synonym for the concept

**Date:** June 27, 2016; decision to give preferred status July 18, 2016

**Status:** preferred

## imagery skill

**Grammatical Function:** noun

**Synonyms:** *imagery ability*

**Variants:** n/a

**Cross-reference:** *imagery ability*

**Definition:** Talent or ability in the use of collective mental representations of objects, events, or movements in the context of mental music practice. The mental representations may include specific imagery such as auditory, kinesthetic, motor, and visual images. (Oxford University Press, 2016) (Oxford University Press, 2016) (Thomas, mental imagery, 2015)

**Definition Context:**

"...being able to imagine music in the mind: aurally, visually and kinaesthetically..." (Wöllner & Williamon, 2007, p. 39)

**Sources of Definition:** (Oxford University Press, 2016) (Oxford University Press, 2016) (Thomas, mental imagery, 2015)

**Sources of Term:** (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Keller, 2012) (Wöllner & Williamon, 2007) **5**

**Comments:** synonymous with the term *imagery ability* which is used more in the corpus and therefore preferred

**Date:** July 4, 2016

**Status:** not recommended

## imagery technique

**Grammatical Function:** noun

**Synonyms:** *mental practice technique* "In this study, experienced pianist participants...were free to choose their own mental practice technique, rather than having an imagery technique imposed upon them by the researcher" (Wright, Wakefield, & Smith, 2014, p. 451). possibly used as a synonym for *mental practice technique*

**Variants:** *imagery strategy* (Wright, Wakefield, & Smith, 2014)

**Cross-reference:** *mental practice technique*

**Definition:** see *mental practice technique*

**Definition Context:** n/a

**Sources of Definition:** n/a

**Sources of Term:** (Bishop, Bailes, & Dean, 2014) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) (Wright, Wakefield, & Smith, 2014) **4**

**Comments:** insufficient usage in corpus

**Date:** June 27, 2016

**Status:** not recommended

## imagine

**Grammatical Function:** verb

**Synonyms:** n/a

**Variants:** *image* (verb); *imagined* (adjective)

**Cross-reference:** n/a

**Definition:** "form a mental image or concept of" (Stevenson, Oxford Dictionary of English, 2015)

**Definition Context:** none

**Sources of Definition:** (Stevenson, Oxford Dictionary of English, 2015)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007); (Holmes, 2005) (Johnson, 2011) (Keller, 2012) (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) (McHugh-Grifa, 2011) (O'Shea & Moran, 2015) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **15**

**Comments:** general language rather than terminology

**Date:** June 24, 2016

**Status:** not recommended



**imagined**

**Grammatical Function:** adjective

**Synonyms:** n/a

**Variants:** n/a

**Cross-reference:** *imagery*

**Definition:** see *imagery*

**Definition Context:** "sounded and imagined music" (Bishop, Bailes, & Dean, 2014, p. 52)

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bishop, Bailes, & Dean, 2014) (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (Johnson, 2011) (Keller, 2012) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (O'Shea & Moran, 2015) (Wöllner & Williamon, 2007) (Zatorre & Halpern, 2005) **9**

**Comments:** general language rather than terminology; should be included with *imagine*

**Date:** June 24, 2016

**Status:** not recommended

**imagined movement**

**Grammatical Function:** noun

**Synonyms:** *movement imagination; motor image; motor imagery*

**Variants:** n/a

**Cross-reference:** *motor imagery*

**Definition:** see *motor imagery*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Johnson, 2011) (O'Shea & Moran, 2015) 4

**Comments:** insufficient usage to warrant the use of the term *movement*; general language rather than terminology

**Date:** June 27, 2016

**Status:** not recommended

**imagined performance**

**Grammatical Function:** noun

**Synonyms:** *mental imagery; mental practice; mental performance;*

**Variants:** *imagined mental performance* (synonym) (Wöllner & Williamon, 2007)

**Cross-reference:** *mental imagery*

**Definition:** *see mental imagery*

**Definition Context:** "...*feel* themselves playing the piano (using MI [motor imagery]) rather than simply visualising or hearing themselves playing. Participants' hands/fingers were observed and visually recorded throughout to ensure they did not move" (O'Shea & Moran, 2015, pp. Procedure, para. 2)

**Sources of Definition:** n/a

**Sources of Term:** (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (O'Shea & Moran, 2015) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Wöllner & Williamon, 2007) **4**

**Comments:** insufficient usage in corpus; general language rather than terminology

**Date:** June 27, 2016

**Status:** not recommended

**informal practice**

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *formal practice* (antonym) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011, p. 73)

**Cross-reference:** *practice*

**Definition:** *see practice*

**Definition Context:** "Informal practice is generally more exploratory in nature and immediately enjoyable..." (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005, p. 76)

**Sources of Definition:** n/a

**Sources of Term:** (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) **2**

**Comments:** insufficient usage in corpus; despite use in only two sources, a terminological record was created for this term because there is no true cross reference

**Date:** June 27, 2016

**Status:** not recommended

## internal model

**Grammatical Function:** noun

**Synonyms:** *image; mental image*

**Variants:** n/a

**Cross-reference:** *image; mental image*

**Definition:** "According to the view of the *internal model* (Wolpert et al., 1995), both MP and PP utilize forward internal models: an efferent copy of the motor command is generated in the brain each time a movement is executed, regardless of whether the execution is actual or just imagined (Frith et al., 2000). This efferent signal would be used to make predictions about the future states of the effector" (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013, p. 2)

**Definition Context:**

"According to the view of the *internal model* (Wolpert et al., 1995), both MP [mental practice] and PP [physical practice] utilize forward internal models: an efferent copy of the motor command is generated in the brain each time a movement is executed, regardless of whether the execution is actual or just imagined (Frith et al., 2000). This efferent signal would be used to make predictions about the future states of the effector" (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013, p. 2)

"...sensorimotor transformations between bodily states and events in the immediate environment are represented in the brain (Wolper, D.M., Miall, R.C., & Kawato, M., 1998). There are two types of internal models...both purportedly residing in the cerebellum and communicating with other brain regions.....see (Keller, 2012, p. 209).

**Sources of Definition:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013, p. 2) (Keller, 2012) (Lotze, *Kinesthetic Imagery of Musical Performance*, 2013) **3**

**Comments:** insufficient usage in corpus

**Date:** June 27, 2016

**Status:** not recommended

## internal representation

**Grammatical Function:** noun

**Synonyms:** *image; mental image*

**Variants:** *internal mental representation*; (Repp, 1999a as cited in (Wöllner & Williamon, 2007, p. 40)

**Cross-reference:** *image; mental image*

**Definition:** see *image; mental image*

**Definition Context:** "internal representations or mental images of the musical sound structure" (Repp, 1999a, p. 412 as cited in Wöllner & Williamon, 2007, p. 40) from a discussion of auditory feedback

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (Fine & Bravo, *Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis"*, 2011) (Holmes, 2005) (Johnson, 2011) (O'Shea & Moran, 2015) (Wöllner & Williamon, 2007) (Zatorre & Halpern, 2005) 9

**Comments:** The term *image* is also used in the literature and is used in the preferred variants and complex terms *imagery* and *mental image*.

**Date:** June 27, 2016; July 4 2016

**Status:** not recommended

## kinesthetic feedback

**Grammatical Function:** noun

**Synonyms:** *tactile feedback* (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010, p. 509); *tactile feedback* (used in same sentence with kinesthetic feedback not as synonyms - tactile feedback referring to fingertips and kinaesthetic feedback referring to hands and arms) (Wöllner & Williamon, 2007, p. 40)

**Variants:** n/a

**Cross-reference:** *feedback* entry in glossary

**Definition:** see *feedback* entry in glossary; note that *kinesthetic* relates to the feeling of movement

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Johnson, 2011) (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) (Wöllner & Williamon, 2007) **4**

**Comments:** insufficient usage in corpus; the term *feedback* has been added to the glossary to include the terms *auditory*, *kinesthetic*, *motor*, and *visual feedback*. This was done because there was insufficient usage of the terms *kinesthetic*, *motor*, and *visual feedback* to warrant their inclusion in the glossary.

