11-11-2020 12:45 PM

See It and Believe It: An Investigation into Singers' Imagery Use

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Musical Arts degree in Music

Abstract

Sport and dance psychology researchers have shown, time and again, how imagery improves performance in their respective fields. In singing, imagery has a long history in the *bel canto* (beautiful singing) tradition but it is more linked to using metaphor and simile as teaching aids rather than a mental practice technique to improve performance. Because of this, imagery in singing is even broader than imagery in athletics or dance. Moreover, imagery in singing psychology has not been as thoroughly examined in an empirical setting, especially not from a sport and dance psychology perspective.

This monograph aims to outline the term "imagery" in its many forms and applications to sport, singing, and other fields to better understand the term across disciplines. For the purposes of this monograph, the author is operating under the definition of imagery from a sport and dance psychology perspective, whereby imagery is an experience that mimics a real experience. It occurs in the mind's eye. It is multi-sensory, meaning that it is not limited to visualization, but encompasses all five senses as well as the kinesthetic sense.

The guiding questions of this study were concerned with the individual singer's use of imagery and how this differs between professional singers and student singers. This study was based on the author's previous work where singers used imagery for vocal technique, performance anxiety and goals, and characterization, i.e., portrayal of characters, in their own personal singing. This research used a study-specific survey to explore the nature and function of singers' imagery use with respect to vocal technique, performance anxiety and goals, and characterization. 130 singers were surveyed to determine the nature and function of their imagery use. Findings of the study revealed that no group differences exist between

professional and student singers' imagery use. There was a significant difference between males and females on the characterization subscale, suggesting that female singers may use imagery for characterization more so than males.

Keywords

imagery, mental imagery, classical, singing, pedagogy

Summary for Lay Audience

This investigation uses a study-specific questionnaire to examine the reasons why classical singers (sometimes referred to as operatic singers) may use imagery. Imagery is an experience that mimics a real experience. It occurs in our mind's eye and it is different from dreaming in that we are awake and conscious. It is different from thinking because it is often associated with a performance goal, e.g., memorization or characterization. Imagery users may not know they are using imagery or may refer to it as "mental practice." A review of the literature demonstrates this overlap in the understanding of "imagery" and "mental practice." Some researchers view imagery as a component of mental practice while others view them as the same. Both perspectives are outlined and discussed. Furthermore, in past musical imagery studies, there is a lack of consideration for previous work that has been done in the sport psychology domain, as well as in dance psychology. The literature review aims to correct this and build upon similar imagery work in other disciplines.

A survey method was chosen to reach as many classical singers as possible. The survey was based on a previous study where the author found that singers use imagery for vocal technique, performance anxiety and goals, and characterization. 130 singers comprised of both professionals and students were surveyed to understand the reasons why they may use imagery in their own personal singing. This survey also sought to determine if there were any differences in imagery use in professionals and students to inform future training of young singers.

While no group differences were found, this study revealed that female singers may use imagery for characterization more so than males. The practical implications of the study are

wide and varied for classical singers, singing teachers, and future researchers into singing psychology.

Acknowledgments

The completion of a doctoral monograph would not be possible without the contributions and support of many individuals. Dr. Sophie L. Roland, committee chairperson, co-supervisor, and my voice teacher, has provided unswerving support, guidance, and encouragement throughout the years of my doctoral work. Dr. Craig Hall, co-supervisor, and on whose work much of this monograph is based, has guided the technical aspects of this document with patience and understanding. Dr. Sarah Deck has assisted in the analysis portions of this monograph and has served as unofficial statistics consultant.

I am grateful to Dr. Krista Chandler and Dr. Melanie Gregg for their input on the survey items. This also extends to my colleagues in the program who provided feedback on the survey items.

I express my deepest thanks to my family and my friends, especially my mother and brother, for supporting me through this process. Special thanks to my dear friend, Shannon Thompson, for serving as editor of the more technical sections of the monograph.

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Preface

I was raised in a musical family. My earliest memory is singing in the choir with my mother – at the top of my lungs with a descant harmony that was, no doubt, imprecise. I was often involved in choirs and school musicals, but it was not until age sixteen that I began to take voice lessons. I immediately loved them and dreamed of becoming a famous singer. The only problem was that I was one of those lucky individuals who not only excelled in music, but in many other subjects as well. I needed only to choose one to pave the way to my future. Not one to be pigeon-holed, I decided to pursue both music and something more "practical" simultaneously.

I enrolled in the Bachelor of Human Kinetics degree at the University of Windsor while studying music largely outside of school. During these years, I took an interest in sport psychology although I had never been an athlete. There I found many similarities between the challenges that athletes face before a game or a competition and the challenges that musicians face, specifically, singers, before an audition or performance. This connection made sense to me because at their core, athletes and singers are both performers, making the psychology behind their performance similar, as well. After that, I made a point to take as many sport psychology classes as possible to see if I could draw further parallels between athletes and singers.

Over the course of my undergraduate degree, I was able to make further connections between both groups, not just in the ways that each group performs and competes, but in the ways that they train and prepare themselves for performance and competition. Even at this early stage I knew that I had a worthy interdisciplinary research topic, so I decided to return to my passion and begin a Master's degree of Music in 2014. That year, I crafted my first research proposal

for the Social Sciences and Humanities Research Council's CGS-Master's award and was fortunate enough to receive one. Since then, I have expanded upon my original idea and have begun working with one of the foremost Canadian researchers in sport psychology, Dr. Craig R. Hall, at Western University, who has helped me to hone and refine my research idea. With his expertise and that of my supervisor, accomplished mezzosoprano and Chair of Music Performance Studies at the Don Wright Faculty of Music, Dr. Sophie L. Roland, I have the perfect marriage of co-supervisors from both the sport psychology and singing fields.

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Chapter 1

1 Purpose of the Study

Hall et al. (2009a) found that athletes of higher skill levels employ all five functions of imagery (i.e., cognitive general, cognitive specific, motivation specific, motivation general-mastery, motivation general-arousal) more frequently than athletes participating at lower skill levels. Thus, professional singers were sought to participate in the present study. Their results were compared to student-level singers to investigate their use of imagery and determine if there were any differences between the two groups.

The purpose of this study was to examine the reasons why professional and student singers may use imagery, and to then compare the results to expand the discourse on training for both professional and non-professional singers. The findings have implications for all singers, singing teachers, singing researchers, and those interested in the psychology of singing.

1.1 Why study expert performance?

The reason for examining the use of imagery in experts is in line with that of Siegler's for investigating adult cognition in developmental psychology: "Knowledge of the adult cognitive system is useful for studying changes in children's thinking. It is much easier to study development when we know where the development is going," (Siegler, 1986, p. 361). Compared with novices, expert musicians are better equipped to adapt to novel situations, are more able to recount what happened during performance, perform more reliably, and are less encumbered by external stimuli (Lehmann & Davidson, 2002).

Naturally, we want to investigate how experts achieve these results and see if we can use them to influence training in novice musicians through imagery. I propose that imagery is an important tool for expert musicians, and especially, expert singers.

1.2 Why imagery?

I chose imagery as the focus of my research because it is a well-documented topic in sport, especially in elite adult athletes (cf. Hall, 2001), and previous sport literature has established that athletes can benefit from using imagery in sports to enhance performance (Morris, Spittle, & Watt, 2005). I propose that this not only applies to athletes, but to those that work in any kind of high-stakes performance setting, such as singing. In my own singing, I have suffered from crippling performance anxiety where I was unsure whether I would be able to walk onstage without forgetting every single word. In my very first performance at Western University, I performed the role of Musetta in Puccini's *La Bohème.* I was waiting in the wings for my entrance and my heart was thumping out of my chest and I could not remember my first line. As my entrance got closer and my panic rose even further, I stopped and took a pause. I remembered that I had had experiences like these before and had still succeeded. I remembered my imagery routine that I had learned and developed from my undergraduate studies in kinesiology, which involved the following cues: "Inhale, exhale, imagine calming scenery, like a meadow, picturing my bathroom pep talk where I remind myself of previous success." Not only did I experience all these images visually, I felt and sensed them through my auditory and kinesthetic senses as well. These are all examples of an imagery experience. It was multi-sensory. It was different from dreaming because I was awake and conscious. I was aware of using it.