**Date:** June 27, 2016

**Status:** preferred but not recommended for glossary

## kinesthetic imagery

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *kinesthetic image* (McHugh-Grifa, 2011) (Wright, Wakefield, & Smith, 2014); *kinesthetic motor imagery*

**Cross-reference:** *imagery*; *motor imagery*

**Definition:** Collective mental representations related to the feeling of movement without actual movement execution: a type of *motor imagery* (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007; *imagery*, 2016; Thomas, *mental imagery*, 2015). See also *imagery*.

**Definition Context:**

"...imagining hand movements (kinesthetic imagery)..." (Cahn D. , 2008, p. 182).

"...kinesthetic imagery, imagining the feel of the instrument under one's hand, for instance;..." (Fine, Wise, Goldemberg, & Bravo, 2015, p. 2).

"Furthermore, kinesthetic motor imagery (i.e. to try to feel the sensations that are usually felt in the muscle-tendon complexes when actually executing the movement rather than just visualizing the execution)..." (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007, p. 890)

**Sources of Definition:** (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Oxford University Press, 2016) (Thomas, *mental imagery*, 2015)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Cahn D. , 2008) (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Gregg & Clark, *Theoretical and Practical Applications of Mental Imagery*, 2007) (Gregg, Clark, & Hall, 2008) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lotze, *Kinesthetic Imagery of Musical Performance*, 2013) (McHugh-Grifa, 2011) **10**

**Comments:** *kinesthetic* differs from *motor* because it includes an emphasis on the **feeling** or **sense** of movement

**Date:** July 4, 2016

**Status:** preferred



## mental image

**Grammatical Function:** noun

**Synonyms:** *image; mental imagery; mental representation*

**Variants:** *internal representation* (Repp, 1999a as cited in (Wöllner & Williamon, 2007, p. 40)

**Cross-reference:** *image*

**Definition:** Cognitive representation of an object, event, or movement in the context of *mental practice* in music. (Oxford University Press, 2016) (Thomas, mental imagery, 2015) See also *auditory image*.

**Definition Context:**

"internal representations or mental images of the musical sound structure" (Repp, 1999a, p. 412 as cited in Wöllner & Williamon, 2007, p. 40) from a discussion of auditory feedback

**Sources of Definition:** (Oxford University Press, 2016) (Thomas, mental imagery, 2015)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Holmes, 2005) (Johnson, 2011) (Wöllner & Williamon, 2007) **8**

**Comments:** glossary entry as *image*

**Date:** July 2, 2016; July 14, 2016 revised glossary to read *image* and *imagery*

**Status:** preferred but not recommended for glossary

## mental imagery

**Grammatical Function:** noun

**Synonyms:** *imagery*

**Variants:** *mental musical imagery; mental image*

**Cross-reference:** *imagery*

**Definition:** Collective cognitive representations of objects, events, or movements in the context of *mental practice*. Imagery may include specific cognitive representations such as auditory, kinesthetic, motor, and visual. (Oxford University Press, 2016) (Thomas, mental imagery, 2015). See also *auditory imagery, kinesthetic imagery, motor imagery, and visual imagery*.

**Definition Context:**

"...mental imagery: a subjective experience of the sensory outcomes and/or actions associated with a skill, in the absence of stimulus events or performed actions" (Coffman, 1990; Driskell et al., 1994; Roure et al., 1999; Jeannerod, 2001; Zatorre and Halpern, 2005; Hubbard, 2010 as cited in Brown & Palmer, 2013, p. 1).

"Mental imagery is any experience that mimics sensory or perceptual experiences, whereby the individual is consciously aware of his/her imagery experience; thus, it differs from daydreams (Richardson 1969)" (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007).

"In all, three aspects of mental imagery used by musicians have been differentiated (Repp, 2001; Keller, 2012). Firstly, there is the silent reading of musical scores, requiring an advanced skill referred to as "notational audiation" (Brodsky et al., 2008). Secondly, there is action simulation during musical performance, including thinking of the ideal sound during performance, which might guide the movements but is also associated with the technique of anticipatory auditory imagery in playing in an ensemble (Keller, 2012). Thirdly, musicians perform mental practice away from the instrument" (Lotze, Kinesthetic Imagery of Musical Performance, 2013, p. 1).

**Sources of Definition:** (Oxford University Press, 2016) (Thomas, mental imagery, 2015)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Bishop, Bailes, & Dean, 2014) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Clark &

Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Gregg & Clark, *Theoretical and Practical Applications of Mental Imagery*, 2007) (Gregg, Clark, & Hall, 2008) (Haddon, *What Does Mental Imagery Mean to University Music Students and their Professors?*, 2007, p. 302) (Highben & Palmer, *Effects of Auditory and Motor Mental Practice in Memorized Piano Performance*, 2004) (Johnson, 2011) (Keller, 2012) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lotze, *Kinesthetic Imagery of Musical Performance*, 2013) (Wöllner & Williamon, 2007) (Zatorre & Halpern, 2005) **19**

**Comments:** see (Gregg & Clark, *Theoretical and Practical Applications of Mental Imagery*, 2007) (Gregg, Clark, & Hall, 2008) for use of *mental imagery* as synonym for *mental practice* also Lotze

**Date:** July 4, 2016; July 14, 2016 revised glossary to read *image* and *imagery*

**Status:** preferred but not recommended for glossary

**mental performance**

**Grammatical Function:** noun

**Synonyms:** *mental rehearsal*

**Variants:** n/a

**Cross-reference:** *mental practice*

**Definition:** *see mental practice*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (Wöllner & Williamon, 2007) 2

**Comments:** insufficient usage in corpus

**Date:** July 4, 2016

**Status:** not recommended

## mental practice

**Grammatical Function:** noun, verb

**Synonyms:** *mental rehearsal; mental performance; covert practice; covert rehearsal*

**Variants:** *MP* (initialism); *mentally practice* (Johnson, 2011); *mental practicing* (Wöllner & Williamon, 2007); *deliberate mental practice* (Wöllner & Williamon, 2007, p. 51); *practice mentally* (Wöllner & Williamon, 2007, p. 51); *imagery practice* (type of *MP*) (Wright, Wakefield, & Smith, 2014)

**Cross-reference:** *practice*

**Definition:**

(noun) Repeated cognitive performance of an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

(verb) To repeatedly perform, cognitively, an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

**Definition Context:**

"Mental practice (MP) is generally defined as a technique by which someone with the intent to practice creates a mental representation of a preconceived idea or action in order to enhance performance" (van Meer & Theunissen, 2009 as cited in Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 275).

"From a cognitive point of view, MP [mental practice] appears to be an automatic rather than voluntary strategy used when facing a musical task" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 285).

"These observations lead to the conclusion that that effective memorization of a piece of music by mental practice requires the mental representation of how the music sounds" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 286).

"MP [mental practice] is usually defined as the cognitive rehearsal of a task in the absence of over physical movements" (Driskel et al., 1994 as cited in Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013, p. 1).

"MP [mental practice] could also be effectively used to rehearse the sequence and to strengthen its mental representation"(Jeffrey, 1976 as cited in Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013, p. 10).

"Mental practice, or the covert rehearsal of a task without physical practice,..." (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013, p. 2).

"Driskell et al. (1994) defined MP[mental practice] as the 'cognitive rehearsal of a task in the absence of overt physical movement'" (Cahn D. , 2008, p. 179).

"Mental practice (MP) as a form of rehearsal strategy...." (Cahn D. , 2008, p. 179).