The images occurred in my mind with the purpose of calming me down for performance. In this moment of clarity, I told myself that I had two options: to let this anxiety consume me and completely take over, or to view it as facilitative and use it to fuel my energy for performing. I chose the latter. I had the wherewithal to make this choice because of my imagery training. All this happened in mere minutes before my stage entrance, but it worked. In this scenario, I used imagery as an emergency brake to reduce my performance anxiety and to fuel my self-confidence for performance. It can be applied in many other situations. I have used it countless times in performance, in practice, in lessons, in auditions, and in rehearsal. I have become a more adept "imagery user" because I use it so often and I want other singers to be able to use imagery too. I hope that this research will help other singers to understand the term "imagery" from a broader perspective than what is typically taught in vocal pedagogy. This knowledge has implications for singers to overcome their own anxiety and to enhance their performance in many other ways. Imagery is not a cure-all method, but it paves the way for a more confident performance.

> The effectiveness of mental rehearsal techniques depends on the degree to which they are incorporated into active practicing, preparing, and performing. They cannot substitute for other forms of preparation, but they do provide an extra margin of security because they can reinforce learning. They make it possible to visualize the ideal performance of a work – even if it's not actually possible to achieve this, (Salmon & Meyer 1992, p. 182).

Singing is as much a mental task as it is a physical task and therefore, requires efficient practice in both areas. Singers are taught to train the physical side of singing on a regular

basis, but rarely are they taught to train the mental side of singing, simply because little is known about mental training techniques for singers.

> It is my understanding that in artistic singing and, consequently in vocal pedagogy, no satisfactory results can be obtained without mental concepts, without training mental awareness, without training the ear, and without training the ability of the imagination (Guenter, 1992, p. 46).

Singing is a highly cognitive task that requires attention to multiple areas simultaneously. These include, but are not limited to the following: text, memorization, music, collaboration with other instrument(s), connecting with the conductor, acting, stage movement, singing in a foreign language, complicated costumes, heavy make-up and wigs, singing in a variety of styles from eras spanning as much as four hundred years, all while dealing with nerves from being in a high-stakes performing situation. It is because of these considerations in singing that mental training techniques such as imagery are worthy of further investigation and standard application in the voice pedagogy field. Once more knowledge in this field is acquired, mental training components of singers may have to be deferred to someone other than the voice teacher, such as an imagery consultant.

1.3 Background

This study is a continuation of a previous qualitative study entitled “Investigating the Circumstances under which Singers use Imagery,” (DeSantis, Deck, & Hall, 2019). Semi-structured interviews using Munroe, Giacobbi, Jr., Hall, & Weinberg’s (2000) 4 Ws framework (Where, When, What, Why) were conducted with six high-level singers. Findings from this study revealed that singers used imagery for vocal technique,

performance anxiety and goals, and characterization. The research questions that follow seek to build upon this initial study by providing quantitative evidence to better understand the reasons why singers may use imagery. This, in turn, can then help researchers, singers, and teachers of singing understand what aspects of imagery use can be applied to improving performance. Finally, by investigating both professional and non-professional singers' use of imagery, we can provide valuable insights into music education, thereby influencing training.

1.4 Research Questions

1. What are the reasons why singers may use imagery?
2. How can this knowledge be utilized to improve their performance?
3. How does the use of imagery differ between professional singers and student singers?

1.5 Significance of the Study

The populations that will benefit from this study are singers of both professional and non-professional caliber, including teachers of singing as well as other musicians and their teachers. Non-singing musicians may benefit from this research; however, singing musicians need to be separated from non-singing musicians because of the text, memorization, and dramaturgy that singers incorporate into their practice.

1.6 Limitations to the Study

This study is modelled on the work of Hall, Mack, Paivio, and Hausenblas (1998) in their study: *Imagery Use by Athletes: Development of the Sport Imagery Questionnaire*, as well as Nordin and Cumming's study: *Measuring the Content of Dancers' Images: Development of the Dance Imagery Questionnaire* (2006a). Typically, there are more

people participating in sport and dance, which allows for a larger sample size. Because of this, the participant pool was not as wide for the present study. However, the present sample size is greater than that of many mental practice and music performance studies in the literature. In the studies reviewed in this document, sample sizes are often less than 100 (e.g., Bernardi et al., 2013). Furthermore, given that there are far more female singers than male singers, professional or non-professional, the sample size is slanted towards the female population.

1.7 Glossary

***Ability of the Imagination** – how one is able to accurately envision images, clarity, vividness, etc.

Auditory Imagery – acoustic mental representations of objects or events (Cahn, 2008; "Imagery", 2016; Thomas, 2014)

***Extramusical** – outside the realm of music.

Flow – a state of consciousness where one becomes totally absorbed in what one is doing, to the exclusion of all other thoughts and emotions. It is a harmonious experience where mind and body are working together effortlessly, leaving the person feeling that something special has just occurred (Jackson & Csikszentmihalyi, 1999, p. 5)

Image – Mental representation (auditory, kinesthetic, motor, and/or visual) of an object, event or movement (Johnson, 2011); "Image", 2016; Thomas (2014).

Imagery – Imagery is an experience that mimics real experience or approximates a desirable sensation. We can be aware of 'seeing' an image, feeling movements as an image, or experiencing an image of smell, taste or sounds without experiencing the real thing. Sometimes people find that it helps to close their eyes. It differs from dreams in that we are awake and conscious when we form an image, (Nordin and Cumming, 2006a, p. 87).

Imagery Ability – the user's capacity to implement imagery. Imagery ability may not be viewed and assessed as a single construct, rather, that it has three distinguishable, observable, and measurable features (Denis, 1991; Moran, 1993). These involve "vividness, which refers to the clarity of an image; controllability, relating to the ease and accuracy with which a person can manipulate an image; and accuracy of reference, or the

extent to which the image accurately reflects the object it represents," (Clark et al., 2012, p. 358).

***Imagery Use** – the way performers implement imagery into their routines.

Kinesthetic Imagery – 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, 2014)

"Kinesthetic imagery involves feelings of force and motion or the mental simulation of sensations associated with bodily movements," (Moran & MacIntyre, 1998, p. 406).

Layered Images – a term that comes from Nordin and Cumming's 2005 study where dancers created images that were layered in terms of function and reason. Typically, the layers were created by first imaging skills, like a pirouette, and thereafter adding qualitative elements such as emotions and characterization on top (p. 410).

***Mental Awareness** – being conscious of one's mental state and able to discern from one to another state, i.e., daydreaming, being in the zone/flow state, normal attention, etc.

***Mental Concepts** – perceptions of the vocal physiology to help singers understand the internal vocal mechanism.

Mental Practice – "Mental practice refers to the cognitive rehearsal of a task in the absence of overt physical movement. When a musician practices a passage by thinking it through or when an athlete prepares for an event by visualizing the steps required to perform the task, he or she is engaging in mental practice," (Driskell, Copper, & Moran, 1994, p. 481).

Metaphor – Metaphors can be seen as conceptual processes in which we comprehend one concept (target domain) in terms of another concept (source domain), as described by the conceptual metaphor theory," (Schaerlaeken et al., 2019; Johnson, 1987; Lakoff & Johnson, 1980).

Mnemonic Device – any learning tool to help retention and retrieval (memory). Mnemonic devices provide a way of externally organizing information that might not be inherently organized (Reisberg, 2001), thus facilitating learning and remembering the information. The most successful mnemonic devices are ones that (a) create a structure for the learned material, (b) supply an easy-to-remember memory record of the material, and (c) help facilitate a future retrieval process (Rainey & Larsen, 2002).

Motor Imagery – Mental representations related to movement but without movement execution ("Imagery", 2016; Thomas, 2014)

*__Non-professional Singer__ – a novice or student singer who has been taking classical voice lessons at the university level and is enrolled in an undergraduate or graduate voice performance degree.

__*Pitch Imagery__ – imagining the pitches in one's mind.

*__Professional Singer__ – one who is currently performing in a minimum of five public performances per year and receiving remuneration for their work.