"Content analysis identified the main characteristics of mental practice as—occurring away from the instrument; involving several types of imagery, often in real time; and focusing on performance preparation, particularly aspects of execution and realization. During mental practice, the score tended to function more as a memory aid, an orientation guide, and as a point of reference for interpretation" (Fine, Wise, Goldemberg, & Bravo, 2015, p. 1).

"...it has been defined in many ways, and may be interchangeable with other similar terms. Although there is no clear consensus as to its characteristics, in music at least the term is generally agreed to cover the use of imagery (Clark et al., 2012) and the development and manipulation of cognitive representations to enhance performance (Lehmann & Davidson, 2002).....Musicians' use of mental practice primarily involves the development of motor, kinesthetic, and auditory representations to enhance performance, for instance, by assisting memorization (Bernardi, Schories, Jabusch, Colombo, & Altenmueller, 2013) and developing technical excellence in performing. Imagery is of central importance: indeed, Clark and Williamon (2012, p. 472) suggest that imagery and mental practice may be different terms for the same thing" (Fine, Wise, Goldemberg, & Bravo, 2015, pp. 1-2).

"*Mental practice* has been defined as 'cognitive or imaginary rehearsal of a physical skill without overt muscular movement' (Connolly & Williamon, 2004, p. 224; see also Clark, Lisboa & Williamon, 2014; Clark, Williamon & Aksentijevic, 2012; Coffman, 1990; Gregg, Clark, & Hall, 2008), and it is generally agreed to be an efficient means of preparing for performance" (Fine, Wise, Goldemberg, & Bravo, 2015, p. 2).

"There is a clear relationship between mental practice and imagery, and most researchers agree that several forms of imagery are involved in musical mental practice" (Clark et al., 2012; Holmes, 2005; Lehmann, 1997) as cited in (Fine, Wise, Goldemberg, & Bravo, 2015, p. 2).

"...and the respondents' statements reflected the established relationship between mental practice and imagery" (Fine, Wise, Goldemberg, & Bravo, 2015, p. 9).

"However, in addition to practicing at the instrument, one can perfectly well practice away from it, doing so in one's mind. This mental practice is a cognitive strategy conducted prior to performance that complements and enhances physical rehearsal with the instrument" (Driskell et al. 1994 as cited in (Fine & Bravo, Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis", 2011, p. 622)

"Mental practice is clearly a strategy to assist learning (whether of an instrument or specific piece) and involves the development and enhancement of internal mental representations of the piece" (Fine & Bravo, Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis", 2011, p. 622).

"Coffman (1990) described mental practice as "the covert or imaginary rehearsal of a skill without muscular movement or sound...." (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004, p. 1)

"In line with Don Coffman's definition of mental practice, I consider *mental practice* to be a 'covert or imaginary rehearsal of a skill without muscular movement or sound' (Coffman, 1990, p. 187). This definition is consistent with the one used by Driskell et al. (1994): 'Mental practice is the symbolic, covert, mental rehearsal of a task in the absence of actual, overt, physical rehearsal' (p. 481).....To summarize, mental practice is inner rehearsal of the procedural steps used in skills, and mental practice embraces a wide variety of physical and cognitive skill sets"(Johnson, 2011, p. 5).

"*undirected* mental practice....directed mental practice (instructions given during the mental practice session)" (Johnson, 2011, p. 26).

"Coffman (1990) defines mental practice as "the covert or imaginary rehearsal of a skill without muscular movement or sound" (p. 187). Other definitions similarly describe mental practice as a technique that is carried out exclusively within the imagination (Grouios, 1992; Highben & Palmer, 2004; Miksza, 2005; Ross, 1985)" (McHugh-Grifa, 2011, p. 65).

"For the purposes of the present study, the definition of mental practice was expanded to include any practice strategies that are performed without producing sound on an instrument" (McHugh-Grifa, 2011, p. 69).(operational definition)

"...it seems appropriate to suggest that defining mental practice as a silent, motionless activity is unrealistic and unnatural" (McHugh-Grifa, 2011, p. 76).

"Mental practice in music performance can be defined as "the covert or imaginary rehearsal of a skill without muscular movement or sound" (Coffman, 1990, p. 187 as cited in (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005, p. 76)

"The term motor imagery (MI) – also called mental practice (MP); Driskell, Copper, & Moran, 1994) -- refers to the conscious mental simulation of an action without concomitant bodily movement (Debarnot, Sperduti, Di Rienzo, & Guillot, 2014). This conscious simulation is thought to be constructed in working memory" (Munzert, Lorey, & Zentgraf, 2009 as cited in (O'Shea & Moran, 2015, p. 3)).

"In the context of expert performance, mental practice is commonly defined as "the cognitive or imaginary rehearsal of a physical skill without overt muscular movement" (Connolly & Williamon, 2004, p. 224)" (Wöllner & Williamon, 2007, p. 51).

"The research described above can also help illuminate how musicians use mental practice. This skill involves imagery in several modalities: visual (pianists "see" their hands on the keyboard), motor/kinesthetic (they "feel" the keyboard and finger motions), as well as auditory" (Zatorre & Halpern, 2005, p. 11).

**Sources of Definition:** (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Oxford University Press, 2016)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Cahn D. , 2008) (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011)(Fine, Wise, Goldemberg, & Bravo, 2015) (Fine & Bravo, Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis", 2011) (Gregg, Clark, & Hall, 2008) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Johnson, 2011) (Keller, 2012) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (McHugh-Grifa, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (O'Shea & Moran, 2015) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **21**

**Comments:** the term *mental practice* is preferred over terms such as *mental rehearsal* and *covert practice* because of wide usage of the term and its relationship to known term *practice* and its symmetry with the term *physical practice*.

Definition from a technical dictionary on sports science and medicine: "A form of practice in which subjects produce a vivid mental image of actually performing a technique; that is, they do not imagine that they are watching themselves perform, but they actually carry out the activity in their imagination without overt physical movement" (Kent, 2007, p. 430).

**Date:** July 6, 2016

**Status:** preferred



## mental practice strategy

**Grammatical Function:** noun

**Synonyms:** *imagery strategy* (Lotze, *Kinesthetic Imagery of Musical Performance*, 2013)  
(Wright, Wakefield, & Smith, 2014)

**Variants:** *mental practice strategies* (plural)

**Cross-reference:** *practice strategy*

**Definition:** Method, involving repeated cognitive performance of an activity, used in order to achieve a long term music learning and/or performance goal. (Miksza, *A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation*, 2011) (Oxford University Press, 2016) (Oxford University Press, 2016)

**Definition Context:** Bernardi et al, 2013 provide a questionnaire about mental practice strategies which are listed as auditory, kinesthetic, motor, and visual imageries, and analysis (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 289).

**Sources of Definition:** (Miksza, *A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation*, 2011) (Oxford University Press, 2016) (Oxford University Press, 2016)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Johnson, 2011) (McHugh-Grifa, 2011) (Wright, Wakefield, & Smith, 2014) **7**

**Comments:** decided in the end that technique, but not strategy was preferable

**Date:** July 6, 2016; August 26, 2016 (removed from glossary)

**Status:** preferred but not recommended for the glossary

## mental practice technique

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *mental practice techniques* (plural)

**Cross-reference:** n/a

**Definition:** Way of executing the repeated cognitive performance of an activity in order to acquire or maintain proficiency on a musical instrument or the voice. Techniques may include the use of *score analysis*, *imagery*, and *models* (Miksza, 2011; practice, 2016; technique, 2016).

**Definition Context:** "MP [mental practice] techniques for musicians include conducting a formal analysis of the score, listening to a recording of the piece, forming auditory imagery of the pitches, imagining movement (visually and/or kinaesthetically) and using visual imagery of the score" (Klöppel, 1996; Orloff-Tschekorsky, 1996 as cited in Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 276).