__Self-efficacy__ – situation-specific self-confidence (Bandura, 1997).

__Visual Imagery__ – optical mental representations of objects, events, or movements ("Imagery", 2016; Thomas, 2014).

*The above are operational definitions created by the author for the purposes of the monograph.

(Musical terms retrieved from Naxos Musical Glossary)

__Appoggio__ – "By singing *appoggiata*, is meant that all notes from the lowest to the highest, are produced by a column of air over which the singer has perfect command, by holding back the breath, ad not permitting more air than is absolutely necessary for the formation of the note to escape from the lungs," (F. Lamperti, 1916, p. 22).

__Crescendo__ – (Italian: growing, becoming louder) is frequently used as a dynamic instruction to performers.

__Decrescendo__ – (Italian: growing less) is used as a direction to performers, meaning becoming softer.

__Legato__ – (Italian: smooth) is used as an instruction to performers. It is the opposite of *staccato*, which indicates a shortening and consequent detaching of notes.

__Melisma__ – one syllable sung over many notes.

__Singing Formant__ – Singers in general and operatic (especially male) singers, in particular, strive to enrich and enhance their singing voice by developing the singer's formant, which provides the voice with a special "ring," as well as causing an increase in signal intensity, resulting from the clustering of the third, fourth, and fifth formants near 3 kHz, (Sundberg, 1987, 1990, 2001). This is attained by lowering the larynx and widening the hypopharynx. Thus, it is an articulatory phenomenon within the vocal tract that enhances the resonance. As an acoustic correlate, this clustering of formants promotes extra energy in the higher frequency range, allowing the singer to be heard without amplification over an accompanying orchestra.

The singing formant gives the voice its characteristic tonal quality. Many studies have identified the presence of the ‘singer’s formant,’ which is created by clustering formants F_3, F_4, and F_5 (Kouroupetroglou, 2014; Joliveau, Smith, & Wolfe, 2004).

Staccato – short, detached notes.

Timbre – the perceived sound quality of a musical note.

Chapter 2

2 Review of the Literature

In this chapter, imagery's roots as a form of mental practice and its applications to performance in both the sport and music domains will be outlined. Definitions and theories of imagery will also be reviewed.

2.1 Mental Practice and Performance

Mental practice is a common term used in both sport and music. The research that employs this terminology is reviewed below.

2.2 Mental Practice in Sport

Only in the last three to four decades has the mental aspect of sport performance been on the rise in scholarly study. This is due to the relationship between the mental and physical sides of performance; not to be treated separately, but in tandem for optimal performance gains. For example, according to Herrera and Vargas (2019),

> If mood or concentration are low, not only is the physical performance in training or competition hindered, but it also affects continuity within a given sports discipline. With mental practice, mental aspects of performance like self-talk, self-perception, pre-competitive anxiety, self-confidence, concentration, and motivation are improved, which also leads to an increase in athletes' personal wellbeing. (p. 96)

While the breadth of the research on sport psychology has been conducted within the last half-century, its roots stretch as far back as 1890 when William James first mentioned mental practice and stated that "each representation of movement somehow arouses the actual movement," (p. 562). However, its application to the sport and exercise world

became more prominent following 1994 when Driskell, Copper, and Moran conducted a meta-analysis of mental practice as a technique that could benefit performance. They explain mental practice as follows:

> Mental practice refers to the cognitive rehearsal of a task in the absence of overt physical movement. When a musician practices a passage by thinking it through or when an athlete prepares for an event by visualizing the steps required to perform the task, he or she is engaging in mental practice. (Driskell, Copper, & Moran, 1994, p. 481)

Mental practice involves rehearsing a task or skill in the mind's eye without any physical movement. A widely accepted definition of mental practice was developed by Richardson as "the symbolic rehearsal of a physical activity in the absence of any gross muscular movements," (1967, p. 95). Mental practice has many monikers, including, imaginary practice (Perry, 1939); covert rehearsal (Corbin, 1967); symbolic rehearsal (Sackett, 1934); and introspective rehearsal or conceptualization (Egstrom, 1964). Given the overlap between these terms, there is some confusion amongst learners of what mental practice entails and how it differs from mental preparation. An important distinction is that the latter is a more general term, and it involves improving performance by incorporating any of the following: positive imagery methods, increasing arousal, enhancing attention, relaxation, and including self-efficacy (i.e., situation-specific self-confidence; Bandura, 1997) affirmations prior to performance (cf. Caudill, Weinberg, & Jackson, 1983; Hall & Erffmeyer, 1983; Shelton & Mahoney, 1978). In contrast, mental practice refers to rehearsing the necessary steps to perform a task in the mind's eye without any physical aspect of the task getting involved.

Mental practice is commonly used amongst athletes to complement physical practice (Cocks, Moulton, Luu, & Cil, 2014) and its efficacy is supported within many different sport activities (Martin et al., 1999). In 1983, Feltz and Landers synthesized the relevant data into a meta-analysis of sixty studies which investigated the effects of mental practice on motor skill learning and performance. They found that mental practice was better than no practice, but that mental practice alone was not as effective as physical practice alone. This finding is echoed in the music performance literature (Moran, 2012).

According to Feltz and Landers (1983, p. 26),

> A typical research design involved a comparison of the performances of subjects who had previous mental practice to a control group that had not received mental instructions. Quite often, these groups were also contrasted to a physical practice group and a group receiving mental and physical practice. A practice period of varying lengths was then instituted in which all groups except the control group practiced a physical skill daily. Following this practice period, the subjects' skills were tested under standard conditions so that it could be determined whether their performance scores differed as a result of the practice condition administered. If the mental practice group surpassed the performance of the control group, mental practice was said to be effective in facilitating performance. Many studies have noted this finding, but it is sometimes found with this design that mental practice groups do not perform as well as physical practice groups and the groups with combined mental and physical practice (Corbin, 1972).

When mental practice was first studied, not all experimental conditions combined mental and physical practice. To illustrate, Mendoza and Wichman (1978) conducted an experiment on dart-throwing ability. 32 participants were divided into a control group, a mental practice group, and a physical practice group. After six days of mental or physical practice in the experimental groups, the performance level on the task was measured. Statistically significant results showed that the experimental groups scored higher than

the control group with the physical practice group experiencing the highest performance gains.

More recent studies have built upon this initial design to combine mental and physical practice conditions. For example, Brouziyne and Molinaro (2005) conducted a similar experiment on novice golfers. The researchers wanted to investigate whether mental imagery combined with physical practice can improve golf performance for the approach shot. 23 participants were recruited and divided into three groups: physical practice, mental imagery and physical practice combined, and a third group where participants performed other sporting activities. Results revealed that performance was most improved in the group that combined physical practice and mental imagery when compared with the other two groups.

In 2014, Gomes extended the research design by investigating the order of practice sessions, i.e., mental practice before physical practice. 60 university students were divided into five groups: mental practice, physical practice, mental practice then physical practice, physical practice then mental practice, and a control. The task involved participants being asked to move three tennis balls among six containers in a pre-set sequence within a certain time. Skill learning and skill retention were assessed across groups. Physical practice and both combinations of mental and physical practice produced better scores than mental practice alone and the control group. The order of mental and physical practice made no difference.

Many studies show that using mental practice results in athletes' improved performance, ranging from acquiring skills to soothing pre-competitive anxiety. For example, Vodičar, Kovač, and Tušak (2012) conducted a study in which eleven professional basketball players on the Slovenian National team participated in a twelve-week program aimed at improving pre-competitive state anxiety. Methods involved relaxation techniques, positive self-talk, hypnotic suggestions, concentration techniques, and visualization techniques. Data was collected from the CSAI (Competitive State Anxiety Inventory-2), SAS (Sport Anxiety Scale), STAI (State-Trait Anxiety Inventory), and the TP Attention Test. Results indicated that participants improved their ability to concentrate and reduced their pre-competitive state anxiety.

Since Feltz and Landers' original publication in 1983, researchers have made great strides in expanding this discourse and have produced a variety of literature reviews that study mental practice and its involvement in different variables in sport (Herrera & Vargas, 2019), such as motivation, self-confidence, pre-competitive anxiety, rehabilitation, and improved strength and training (Bales & Bales, 2012; Cárdenas, Conde, & Perales, 2015; Cumming & Williams, 2013; Eaves, Riach, Holmes, & Wright, 2016; Kahrovic, Radenkovic, Mavric, & Muric, 2014; MacIntyre et al., 2013; Martin, 2012; Ohuruogu, Jonathan, & Ikechukwu, 2016; Ridderinkhof & Brass, 2015; Schack, Essig, Frank, & Koester, 2014; Slimani, Tod, Chaabene, Miarka, & Chamari, 2016c; Slimani, Bragazzi et al., 2016b; Visek, Harris, & Blom, 2013).

In more recent years, researchers have built upon these findings by examining new variables such as transcranial activity during mental practice and making recommendations for mental practice. Future researchers can build upon this work and apply these concepts to other fields, such as the performing arts.

2.3 Mental Practice in Music

According to Fine, Wise, Goldemberg, and Bravo (2015, p. 69), “Musicians’ use of mental practice ‘primarily involves the development of motor, kinesthetic, and auditory representations to enhance performance, for instance, by assisting memorization (Bernardi et al., 2013) and developing technical excellence in performing.” To illustrate, Wladyslaw Szpilman, famed pianist who survived the Holocaust, stated:

> From early in the morning until I took this meal, as I lay there with my eyes closed, I went over in my mind all the compositions I had ever played, bar by bar. Later, this mental refresher course turned out to have been useful: when I went back to work, I still knew my repertory and had almost all of it in my head, as if I had been practicing all through the war.
> Retrieved from Pancaroglu (2006, p. 58)

Music-making is a practice, both physical and mental, requiring a lifetime of dedication. Whether premiering at the Vienna State Opera or a debut recital, all musicians can benefit from mental practice. To illustrate, Fine and Bravo (2011) found that of a group of classical music performers, which included instrumentalists, singers, and conductors, 70% stated that mental practice was useful or even vital to them. “For musicians on a restricted playing schedule, or for those recovering from injury, mental practice is an indispensable tool. Every musician's technique and artistic development can benefit from the conscientious application of mental practice skills,” (Freymuth, 1994, p.5).

World-class violinist and composer, Fritz Kreisler, was regarded as one of the finest violinists of his time and known for his dulcet tone and musical expression. In addition to his prowess as a performer, his mental capabilities further set him apart from his contemporaries: he claimed to have learned an entire violin concerto during the train ride to the concert that evening without a rehearsal and with rave reviews from the audience. To this end, Kreisler stated, "I practice only as I feel the need. I believe that everything is in the brain. You think of a passage and you know exactly how you want it," (Schwartz, 1983, p. 304).

In his interviews with famous singers, *Great Singers on Great Singing*, Hines (1982) reiterated this notion that music-making begins in the brain. When asked about their ideas on vocal technique, Marilyn Horne and Birgit Nilsson advocate for singing, first, from your mind, and The People's Tenor, Luciano Pavarotti, stated, "For me, the voice begins in the brain, like every thought… goes to the diaphragm and must be formed here in the throat… not in the nose… not in the other cavities," (Hines, 1982, p. 220).

Despite these reports from world-renowned musicians, Highben and Palmer (2004, p. 1) reported the following: "Although several meta-analyses have compared effects of different types of mental practice (Driskell, Copper & Moran, 1994; Feltz & Landers, 1983), few studies have compared types of mental practice in the context of music performance." An exception is Bernardi and colleagues (2013) when they conducted a study on sixteen pianists and how they memorized two piano pieces to test three mental practice methods: mental practice alone, physical practice alone, and mental practice and

physical practice combined. Their findings revealed that mental practice alone led the participants to a level of proficiency that was between 40% and 60% of the physical practice condition. The second condition revealed an indiscernible difference between 30 minutes of physical practice and 20 minutes of physical practice combined with 10 minutes of mental practice. This is an important implication for musicians for optimal practice time and reducing playing-related injuries from over-use. Secondary findings revealed that pitch imagery (imagining the pitches in one's mind) and structural analysis were associated with better post-mental practice performance.

Studies examining mental and musical performance have the majority of participants, if not all, citing the piano as their primary instrument (Fine et al., 2015; Highben & Palmer, 2004; Bernardi, De Buglio, Trimarchi, Chielli, & Bricolo, 2013; Bernardi, et al., 2013; Lim & Lippman, 1991; Rubin-Rabson, 1941). This may be due to the complex nature of memorized piano performance in expert pianists where the music is challenging and rich in harmonic texture. This is not to say that singers' or other instruments' music is neither challenging nor rich, but that pianists' motor output (i.e., accurate fingering, melody, harmony, rhythm, dynamics, tempo, lack of text, and emotional expressivity) compounds the difficulty of memorized piano performance. Therefore, they may spark greater interest amongst researchers.

Because of the many terms associated with mental practice, it is not surprising that there is some confusion regarding the term among researchers in the field. For example, in 2015, Fine and colleagues conducted a mixed-methods study to ascertain performing

musicians' understanding of mental practice and score analysis. Results of the study revealed that over half of the eighty-nine musicians associated the term "mental practice" interchangeably with "mental imagery" (see Table 1). Even though the questionnaire asked about the frequency of respondents' hearing music internally while score-reading, the words image or imagery did not appear, yet multiple types of imagery were noted. This lends support to the idea that musicians may use imagery but may not know that they use it. This idea is corroborated by Horowitz (1978) where it was suggested that unless someone is a frequent imagery user, they may be unaware of the characteristics of the images and how often the images are used, unless they are related to something specifically vivid or represents something the imager wishes to avoid.

It is also possible that musicians may refer to imagery as something else, such as mental practice or mental rehearsal. In fact, Clark and Williamon (2012, p. 472) suggested that mental rehearsal and mental imagery may be different terms for the same thing.

Categories of Responses Relating to Respondents' Understanding of the Term Mental Practice

Superordinate categories	Specific categories and subcategories
Characteristics (73)	Away from one's instrument (33 + 19[a])
	In the mind (15)
	Use of score (14)
	Without (3)
	With/either (11 + 1[b])
	Holistic/wider definitions (8)
	Uncertainty about term (3)
Activities (61)	Mental imagery (54)
	Audiation (15)
	Visualization/Imagining playing/practising (15)
	Kinesthetic/movement (10)
	Thinking through the piece (9)
	Visual imagery (3)
	Performance situation (2)
	Thinking about (3)
	Actions (2)
	Analysis (2)
Aims (28)	Musical understanding/knowledge (7)
	Physical execution/technique (5)
	Planning approach/interpretation (4)
	Memorization (3)
	Problem solving (3)
	Mental preparation (3)
	General performance preparation (2)
	Efficiency (1)

Table 1 – Retrieved from Fine et al., (2015, p. 73).

In response to the question "What do you understand by the term "mental practice?", 70 participants answered, which resulted in 160 sub-statements depicted in Table 1 above. These were then categorized into Characteristics, Activities, and Aims. Table 1 depicts the categories from the participants' responses. The numbers in parentheses refer to the number of sub-statements within each category and sub-category. Mental imagery had the largest number of sub-statements in reference to the term "mental practice," which suggests that many view mental practice and imagery as the same.

To this end, scholars have reported that there exists a clear relationship between mental practice and imagery, with various forms of imagery being involved in mental practice for musicians (Clark et al., 2012; Holmes, 2005; Lehmann, 1997). Mielke and Comeau

(2019, p. 206-207) offer a comprehensive definition based on their glossary and taxonomy of mental practice in music performance (see Figure 1):

Mental Practice (noun) – Use of imagery (auditory, kinesthetic, motor, visual) in the repeated cognitive execution of an activity in order to acquire or maintain proficiency on a musical instrument or the voice ("Mental practice", 2007; Miksza, 2011; "Practice", 2016).

Mental Practice (verb) – To use imagery (auditory, kinesthetic, motor, visual) to repeatedly perform, cognitively, an activity in order to acquire or maintain proficiency on a musical instrument or the voice ("Mental practice", 2007; Miksza, 2011; "Pratice", 2016).