**Sources of Definition:** (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Oxford University Press, 2016) (Oxford University Press, 2016)

**Sources of Term:** (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Fine, Wise, Goldemberg, & Bravo, 2015) (Johnson, 2011) (McHugh-Grifa, 2011) (Wright, Wakefield, & Smith, 2014) 5

**Comments:**

**Date:** July 6, 2016

**Status:** preferred

## mental rehearsal

**Grammatical Function:** noun

**Synonyms:** *mental practice; mental performance; covert practice; covert rehearsal*

**Variants:** *mentally rehearse* (verb form) (Cahn D. , 2008, p. 189) (Johnson, 2011) (McHugh-Grifa, 2011); *mental music rehearsal* (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007, p. 889)

**Cross-reference:** *mental practice*

**Definition:** see *mental practice*

**Definition Context:** "mental rehearsal (which is a highly refined form of music imagery representing covert music performance)" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 442).

"Mental rehearsal, or 'thinking through' music is generally accepted to be of value in learning, but a wide awareness in either music pedagogy or music psychology has not so far been evident" (Holmes, 2005, p. 226).

"Mental rehearsal as imagining music, without actually playing, is also valued as a practice strategy in a number of ways and for several reasons" (Holmes, 2005, p. 226).

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Bishop, Bailes, & Dean, 2014) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007) (Holmes, 2005) (Johnson, 2011) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Osborne, Greene, & Immel, 2014) **14**

**Comments:** the term *mental practice* is widely used and preferred because of the base term *practice*

**Date:** July 6, 2016

**Status:** not recommended

## mental representation

**Grammatical Function:** noun

**Synonyms:** *image; mental image*

**Variants:** *auditory mental representation* (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007, p. 890)

**Cross-reference:** *image; mental image*

**Definition:** *see image; mental image*

**Definition Context:**

"Mental representations of pitch and melody have been shown to involve auditory (Deutsch, 1970; Keller et al., 1995), verbal (Keller et al., 1995), and motor processing (Mikumo, 1994; Finney and Palmer, 2003) (Bailes, Bishop, & Dean, 2012, p. 1).

"if mental representations for music are defined as 'hypothetical entities that guide our processing of music' (Schröger, 2005, p. 98), then it would be clear that how we perceive, understand, and appreciate music is determined not by the nature of the input but by what we do with it" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 442).

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Bishop, Bailes, & Dean, 2014) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Fine, Wise, Goldemberg, & Bravo, 2015) (Fine & Bravo, Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis", 2011) (Holmes, 2005) (Keller, 2012) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) (O'Shea & Moran, 2015) (Wöllner & Williamon, 2007) **11**

**Comments:** although the terms *representation* and *image* are both used in the corpus, *image* is related to *imagery* which is widely used in the literature; *mental representation* is often used to define other terms such as *imagery* (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 275) (Bishop, Bailes, & Dean, 2014, p. 62) (Fine, Wise, Goldemberg, & Bravo, 2015).

**Date:** July 4, 2016

**Status:** not recommended

**mental skills**

**Grammatical Function:** noun

**Synonyms:** *imagery ability*

**Variants:** *mental practice skill* (Cahn D. , 2008)

**Cross-reference:** *imagery ability*

**Definition:** see *imagery ability*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Gregg, Clark, & Hall, 2008) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007) (Osborne, Greene, & Immel, 2014) **4**

**Comments:** insufficient usage in corpus; avoid this term because of confusion with the term *mental skills* which includes, but is not limited to *imagery* and *mental practice* ; for example, *mental skills* includes relaxation which is not consistently considered a part of *mental practice* in music performance. (Williamon, Mental Skills Training, 2004)

**Date:** July 4, 2016

**Status:** not recommended

**mental skills training**

**Grammatical Function:** noun

**Synonyms:** *performance psychology skills training; psychological skills training; performance psychology training*

**Variants:** n/a

**Cross-reference:** n/a

**Definition:** n/a

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Osborne, Greene, & Immel, 2014) (Wright, Wakefield, & Smith, 2014) **4**

**Comments:** insufficient usage in corpus; avoid this term because of confusion with the term *mental skills* which includes, but is not limited to *imagery* and *mental practice* ; for example, *mental skills* includes relaxation which is not consistently considered a part of *mental practice*. (Williamon, Mental Skills Training, 2004)

**Date:** July 4, 2016

**Status:** not recommended

**mental skills training program**

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** n/a

**Cross-reference:** n/a

**Definition:** n/a

**Definition Context:** see p. 349 in (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) for a full description of the musician-specific mental skills training program developed for the study (operational definition)

**Sources of Definition:** (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011, p. 349)

**Sources of Term:** (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Osborne, Greene, & Immel, 2014) (Wright, Wakefield, & Smith, 2014) **3**

**Comments:** insufficient usage in corpus; avoid this term because of confusion with the term *mental skills* which includes, but is not limited to *imagery* and *mental practice* ; for example, *mental skills* includes relaxation which is not consistently considered a part of *mental practice*. (Williamon, Mental Skills Training, 2004)

**Date:** July 4, 2016

**Status:** not recommended

## mental strategy

**Grammatical Function:** noun

**Synonyms:** *imagery strategy; mental practice strategy*

**Variants:** *mental practice strategy*

**Cross-reference:** *practice strategy*

**Definition:** *see mental practice strategy; practice strategy*

**Definition Context:** "...the following strategies: mentally hearing the sound of notes, mentally feeling the movement of fingers/hands, mentally visualizing the movements of fingers/hands, mentally visualizing the score, harmonic analysis of the piece, rhythmical analysis of the piece, melodic analysis of the piece" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 280).

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Cahn D. , 2008) (Johnson, 2011) (McHugh-Grifa, 2011) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) 7

**Comments:** *mental practice strategy* is a more precise term and therefore preferred

**Date:** June 30, 2016

**Status:** not recommended



## model/modeling

**Grammatical Function:** noun; verb

**Synonyms:** *modeling*; *self-recording* (Morrison, Montemayor, & Wiltshire, 2004); *recorded model*; *auditory model*; *performance model* (Cash, Allen, Simmons, & Duke, 2014, pp. 90, 91); *visual model* (Frewen, 2010) (Miksza, 2011)

**Variants:** *modeling strategy*, *modeling skill*, *modeling behaviour*, *teacher modeling* (Morrison, Montemayor, & Wiltshire, 2004)

**Cross-reference:** n/a

### Definition:

(noun) Live or recorded sound or music performance used as an example to follow in the context of music practice and performance. May be specific to auditory, kinesthetic, motor, and visual aspects of music performance (Cash, Allen, Simmons, & Duke, 2014; model, 2016).

(verb) To provide or use a live or recorded sound or music performance as an example to follow in the context of music practice and performance. May be specific to auditory, kinesthetic, motor, and visual aspects (Cash, Allen, Simmons, & Duke, 2014; model, 2016).

**Definition Context:** "Live and recorded performance models serve an obvious function in this regard, as models provide vivid representations of goals that learners are working to achieve, thus influencing learners' focus of attention and motivation" (Cash, Allen, Simmons, & Duke, 2014, p. 90).

"Participants hear the model, retain it through practice, mentally re-create the model, and then demonstrate learning through performance. Modeling is effective because it allows learners to have an accurate representation of their target goal and use that representation to guide their practice, identify errors, and self-correct" (Frewen, 2010, p. 321).

"In music instruction, modeling has been defined as the live or recorded presentation of anything that may be imitated later by an observer (Madsen, Greer, & Madson, 1975). In music lessons or rehearsal, modeling typically consists of alternations of teacher demonstrations and student imitations, with teachers using their instrument, voice, or electronic media and students responding with their instrument or voice (Dickey, 1992)" (Frewen, 2010, p. 321).