While Fine and colleagues (2015) demonstrated that the participants in their study view mental practice and imagery as the same (see Table 1), Mielke and Comeau (2019) show that imagery is a component of mental practice and not the same as mental practice (see Figure 1). They reviewed 33 studies on mental practice and music performance from 2004 through 2015 and devised the following tree diagram. Based on their extensive review, they view imagery as a mental practice technique. Future researchers could use this diagram to inform operational definitions of mental practice, imagery, and other associated terms in their publications to mitigate taxonomy confusion.

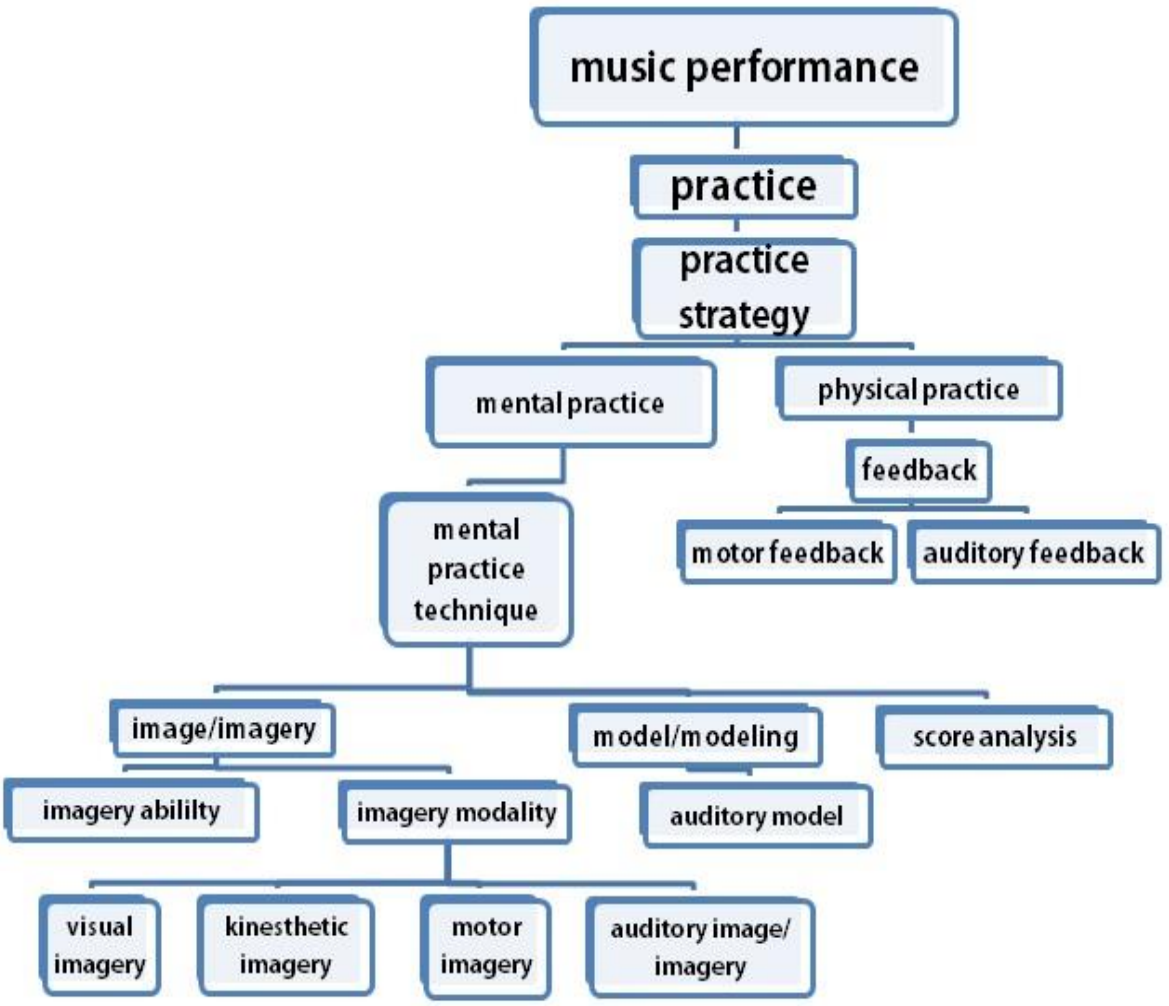


Figure 1 – The above figure describes the term relationships uncovered by Mielke and Comeau (2019, p. 208) in their taxonomy of mental practice in music performance.

Regardless of the context, mental practice's defining feature is that it is practice away from one's instrument. More specifically, musicians use mental practice to hear the music in their minds (audiation or auditory imagery) without the presence of a physical sound; to go over the score or the performance environment in one's mind; to simulate the feel of the instrument in one's hand; to imagine the required motor output, such as fingering; and to imagine expressive devices to better connect with the audience during performance.

2.4 How does Mental Practice work?

In 1967, Fitts and Posner (1967) developed a model for learning motor skills, which consists of a cognitive stage, an associative stage, and an autonomous stage (for further theories, see Shuell, 1990). In order for a task to become routine, learners need to understand what needs to be done to complete the task; to explore how to actually perform the task, and to then practice so that the task becomes routine (Hall, J.C., 2002). Musicians use this model in score analysis, use of retrieval structures (cues to recall), and performance preparation away from the instrument. For example, if a singer is learning a difficult melismatic passage, the singer will need to understand the structure of the passage in relation to the harmony underneath in order to sing the correct notes and then practice them so that they may be sung by rote. After this, the singer is in the autonomous stage and may use mental practice to enhance their performance.

2.5 Benefits of Mental Practice

Mental practice is multi-faceted and can provide the performer with many advantages (Clark et al., 2012; Connolly & Williamon, 2004). Following interviews with conservatory-level musicians, mental rehearsal is found to be useful for many aspects of music-making. They reported that mental rehearsal can be used as follows:

> To develop emotional expressivity; to enhance technique and practice efficiency; to improve learning and memorization (see also Rubin-Rabson, 1937; to heighten sensory awareness; to refocus attention during performance; to enhance general confidence and resilience in a performance situation; to enable greater control over negative emotions; to establish a stronger connection with the audience; and to achieve peak experience. (Connolly & Williamon, 2004, p. 225–226; Clark et al., 2012)

Furthermore, Lotze (2013) found that when guitar players used mental practice with a modelled recording of the music alternated with physical practice, mental practice produced a superior performance in tonal quality and memory-coding in comparison to physical practice alone (Theiler & Lippman, 1995). Similar results were found in vocal performers from the same study, with further improvements in rhythmic and pitch accuracy, articulation and phrasing, dynamics and expression, and tempo. This finding echoes the sport psychology literature (e.g., Hall, 2001) where mental practice is most beneficial for more cognitive tasks, such as singing.

When investigating the effectiveness of mental practice vs. physical practice, music researchers' findings have been mixed (Clark et al., 2012). This may be because of the varied tasks and measurements of mental practice employed, but it is generally agreed that mental practice is effective at enhancing performance although not as much as physical practice (Bernardi, et al., 2013; Clark et al., 2012; Driskell, Copper, & Moran,

1994; Pascual-Leone et al., 1995). Combining mental practice with physical practice is likely to be the most effective approach (Clark et al., 2012; Ross, 1985; Rubin-Rabson, 1941), and this has also been demonstrated in athletes (Azimkhani, Abbasian, Ashkani, & Gürsoy, 2013; Herrera & Vargas, 2019).

2.6 Training Musicians to use Mental Practice

In music education, mental practice has not formally been taught, rather, it is a skill that a musician is expected to acquire over time. Some believe that mental practice should be taught to those studying music as a supplement to physical practice. In fact, mental skills training is becoming more prominent in some conservatory teaching, incorporating concepts gleaned from elite athletes (Clark & Williamon, 2011; Williamon, 2004). Connolly and Williamon (2004) recommend that mental practice be viewed as a long-term commitment in order to achieve optimal results. Additionally, Provost (1992) advocates for consistent use of mental practice for repertoire maintenance.

2.7 Future Directions of Mental Practice in Music

Fine et al.'s work (2015) on performers' understanding of mental practice and score analysis raised an intriguing question from their interviews with musicians: Are there any group differences in understanding the terms mental practice and score analysis, specifically in conductors and singers? To illustrate, all individual practice that conductors engage in can arguably be mental practice away from their instrument (the orchestra), and the score is for all intents and purposes, their Orchestral Bible (Meier, 2009), whereas singers, contrastingly, have their instrument inside of them at all times.

As a form of performance preparation, Battisti (2007) recommends that conductors score-read in real time, hear the music in the mind's ear, and formally analyze the score before performance. As such, for conductors, the lines between score reading and analysis are blurred. However, Fine et al. (2015) did not separate singers and conductors into different groups, consequently, whether or not this same overlap exists between score reading and analysis in singers requires further study.

2.8 Imagery Defined

When it comes to imagery, it is important to note that some researchers view imagery as a component of mental practice (Mielke & Comeau, 2019), while others view them as being the same (Miksza, 2011). In fact, most of the research on mental practice can really be considered imagery research (Hall, 2001). This is demonstrated in the above review of the mental practice literature. Accordingly, there is overlap between the findings reported for mental practice and those reported for imagery.

Imagery provides a targeted mental training approach to enhancing performance and because of this, it is often viewed as "the cornerstone of sport psychology," (Cornelius, 2002, p. 206). Countless imagery studies have been published and the literature is ever-expanding. More specifically, Hall, Munroe-Chandler, Fishburne, and Hall. N.D., (2009) found that many athletes have reported using imagery to improve their sport performance, including Michael Jordan, Tiger Woods, and Wayne Gretzky.

> We taped a lot of famous pictures on the locker-room door: Bobby Orr, Potvin, Beliveau, all holding the Stanley Cup. We'd stand back and look at them and envision ourselves doing it. I really believe if you visualize yourself doing

> something, you can make that image come true… I must have rehearsed it ten thousand times. And when it came true it was like an electric jolt went up my spine. (Wayne Gretzky as quoted in Orlick, 1998, p. 67)

"Imagery is an experience that mimics a real experience," (White & Hardy, 1998, p.389). It occurs in our mind's eye and it differs from dreaming in that we are awake and aware of generating images. It is a conscious experience that involves the use of one or more of the senses to create, or recreate, a particular sporting skill or situation (White & Hardy, 1998). Imagery is multi-faceted and multi-functional and in addition to the definitions above, can serve as a blueprint (Sackett, 1934) for athletes to create a strategy to execute a certain play, skill, or pre-performance routine. If an athlete imagines movements and then practices these movements, they can be encoded and solidified into the motor system.

The author of this monograph believes that the term "imagery" itself automatically induces the thought that it is a primarily visual experience. For example, when a performer commits the structure of a piece of music to memory in preparation for performance, a visual representation of the music may include the physical score in the performer's mind, allowing the performer to read the notes in their head. While the visual aspect of imagery is at the forefront, there are five other senses that imagery encompasses: auditory, kinesthetic, tactile, olfactory, and gustatory. Auditory involves the aural experience that a performer encounters, for example, reviewing the text of the score "in one's head" prior to a recital while hearing the music in the background. Kinesthetic can involve how the body moves as a musician steps onto the stage, like an opera singer playing a haggard witch while walking with a limp: paying attention to the

weight transfer of each leg and accompanied by a wicked snarl on the face. The feel of the freshly polished wood of a guitar may be an image involving the tactile sense. Olfactory can include the scent a performer experiences, perhaps that of a newly laundered costume prior to showtime, rather than the usual musty odour performers are wont to experience. Finally, gustatory, while not as common, can be associated with a pianist tasting the perspiration on her lip prior to a concerto.

Not only is imagery multi-sensory, but it is multi-functional as well. In 1985, Paivio suggested that imagery elicited both a cognitive and motivational function that can be targeted towards general and specific performance goals. His work uncovered five functions of imagery. Cognitive Specific (CS) involves acquiring and developing a skill, like working on melismatic exercises to develop agility in the voice. Cognitive General (CG) is associated with implementing routines or strategies, for example, planning breaths and emergency breaths in an aria or song, if needed. Motivation Specific (MS) images relate to individual goals where a singer might set herself a goal of learning ten new arias for audition season. Motivation General is divided into two categories: mastery and arousal, MG-M and MG-A, respectively. The former deals with images of mental toughness and self-confidence, while the latter deals with images of arousal. An example of MG-M would be to use positive imagery to build one’s confidence before a performance. And to better explain MG-A, this could be associated with images like a heart racing before a competition or audition.

These functions are important because they allow researchers to target certain aspects of performance in an intervention setting. For example, Munroe-Chandler, Hall, Fishburne, Murphy, and Hall, N.D. (2012) were able to target cognitive specific imagery with a CS Imagery intervention in soccer athletes. It was found that the youngest athletes receiving the intervention increased their use of CS Imagery and improved their soccer skills.

These functions can also predict the caliber of the performer who uses them. According to Callow and Hardy (2001) and Cumming and Hall (2002a, 2002b), elite-level athletes use significantly more imagery than their amateur counterparts. To illustrate, Cumming and Hall (2002a) found that provincial and national level athletes used all five types of imagery more than regional athletes.

2.9 Musical Imagery

"Imagery is the cognitive or imaginary rehearsal of a physical skill without overt muscular movement. The basic idea 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 & Williamon 2004, p. 224). Additionally, imagery encompasses mental representations (auditory, kinesthetic, motor, and/or visual) of objects, events, or movements ("Imagery", 2016; Thomas, 2014). Therefore, through these senses, musical imagery involves musicians' use of imagery in the mind's eye.

Imagery is similar to perception, but it happens without an outside trigger, rather, it is rooted in information from memory (Zbikowski, 2007). It is dependent upon mental representations, to which we, the users, assign specific meanings. While sound is a

primary target, musicians' use of imagery involves not only sounds, but the external motor output necessary to make sounds, a mental picture of the score and/or instrument, and the emotional underpinning of the music during performance (Clark et al., 2012).

Since there are so many uses of imagery for musicians, some terms have been developed to help describe their imagery process. Frequently used terms include mental rehearsal, mental practice, aural or internal representations, inner hearing, visualization, and finger practice (for further discussion, see Driskell et al., 1994). Since these terms are broad in both range and definition, it is no surprise that they have contributed to some confusion in discussions of musicians' imagery use. To this end, recall that Fine et al. (2015) reported that participants interpreted "mental imagery" and "mental practice" as the same. Whereas Mielke and Comeau (2019) conducted a literature review of the terms and determined that imagery is a component of mental practice. This confusion occurs in other fields such as sport psychology. For instance, Morris, Spittle, and Watt (2005, p. 14) noted a lack of consistency in the parts that make up the imagery process and that "the focus of each definition seems to vary depending on the purpose for which the imagery description is used."

For the purposes of this document, a working definition of imagery follows: Imagery is a component of mental practice because there are elements of mental practice that are not wholly synonymous with imagery, e.g., modelling (see Figure 1, Mielke & Comeau, 2019). Furthermore, mental practice's defining feature is that it is practice away from one's instrument. However, in many of the examples given, imagery can occur while

performing, especially when using kinesthetic imagery, i.e., using these images to influence body movement. It is a mental training technique that can be used in many different situations, such as helping the singer to re-focus during performance (motivational general-arousal), to learn new skills in the voice studio (cognitive specific), to embody different characters on stage by using the six senses, (i.e., visual, auditory, tactile, gustatory, olfactory, and kinesthetic). These reasons for using imagery serve two functions: cognitive and motivational. These images can incorporate metaphor and simile. Suffice it to say that imagery is a wide-ranging term across disciplines and now in singing as well.

2.10 What Imagery is Not

Imagery is not only "hearing in one's head," which is an aspect of auditory imagery. In DeSantis et al.'s (2019) study on how singers use imagery, singers were often confusing imagery with simple metaphor. According to Schaerlaeken, Glowinski, Rappaz, and Grandjean (2019, p. 101), "Metaphors can be seen as conceptual processes in which we comprehend one concept (target domain) in terms of another concept (source domain), as described by the conceptual metaphor theory," (Johnson, 1987; Lakoff & Johnson, 1980). While imagery is often used interchangeably with "metaphor" and "visualization," these terms do not wholly encompass "imagery" from a sport psychology perspective. Athletes of all levels use imagery to enhance various aspects of their work (Mellalieu, Hanton, & Thomas, 2009; Williams & Cumming, 2012). They know what imagery is and are familiar with its specialized application to the sport domain. However, musicians are not fully aware of imagery and its many applications to the music domain.