**Sources of Definition:** (Cash, Allen, Simmons, & Duke, 2014) (Oxford University Press, 2016)

**Sources of Term:**

model: (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Cash, Allen, Simmons, & Duke, 2014) (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010) (Lahav, Boulanger, Schlaug, & Saltzman, 2005) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Morrison, Montemayor, & Wiltshire, 2004) **7**

modeling: (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Morrison, Montemayor, & Wiltshire, 2004) **3**

**Comments:** includes types: auditory, kinesthetic, motor, and visual

**Date:** July 4, 2016

**Status:** preferred

## motor feedback

**Grammatical Function:** noun

**Synonyms:** *performance feedback* (Wöllner & Williamon, 2007)

**Variants:** n/a

**Cross-reference:** *feedback* entry in glossary

**Definition:** see *feedback* entry in glossary

**Definition Context:** "...the motor information they receive from kinesthetic movements associated with the execution of the performance (Finney & Palmer, 2003; Palmer & Meyer, 2000; Ross, 1985)" (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004, p. 1)

**Sources of Definition:** n/a

**Sources of Term:** (Bishop, Bailes, & Dean, 2014) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (McHugh-Grifa, 2011) (Wöllner & Williamon, 2007) 5

**Comments:** the term *feedback* has been added to the glossary to include the terms *auditory*, *kinesthetic*, *motor*, and *visual feedback*. This was done because there was insufficient usage of the terms *kinesthetic*, *motor*, and *visual feedback* to warrant their inclusion in the glossary.

**Date:** July 2, 2016

**Status:** preferred

**motor image**

**Grammatical Function:** noun

**Synonyms:** *motor representation; movement imagery*

**Variants:** *motor imaging* (Holmes, 2005, p. 233)

**Cross-reference:** *image; motor imagery*

**Definition:** *see image; motor imagery*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bishop, Bailes, & Dean, 2014) (Holmes, 2005) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) **5**

**Comments:** insufficient usage in corpus

**Date:** July 4, 2016

**Status:** not recommended

## motor imagery

**Grammatical Function:** noun

**Synonyms:** *movement imagery; movement representation; kinesthetic imagery* (synonym); *motor imaging* (verb) (Holmes, 2005)

**Variants:** *MI* (initialism), *non-motor imagery* (related) "...two types of mental practice: one that focuses on the imagination of sound only (*non-motor imagery*)," (Johnson, 2011, p. 4); *kinesthetic motor imagery* (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007, p. 890)

**Cross-reference:** see also *imagery*

**Definition:** Collective mental representations related to movement but without movement execution (*imagery*, 2016; Thomas, *mental imagery*, 2015). See also *imagery*.

**Definition Context:**

".... motor imagery, imagining the movements required, such as fingering for pianists;..." (Fine, Wise, Goldemberg, & Bravo, 2015, p. 2).

"....motor/kinesthetic imagery (for instance, imagining fingerings)" (Fine, Wise, Goldemberg, & Bravo, 2015, p. 8).

"...but the particular concept of motor imagery– imagining the actual physical *feeling* of playing is probably the least understood" (Holmes, 2005, p. 233).

"...type [of mental practice] that focuses on the imagination of performance movements (motor imagery)" (Johnson, 2011, p. 4).

"Furthermore, kinesthetic motor imagery (i.e. to try to feel the sensations that are usually felt in the muscle-tendon complexes when actually executing the movement rather than just visualizing the execution)..." (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007, p. 890)

"The term motor imagery (MI) – also called mental practice (MP); Driskell, Copper, & Moran, 1994) -- refers to the conscious mental simulation of an action without concomitant bodily movement (Debarnot, Sperduti, Di Rienzo, & Guillot, 2014)" (O'Shea & Moran, 2015, p. 3).

"Motor imagery is the imagination of the kinesthetics involved in actual movement..." (Zatorre & Halpern, 2005, p. 10)

**Sources of Definition:** (Oxford University Press, 2016) (Thomas, *mental imagery*, 2015)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Fine, Wise, Goldemberg, & Bravo, 2015) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Holmes, 2005) (Johnson, 2011) (Keller, 2012) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (O'Shea & Moran, 2015) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **16**

**Comments:**

Confusion caused by both terms "motor imagery" and "kinesthetic imagery" used in the same sentence: "This result is also in line with the finding that corticospinal facilitation during motor imagery is associated with ease of kinesthetic imagery in both expert athletes (Fourkas et al., 2008) and in the general population (Williams et al., 2012)" (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013, p. 11).

Both terms "motor imagery" and "kinesthetic imagery" are used as separate terms p. 1, 2 and as one term "motor/kinesthetic imagery" p. 8 (Fine, Wise, Goldemberg, & Bravo, 2015) which causes confusion.

See (Johnson, 2011, p. 4) for explanation of why the author chose 'non-motor' rather than 'auditory' imagery.

**Date:** July 4, 2016

**Status:** preferred

## motor learning

**Grammatical Function:** noun

**Synonyms:** *motor skill learning* or *practice* (Wright, Wakefield, & Smith, 2014, p. 456); *sensorimotor learning* (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013)

**Variants:** n/a

**Cross-reference:** n/a

**Definition:** n/a

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010) **2**

**Comments:** insufficient usage in corpus; *learning* is an orphan term in this corpus about music performance in general rather than learning specifically; if *learning* was included, other terms such as *memorization* would also need to be included as they were both topics of study in some of the literature.

**Date:** July 4, 2016

**Status:** not recommended

## motor performance

**Grammatical Function:** noun

**Synonyms:** *movement execution*

**Variants:** *motor skill performance* (Wright, Wakefield, & Smith, 2014)

**Cross-reference:** *performance*; *music performance* (similar)

**Definition:** Observable production of a voluntary movement or a motor skill (Kent M. , 2006) (Schmidt & A., 2008, p. 11).

**Definition Context:** none

**Sources of Definition:** (Kent M. , 2006) (Schmidt & A., 2008, p. 11)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Johnson, 2011) (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lahav, Boulanger, Schlaug, & Saltzman, 2005) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (Wöllner & Williamon, 2007) **7**

**Comments:** *music performance* is not really a synonym in all circumstances; for example, the term is used as task performance by (Wöllner & Williamon, 2007); insufficient usage in corpus

**Date:** July 7, 2016

**Status:** preferred but not recommended for glossary



**motor practice**

**Grammatical Function:** noun

**Synonyms:** *physical practice*

**Variants:** n/a

**Cross-reference:** *physical practice*

**Definition:** *see physical practice*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Johnson, 2011); used as methodology term (Wright, Wakefield, & Smith, 2014) **3**

**Comments:** insufficient usage in corpus

**Date:** June 25, 2016

**Status:** not recommended

**motor representation**

**Grammatical Function:** noun

**Synonyms:** *kinesthetic representation* (Wöllner & Williamon, 2007, p. 49); *motor imagery*; *somatosensory representation* (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013); *movement representation*

**Variants:** n/a

**Cross-reference:** *motor imagery*

**Definition:** see *motor imagery*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (O'Shea & Moran, 2015) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) 7

**Comments:** *image/imagery* are preferred terms for this complex term i.e. *motor imagery*

**Date:** July 4, 2016

**Status:** not recommended

**movement execution**

**Grammatical Function:** noun

**Synonyms:** *motor performance*

**Variants:** n/a

**Cross-reference:** *motor performance*

**Definition:** n/a

**Definition Context:** *see motor performance*

**Sources of Definition:** n/a

**Sources of Term:** (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (O'Shea & Moran, 2015) 3

**Comments:** insufficient usage in corpus

**Date:** June 24, 2016

**Status:** not recommended

**movement imagery**

**Grammatical Function:** noun

**Synonyms:** *motor image; motor imagery; motor mental practice* (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Johnson, 2011)

**Variants:** n/a

**Cross-reference:** *motor imagery*

**Definition:** see *motor imagery*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Johnson, 2011) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (O'Shea & Moran, 2015) 5

**Comments:** less used synonym of *motor imagery*

**Date:** July 3, 2016

**Status:** not recommended

**movement representation**

**Grammatical Function:** noun

**Synonyms:** *motor image; motor imagery; motor representation*

**Variants:** n/a

**Cross-reference:** *image; motor imagery*

**Definition:** see *image; motor imagery*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (O'Shea & Moran, 2015) **3**

**Comments:** insufficient usage in corpus to warrant the use of the term *movement*

**Date:** July 4, 2016

**Status:** not recommended

## music imagery

**Grammatical Function:** noun

**Synonyms:** *auditory imagery; imagery; mental imagery; pitch imagery*

**Variants:** *mental musical imagery* (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007); *musical auditory imagery* (Zatorre & Halpern, 2005, p. 11); *musical imagery*

**Cross-reference:** *imagery*

**Definition:** see *imagery*

**Definition Context:** "Music images possess a sensory quality that makes the experience of imagining music similar to that of perceiving music (Zatorre & Halpern, 1993; Zatorre, Halpern, Perry, Meyer, & Evans, 1996)" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 427).