It is difficult to clarify between these terms: imagery, metaphor, and visualization. Some sources use imagery and visualization interchangeably, as well as imagery and mental practice, and imagery and mental rehearsal (Driskell et al., 2014; Fine et al., 2015). "Usually (but not always) you visualize with your eyes closed so that distracting signals are blocked out," (Syer & Connolly, 1984, p. 47). They go on to say that the medical term for this technique is termed "mental imaging." This is confusing for imagery users as they may equate imagery with simple visualization exercises, which can involve "seeing the sunset over the ocean," or "white clouds racing over the sky," (Syer & Connolly, 1984, p. 56). Metaphor may involve asking a singer to imagine there is an egg balancing on the back of one's tongue to keep an open throat. Singers can use aspects like visualization and metaphor to relax themselves, and to train their coordination and muscle memory. However, imagery is a multi-sensory and multi-functional experience that is so much more than visualization. The current study will be operating under the definition of imagery that involves visualization but is not limited to visualization. In fact, Nordin and Cumming (2006a), adapted a definition of imagery that is in accordance with the author of the monograph's views:

> Imagery is an experience that mimics real experience or approximates a desirable sensation. We can be aware of 'seeing' an image, feeling movements as an image, or experiencing an image of smell, taste or sounds without experiencing the real thing. Sometimes people find that it helps to close their eyes. It differs from dreams in that we are awake and conscious when we form an image. (p. 87)

And an addendum to this would be that it is different from thinking because there is a performance goal in mind – to reduce anxiety, to inform a stage entrance, to connect with the audience, and many more.

2.11 Theories of Imagery

Perhaps one of the first theories of imagery, or rather a foundation for future theories of imagery, is William James's ideo-motor principle (1890), whereby anticipating an intended effect triggers a subsequent action; that is, if the intention to kick a ball is conveyed, the action code and the effect code will join to create the desired effect: a kicked ball. Just four years later, Carpenter (1894) developed his Psyschoneuromuscular theory, which states that imagined events elicit the same innervations in the muscles as actual events, although to a lesser degree. Both these theories involve an intention and an action response, the latter being nearly identical to its modern counterpart, Functional Equivalence, which proposes that imagery causes the same reactions in the body as when the movement being imaged is being physically executed (Holmes & Collins, 2001; Jeannerod, 1994). Using one's imagination to mentally create or recreate an experience activates the same processes and muscles as physically performing the skill. These innervations are not to the same extent as when the physical action is being performed, but nonetheless, they train the muscles to coordinate the movement more efficiently.

As sport psychology evolved over the mid to late twentieth century, many theories of imagery were developed, one being Lang's Bio-informational Theory (1979), which assumes the following:

> A mental image is an organized set of propositions, or characteristics, stored in the brain's long-term memory. When individuals engage in imagery, they activate stimulus characteristics that describe the content of the image for them and response characteristics that describe what their responses are to the stimuli in that situation. (Vealey & Greenleaf, 2010, p. 275)

For example, imagining a penalty kick in the World Cup Final would involve the stimulus characteristics of the feel of the ball against the cleat, the sight of the net, and the sound of the crowd. The response characteristics for this image might include increased respiration and perspiration, increased anxiety, and the sight of the ball narrowly slipping past the goal keeper's fingers and into the net. According to this theory, as a method for imagery to enhance performance, response characteristics must be triggered so that they can be adapted and subsequently improved.

Robert Nideffer, in The Inner Athlete (1976) wrote:

> For instance, right now, without actually engaging in the movement, attempt to get both the image and the feelings associated with kicking a ball. Notice how, as you carefully attend to each movement, you begin to actually use the muscles involved. You don't use them in a way that increases strength but in a way that helps your coordination and timing. (p.189)

Perhaps the most relevant theory of imagery for singers is Paivio's Dual-Coding Theory (DCT, 1971), which posits that the human mind processes information in two ways, or codes: verbally, via language, and non-verbally, via images.

As such, our human memory operates with two independent and interacting systems – verbal memory and image memory. For example, when storing the stimulus code for "dog," both the word "dog" and the image of a dog are processed into the cognitive system, both verbally and non-verbally. When asked to recall the stimulus "dog," one can recall the word or the image separately or combined as one. If only the word is recalled, the image can still be called upon at a later point in time. The ability to dually process

stimuli allows for a greater chance of remembering the stimulus than if it were coded in one mode.

Described as one of the most influential cognition theories in the 20th century (Marks, 1997), Dual-Coding Theory (DCT; see Figure 2) was first developed in 1971 by Allan Paivio and has since been applied to a wide range of psychological issues such as processes of thinking (Paivio, 1975); styles of thinking and individual differences (Paivio & Harshman, 1983); language comprehension (Paivio & Begg, 1981); and how visualization techniques can enhance athletic performance (Paivio, 1985; Hall et al., 1998; Munroe, Giacobbi, Hall, & Weinberg, 2000).

DCT can also be applied to singers. This can speed learning of new music for singers, which is especially beneficial since we must learn to sing in multiple languages, while not necessarily speaking the language. As a personal example, I am learning several pieces in Russian. I do not speak Russian and I cannot read the Cyrillic alphabet. But I can use DCT to help me remember what each word means. If I am trying to remember the word for "love," which is "ljubvi" in IPA (International Phonetic Alphabet) then I could perhaps draw a picture of a heart over this word to aid in my recall when I am reviewing the score since imageable words are known to be easier to store and remember than non-imageable ones (Paivio, 1971, 1986). Naturally, it is not possible to have a picture over each word and remember the translation, but using pictures to remember key words in the song or aria can assist the singer in mapping the music so that a clear image of the score is in their mind. In other words, imagery serves as a mnemonic device (see

Glossary) in this example. This could apply to other performers who must remember lengthy text, such as actors or public speakers, or even lawyers. A future direction of this research is to develop a more up-to-date theory of imagery for singers.