**Sources of Definition:** n/a

**Sources of Term:** (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Johnson, 2011) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **7**

**Comments:** the term is used as a synonym of *imagery* which is widely used and therefore preferred.

**Date:** June 24, 2016, July 2, 2016

**Status:** not recommended

## music performance

**Grammatical Function:** noun

**Synonyms:** *performance*

**Variants:** *musical performance* (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (McHugh-Grifa, 2011, p. 65)

**Cross-reference:** n/a

**Definition:** Artistic act of presenting vocal and/or instrumental sounds (performance, 2016).

**Definition Context:** "Music performance serves as an excellent model for studying MP [mental practice] because it is made up of tasks with complex cognitive elements (to a greater extent than in sport performance). At the same time, for a musician, performance is something that is natural to provide (thus, being ecologically valid) and for a scientist the performance is an output that can be objectively measured....In the field of music performance, MP has been used and taught at least since the contribution of the well-known piano teacher Karl Leimer and his most famous pupil Walter Giesecking (Barry & McArthur, 1994; Leimer & Giesecking, 1998; McMillan, 2005)" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 275).

**Sources of Definition:** (Oxford University Press, 2016)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Bishop, Bailes, & Dean, 2014) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Cahn D. , 2008) (Cash, Allen, Simmons, & Duke, 2014) (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Holmes, 2005) (Johnson, 2011) (Keller, 2012) (Keller, Dalla Bella, & Koch, Auditory Imagery Shapes Movement Timing and Kinematics: Evidence From a Musical Task, 2010) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (McHugh-Grifa, 2011) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) (Osborne, Greene, & Immel, 2014) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **22**

**Comments:** preferred to the term *performance*; specific to music whereas *performance* can refer to general task performance for example

**Date:** July 6, 2016

**Status:** preferred

## musical imagery

**Grammatical Function:** noun

**Synonyms:** *auditory imagery; imagery; mental imagery; pitch imagery*

**Variants:** *mental musical imagery* (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007); *music imagery; musical auditory imagery* (Zatorre & Halpern, 2005, p. 11)

**Cross-reference:** *imagery*

**Definition:** see *imagery*

**Definition Context:**

"Veridical expectations that are highly accessible to conscious awareness can be described as musical imagery (Bailes & Delbé, 2009)" (Bishop, Bailes, & Dean, 2014, p. 51).

"Musical imagery is defined here as the conscious experience of music that is not an immediate consequence of its production or perception" (Bishop, Bailes, & Dean, 2014, p. 52).

Bishop, Bailes, & Dean, 2013 definition is given in (Fine, Wise, Goldemberg, & Bravo, 2015)

"Musical imagery has been defined as "our mental capacity for imagining sound in the absence of a directly audible sound source" (Godøy and Jørgensen 2001). The experience may be manifest in multiple ways, including deliberate use (to rehearse musical ideas, to experience a musical work in one's mind, to analyze and imagine a new score, or to compose) and non-deliberate use, such as hearing music in the mind as an involuntary experience (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007, p. 302).

"...musical imagery – consisting of either auditory or kinesthetic modalities or both..." (Johnson, 2011, p. 27)

"Musical imagery is assumed to be a multimodal process by which an individual generates the mental experience of auditory features of musical sounds, and /or visual, proprioceptive, kinesthetic, and tactile properties of music-related movements, that are not (or not yet) necessarily present in the physical world. Such mental images may be generated through either deliberate thought or automatic responses to endogenous and exogenous cues" (Keller, 2012, p. 206).

"...musicians' imagery for musical movement and sound..." (Wöllner & Williamon, 2007, p. 41)

**Sources of Definition:** n/a



**Sources of Term:** (Bishop, Bailes, & Dean, 2014) (Fine, Wise, Goldemberg, & Bravo, 2015) (Gregg, Clark, & Hall, 2008) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007) (Johnson, 2011) (Keller, 2012) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (Wöllner & Williamon, 2007) (Zatorre & Halpern, 2005) 9

**Comments:** the term is used as a synonym of *imagery/mental imagery* which are widely used and preferred. In addition the adjective *musical* is grammatically incorrect in this usage: the imagery itself is not *musical* but rather is related to the field of *music*.

**Date:** July 3, 2016

**Status:** not recommended

## notational audiation

**Grammatical Function:** noun

**Synonyms:** *music audiation* (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005, p. 77)

**Variants:** *audiation*

**Cross-reference:** *audiation*

**Definition:** "Gordon (1975) called the internal analog of aural perception *audiation*; he further referred to *notational audiation* as the specific skill of "hearing" the music one is reading before physically hearing it performed on an instrument" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 427).

**Definition Context:**

"Gordon (1975) called the internal analog of aural perception *audiation*; he further referred to *notational audiation* as the specific skill of "hearing" the music one is reading before physically hearing it performed on an instrument" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 427).

"Notational audiation is the ability to internally "hear" the music one is reading before physically hearing it performed on an instrument" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 427).

"Our previous findings (Brodsky et al., 1998,1999, 2003) suggest that notational audiation is a process engaging kinesthetic-like covert excitation of the vocal folds, and hence we have theorized that the mind's representation of music notation might not have anything at all to do with hearing per se" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 428).

"...we observed that among musicians who have demonstrable notational audiation skills, music notation appears to be quite automatically and effortlessly transformed from its inherently visual form into an accurate, covert aural–temporal stream perceived as kinesthetic phonatory and manual motor imagery" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 443).

"We therefore conclude that both kinesthetic-like covert excitation of the vocal folds and concurrently cued manual motor imagery are equally vital components that operate as requisite codependent cognitive strategies toward the interpretation and/or judgement of the visual score—a skill referred to as notational audiation" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 443).

**Sources of Definition:** (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 427)

**Sources of Term:** (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Keller, 2012) (Lotze, *Kinesthetic Imagery of Musical Performance*, 2013) **5**

**Comments:** insufficient usage in corpus; term is specific to Gordon and not widely used otherwise. There is no exact equivalent term although *auditory imagery* is similar.

**Date:** June 30, 2016

**Status:** not recommended

**overt**

**Grammatical Function:** adjective

**Synonyms:** n/a

**Variants:** *overt practice strategy*; *covert* (antonym)

**Cross-reference:** *physical practice*

**Definition:** see *physical practice*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Johnson, 2011) (Keller, 2012) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Zatorre & Halpern, 2005) 5

**Comments:** general language rather than terminology; synonyms: undisguised, unconcealed, clear, apparent, obvious, etc.; there are better terms to use for this concept (see Cross-reference)

**Date:** June 18, 2016

**Status:** not recommended

## performance

**Grammatical Function:** noun

**Synonyms:** *motor performance; music performance* (near synonyms)

**Variants:** n/a

**Cross-reference:** *motor performance; music performance*

**Definition:** see *motor performance; music performance*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Bishop, Bailes, & Dean, 2014) (Brown & Palmer, Auditory and Motor Imagery Modulate Learning in Music Performance, 2013) (Cahn D. , 2008) (Cash, Allen, Simmons, & Duke, 2014) (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Fine & Bravo, Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis", 2011) (Frewen, Effects of Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Holmes, 2005) (Johnson, 2011) (Keller, Mental Imagery in Music Performance: Underlying Mechanisms and Potential Benefits, 2012) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Lahav, Boulanger, Schlaug, & Saltzman, 2005) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (McHugh-Grifa, 2011) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) (Morrison, Montemayor, & Wiltshire, 2004) (Osborne, Greene, & Immel, 2014) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) **26**

**Comments:** near synonym for *motor performance; music performance* which are also widely used and more specific; general language rather than terminology

**Date:** July 6, 2016

**Status:** preferred but not recommended for glossary

## physical practice

**Grammatical Function:** noun, verb

**Synonyms:** *rehearsal*; *normal practice* (in which auditory and/or motor feedback were present) (Highben & Palmer, *Effects of Auditory and Motor Mental Practice in Memorized Piano Performance*, 2004, pp. 6-7)

**Variants:** *PP* (initialism); *physically practice* (Wright, Wakefield, & Smith, 2014, p. 449)

**Cross-reference:** also *practice*

**Definition:**

(noun) Repeated performance of an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

(verb) To repeatedly perform an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

**Definition Context:**

"PP [physical practice] intrinsically implies MP [mental practice] processes, despite the subjects' honest attempt to avoid them" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 285).

" 'ecologically valid' PP [physical practice] (not assumed to exclude MP [mental practice] processes)" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 287).

"Practicing the sequence through actual movements is regarded as the most effective way to accomplish learning" (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013, p. 10).

"Traditional physical practice was used as a control condition" (McHugh-Grifa, 2011, p. 65)(explanatory not defining)

**Sources of Definition:** (Miksza, *A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation*, 2011) (Oxford University Press, 2016)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, *Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance*, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Brown & Palmer, *Auditory and Motor Imagery Modulate Learning in Music Performance*, 2013) (Cahn D. , 2008) (Clark & Williamon,

Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Gregg, Clark, & Hall, 2008) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Johnson, 2011) (Lahav, Boulanger, Schlaug, & Saltzman, 2005) (Lotze, Kinesthetic Imagery of Musical Performance, 2013) (McHugh-Grifa, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) **16**

**Comments:** note the operational definition which does not exclude mental practice (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013)

**Date:** July 6, 2016

**Status:** preferred

## practice

**Grammatical Function:** noun, verb

**Synonyms:** *rehearse; musical practice* (McHugh-Grifa, 2011, p. 68)

**Variants:** n/a

**Cross-reference:** n/a

**Definition:**

(noun) Repeated physical and/or mental performance of an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

(verb) To repeatedly perform, physically and/or mentally, an activity in order to acquire or maintain proficiency on a musical instrument or the voice (Miksza, 2011; practice, 2016).

See also *mental practice; physical practice*.

**Definition Context:**

"Effective practice in music has been defined by Hallam (1997) as 'that which achieves the desired end product, in as short a time as possible without interfering with longer term goals'" (Cahn D. , 2008, p. 189).

"Music "practice" and "practicing" in this paper refers to individually oriented self-study directed, no matter how strictly, toward attaining musical proficiency on an instrument or the voice. Although practicing overlaps a great deal with other manifestations of musical learning (e.g., score study for conducting, chamber rehearsing, music analysis", this paper is oriented toward performance competence" (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011).

**Sources of Definition:** (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Oxford University Press, 2016)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, Mental Practice Promotes Motor Anticipation: Evidence from Skilled Music Performance, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Cahn D. , 2008) (Cash, Allen, Simmons, & Duke, 2014) (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Fine & Bravo, Rehearsal Away from the Instrument: What Expert Musicians Understand by the Terms "Mental Practice" and "Score Analysis", 2011) (Frewen, Effects of



Familiarity With a Melody Prior to Instruction on Children's Piano Performance Accuracy, 2010) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007) (Highben & Palmer, Effects of Auditory and Motor Mental Practice in Memorized Piano Performance, 2004) (Holmes, 2005) (Johnson, 2011) (Lahav, Boulanger, Schlaug, & Saltzman, 2005) (McHugh-Grifa, 2011) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) (Morrison, Montemayor, & Wiltshire, 2004) (Wöllner & Williamon, 2007) (Wright, Wakefield, & Smith, 2014) **20**

**Comments:** types of practice (insufficient usage in corpus): *deliberate practice* (see terminological record); *effective practice* (Cahn D. , 2008)

**Date:** July 6, 2016

**Status:** preferred

## **practice strategy**

**Grammatical Function:** noun

**Synonyms:** *rehearsal strategy*

**Variants:** *practice strategies* (plural); *deliberate practice strategy* (Haddon, What Does Mental Imagery Mean to University Music Students and their Professors?, 2007)

**Cross-reference:** n/a

**Definition:** Method, involving repeated physical and/or mental performance of an activity, used in order to achieve a long term music learning and/or performance goal (Miksza, 2011; practice, 2016; strategy, 2016).

**Definition Context:** none

**Sources of Definition:** (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Oxford University Press, 2016) (Oxford University Press, 2016)

**Sources of Term:** (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Cahn, 2008) (Clark & Williamon, Imagining the Music: Methods for Assessing Musical Imagery Ability, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Frewen, 2010) (Holmes, 2005) (Johnson, 2011) (McHugh-Grifa, 2011) (Miksza, A Review of Research on Practicing: Summary and Synthesis of the Extant Research with Implications for a New Theoretical Orientation, 2011) (Miksza, The Effect of Mental Practice on the Performance Achievement of High School Trombonists, 2005) **11**

**Comments:**

**Date:** July 6, 2016

**Status:** preferred

**practice technique**

**Grammatical Function:** noun

**Synonyms:** *rehearsal technique* (Cahn, 2008) (Johnson, 2011)

**Variants:** n/a

**Cross-reference:** see also *mental practice technique*

**Definition:** Way of executing the repeated mental or physical performance of an activity in order to acquire or maintain proficiency on a musical instrument or the voice. (Oxford University Press, 2016) (Oxford University Press, 2016)

**Definition Context:** "...several rehearsal techniques, including PP [physical practice] and MP [mental practice]..." (Cahn, 2008, p. 179).

**Sources of Definition:** n/a

**Sources of Term:** (Johnson, 2011) (Clark & Williamon, Evaluation of a Mental Skills Training Program for Musicians, 2011) (McHugh-Grifa, 2011) (Wright, Wakefield, & Smith, 2014) **4**

**Comments:** insufficient usage in corpus

**Date:** June 28, 2016

**Status:** preferred but not recommended for glossary

**recorded model**

**Grammatical Function:** noun

**Synonyms:** *audio recording; auditory recording; self-recording; model*

**Variants:** n/a

**Cross-reference:** *model*

**Definition:** *see model*

**Definition Context:**

"Live and recorded performance models serve an obvious function in this regard, as models provide vivid representations of goals that learners are working to achieve, thus influencing learners' focus of attention and motivation" (Cash, Allen, Simmons, & Duke, 2014, p. 90).

**Sources of Definition:** n/a

**Sources of Term:** (Cash, Allen, Simmons, & Duke, 2014) (Frewen, 2010) (Morrison, Montemayor, & Wiltshire, 2004) **3**

**Comments:** insufficient usage in corpus

**Date:** June 28, 2016

**Status:** not recommended

**rehearsal**

**Grammatical Function:** noun

**Synonyms:** *practice*

**Variants:** *rehearse* (verb)

**Cross-reference:** *practice*

**Definition:** *see practice*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Fine & Bravo, 2011) (Gregg & Clark, Theoretical and Practical Applications of Mental Imagery, 2007) (Johnson, 2011) (Morrison, Montemayor, & Wiltshire, 2004) (McHugh-Grifa, 2011) **8**

**Comments:** insufficient use in corpus compared to *practice*; *rehearsal* is used with the same meaning as *practice*, but also to mean practice with an ensemble causing confusion; *practice* is used more in the literature and preferred over the term *rehearse* therefore *rehearsal* is not recommended

**Date:** June 23, 2016

**Status:** not recommended

**rehearsal strategy**

**Grammatical Function:** noun

**Synonyms:** *practice strategy*

**Variants:** n/a

**Cross-reference:** *practice strategy*

**Definition:** *see practice strategy*

**Definition Context:** "...rehearsal strategies, which must be distinguished from other techniques of emotional and mental training for performance preparation (e.g., relaxation training, meditation, visualization of prescribed images; see Connolly & Williamon, 2004, for a review)" (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013, p. 275).

**Sources of Definition:** (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Williamon, 2004)

**Sources of Term:** (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Cahn, 2008) (Johnson, 2011) 3

**Comments:** insufficient usage in corpus

**Date:** June 25, 2016

**Status:** not recommended

**rehearse**

**Grammatical Function:** verb

**Synonyms:** *practice*

**Variants:** *rehearsal* (noun)

**Cross-reference:** *practice*

**Definition:** see *practice*

**Definition Context:** "so the musician will usually practice or rehearse the piece" (Fine, Wise, Goldemberg, & Bravo, 2015, p. 2).

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Fine & Bravo, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (McHugh-Grifa, 2011) **5**

**Comments:** insufficient usage in corpus; *practice* is preferred

**Date:** June 23, 2016

**Status:** not recommended

**representation**

**Grammatical Function:** noun

**Synonyms:** *image; mental image*

**Variants:** *visual representation* (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013)

**Cross-reference:** *image*

**Definition:** *see image*

**Definition Context:** none

**Sources of Definition:** n/a

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (Cash, Allen, Simmons, & Duke, 2014) (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (Frewen, 2010) (Holmes, 2005) (Johnson, 2011) (Lotze, *Kinesthetic Imagery of Musical Performance*, 2013) (Miksza, *The Effect of Mental Practice on the Performance Achievement of High School Trombonists*, 2005)**10**

**Comments:** general language rather than terminology; *image* is preferred

**Date:** June 24, 2016; July 4, 2016

**Status:** not recommended



## score analysis/score study

**Grammatical Function:** noun

**Synonyms:** *analysis*; *formal analysis*; *formal/structural analysis*; *harmonic analysis* (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013)

**Variants:** n/a

**Cross-reference:** n/a

**Definition:** Study of the elements and/or structure of a written or printed representation of a musical work with the goal of performance enhancement (Fine, Wise, Goldemberg, & Bravo, 2015; analysis, 2016).

**Definition Context:** "Score analysis was considered more theoretical, though still relevant for performance preparation at a range of levels from exploratory to detailed. During score analysis, information primarily increased musical understanding of the piece, and related to both structural (e.g., form, harmony) and aesthetic (e.g., tempo, phrasing) aspects" (Fine, Wise, Goldemberg, & Bravo, 2015, p. 1).

"Score analysis is primarily about understanding the piece from the point of view of its structure (but also aesthetics) as gleaned from the score. It is thought of as theoretical but still relevant to realization, interpretation, and memorization" (Fine, Wise, Goldemberg, & Bravo, 2015, p. 7).

"Analytical approaches toward the score aim to discover what is or is not structural within the musical discourse (White, 1994). Several performance implications arise from this structural knowledge, such as enabling the performer to enhance interesting details" (Fine, Wise, Goldemberg, & Bravo, 2015, p. 3).

**Sources of Definition:** (Fine, Wise, Goldemberg, & Bravo, 2015; analysis, 2016).

**Sources of Term:** *score analysis* (Fine, Wise, Goldemberg, & Bravo, 2015) (Fine & Bravo, 2011) 2; *score study* (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) 1

**Comments:** insufficient usage in corpus, however *score analysis* was considered to be the most precise term for this concept.

**Date:** June 26, 2016; February 20, 2017

**Status:** the term *score analysis* is preferred

## subvocalization

**Grammatical Function:** noun

**Synonyms:** n/a

**Variants:** *subvocal rehearsal*; *subvocal motor rehearsal* (Bailes, Bishop, & Dean, 2012)

**Cross-reference:** n/a

**Definition:** "...the experience of an inner voice without vocal output or environmental input" (Brodsky, Henik, Rubinstein, & Zorman, 2003, p. 602 as cited in (McHugh-Grifa, 2011, p. 69).

**Definition Context:** "subvocalization (which is the seat of music imagery generated by the inner voice when one reads music notation)" (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008, p. 443).

"Similarly, auditory imagery in mental practice has been linked to subvocalization which can be defined as "the experience of an inner voice without vocal output or environmental input" (Brodsky, Henik, Rubinstein, & Zorman, 2003, p. 602 as cited in (McHugh-Grifa, 2011, p. 69).

**Sources of Definition:** (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Brodsky, Kessler, Rubenstein, Ginsborg, & Henik, 2008) (McHugh-Grifa, 2011) **3**

**Comments:** insufficient usage in corpus

**Date:** June 25, 2016

**Status:** preferred but not recommended for glossary

## visual imagery

**Grammatical Function:** noun

**Synonyms:** *mental visualization* (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013)

**Variants:** *visual imaging* (verb and noun) (Holmes, 2005, p. 225)

**Cross-reference:** *imagery/mental imagery*

**Definition:** Collective optical mental representations (imagery, 2016; Thomas, 2015). See also *imagery*.

**Definition Context:** "...visual imagery (imagining the score),..." (Fine, Wise, Goldemberg, & Bravo, 2015, p. 8)

**Sources of Definition:** (Oxford University Press, 2016) (Thomas, 2015)

**Sources of Term:** (Bailes, Bishop, & Dean, 2012) (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013) (Brown & Palmer, 2013) (Cahn, 2008) (Clark & Williamon, *Imagining the Music: Methods for Assessing Musical Imagery Ability*, 2011) (Fine, Wise, Goldemberg, & Bravo, 2015) (Haddon, 2007) (Holmes, 2005) (Gregg & Clark, *Theoretical and Practical Applications of Mental Imagery*, 2007) (Keller, 2012) (Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) (Wright, Wakefield, & Smith, 2014) (Zatorre & Halpern, 2005) **14**

**Comments:** the contextual definition above describes *visual imagery* as experience rather than representation. The representational conception of *visual imagery* is preferred.

**Date:** July 2, 2016

**Status:** preferred

**visualization**

**Grammatical Function:** noun

**Synonyms:** *visual imagery*

**Variants:** *mental visualization* (Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013) (Bernardi, Schories, Jabusch, Colombo, & Altenmüller, 2013); *visualize* (verb) (Brown & Palmer, 2013)

**Cross-reference:** *imagery; mental imagery; visual imagery*

**Definition:** see *imagery; visual imagery*

**Definition Context:** "...visualization, seeing the score or the performance situation in one's mind;..." (Fine, Wise, Goldemberg, & Bravo, 2015, p. 2).

**Sources of Definition:** n/a

**Sources of Term:** (Fine, Wise, Goldemberg, & Bravo, 2015) (Fine & Bravo, 2011) (Johnson, 2011) 3

**Comments:** general language rather than terminology; insufficient usage in corpus; potential for confusion with the terms *creative visualization; guided visualization* which have different meanings

**Date:** June 23, 2016

**Status:** not recommended