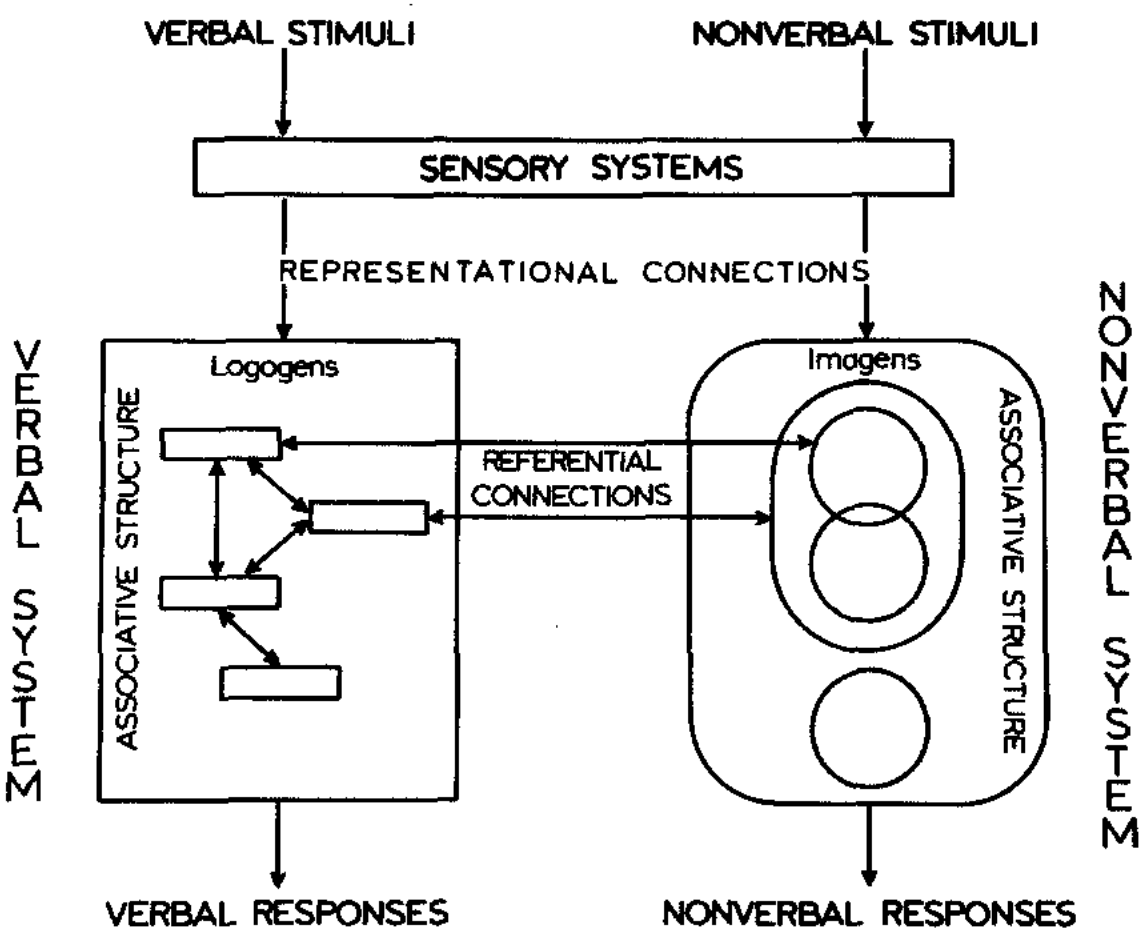


Figure 2 – Verbal and Nonverbal systems of Dual Coding Theory, (Paivio, 1986, p. 67) from *Mental Representations: A dual coding approach*. This figure shows differences in the processing of verbal and nonverbal stimuli and how they are connected associatively (within-system) and referentially (between-system).

2.12 Theories of Emotion and Imagery

Since the time of Aristotle, who stated that music provides images that mimic feeling and 'moral character' (Sörbom, 1994), the association between music and emotion has fascinated scholars. Its ability to soothe in a lullaby, to induce arousal pre-competition, and to create fear during a horror film are just a few examples of its incredible power to influence human emotion. By way of examining the relationship between music and emotion, Sloboda and Davidson (1996) suggested a method through which musicians may better understand the relationship between expressive performance and emotion (1996). They postulated that a structure-emotion link emerges as student musicians experiment with alternative expressive devices, such as dynamic markings, accents, and tempi. Through experiment, musicians reveal which devices evoke emotional responses from listeners (themselves included) that coincide with their original expressive intent. For example, a performer might employ an expressive device like a *messa di voce* (*crescendo* and subsequent *decrescendo* on one note) and evaluate its emotional response. If incorrect, they adjust and find a new way to evoke that emotional response. How they evoke that emotional response involves imagery. If the tune is a lullaby and meant to soothe, the performer might employ images of rocking a baby to sleep. Conversely, if the tune is meant to enliven and invigorate, the performer might employ images of winning a race or completing a challenging feat.

More recently, Stachó (2018) developed a theory of performance expression and mental imagery, which is the first of its kind: a theory on music performance and its relationship to mental acuteness or 'mental virtuosity.' The grounds for the theory posit that rapidity,

vividness of imagery, passion, and intensity associated with a virtuosic performance are based on a concrete 'mental dexterity' at work during performance. The author further explains:

> The theory of performers' attentional processes and strategies presented here suggests that the key qualities of a virtuoso performance in fact pertain to the cognitive domain – the domain of imagery and attention – rather than the mechanical. They rely on a specific and well-definable mental technique that produces both heightened expressivity and technical brilliance, defining elements of "true" virtuosity. Indeed, to become a "true virtuoso", a musician needs to expertly manipulate their own attention in such a way as to be able to predict, reflect, and enjoy, so that the audience can also enjoy their performance. (2018, p. 552)

Aside from the music-emotion-imagery relationships cited above, to the author's knowledge, there are not any other theories relating imagery and music. This topic warrants further research.

Thus far, the roots of imagery, its many definitions, and theories of imagery have been discussed. What has not been covered is imagery's influence on performance. The following section explores this question.

2.13 How does imagery work?

The efficacy for imagery's improvement in performance and learning in a wide variety of motor skills has been well-documented (Cumming & Williams, 2012; Wakefield, Smith, Moran, & Holmes, 2013). What may require further clarification is how imagery improves performance. In 1931, Jacobson reported the presence of electrical activity within certain muscle groups when participants were asked to imagine lifting a weight or bending their arm. Without physically doing the action, the mental rehearsal of that

action resulted in an association with neuromotor activity. Based on the theories discussed above, this suggests that neurological centers in the brain connect with the corticospinal tract in the body to elicit similar muscular activity during imagery, regardless of physical movement.

In the last decade, advances have been made on imagery and how it can improve musical performance. For instance, in 2012, Clark and colleagues discovered the following: "At the neurological level, musical performance and imagery function in a similar manner. Because of this, many of the benefits derived from physical practice can also be gained through imagery," (p. 352). Various studies involving Functional MRI (fMRI) and magnetoencephalography (MEG) have shown the functional equivalence (imagery causes the same reactions in the body as the actual activity) between physical and mental performances within the auditory and motor systems involved in musical performance (e.g. Mellet, Petit, Mazoyer, Denis, & Tzourio, 1998; Kosslyn, Ganis, & Thompson, 2001). To illustrate, Halpern and Zatorre examined the degree of functional equivalence amongst heard and imagined musical sounds and sound qualities (1999; Zatorre, 1999). In order to do so, participants were asked to perform a variety of tasks that included judging the similarity of timbre between physically-heard or mentally-heard instruments, evaluating audible or imaginary pitch intervals, and generating an image to increase a tone or chord stepwise. Results revealed that heard music and imagined music stimulate similar regions in the auditory cortex.

In 2008, Herholz, Lappe, Knief, and Pantev extended this line of inquiry by examining MEG through musicians' and non-musicians' ability to distinguish between incorrect tones in a familiar piece of music. They found that the former produced a "right-lateralized early pre-attentive brain response in the secondary auditory cortex areas to unexpected incorrect notes placed alongside the imagined melodies, whereas the non-musicians did not," (Clark et al., 2012, p. 353). Furthermore, Zatorre, Evans, and Meyer (1994) found that processing pitch during heard music is concentrated in the right hemisphere. Through these developments, further evidence is provided for musical imagery and perception activating similar regions in the auditory cortex and that extensive musical training can enhance these connections.

There have been many famous musicians who advocate for the use of imagery including pianists, Karl Leimer, Walter Gieseking, and Glenn Gould, and cellist, Pablo Casals. Famed pianist, Artur Rubinstein, used a paper keyboard to increase the auditory representations of his music. While integral to performers, imagery must be vital to the creative process in composers and conductors as well (Clark et al., 2012). To this end, Lehmann clarified the benefits of imagery to musical practice and performance by reporting the following: "the most important goal of performance is to match a highly vivid representation of the desired performance with the current execution," (1997, p. 143). And in 2003, Holmes supported this claim by finding that, during elite musicians' practice time, they create clear and vivid representations of their music in the mind's eye and then endeavour to find a means of translating those representations into reality: in

other words, they use imagery to bring the music to life both for themselves and for the audience.

Put into practice, Lehmann (1997) advocated for three individual types of mental representation: “a representation of the desired performance goal; a representation that reflects the current performance; and a representation of the music in terms of its production aspects,” (p. 141). One must engage in practice and preparation to enhance these three types by combining the first and second type to coincide with one another and use the third type as a means of achieving this. For example, if a singer wants to perform a flawless melisma, then they must first have an idea of what they want it to sound like, then have an idea of what it currently sounds like, and use imagery to put these two representations more in line with each other, for example, by imagining the notes emitted by a conveyor belt, or through skipping stones. In the first example, the breath is the conveyor belt that remains smooth and steady while the notes are emitted. In the second example, the breath is the undercurrent of the water, continuously flowing, while the skipped stones are the notes. Furthermore, Lehmann (1997, p. 146) listed three distinct forms of mental representations that musicians may employ to better understand the music:

1. Visualization – memorizing the music in terms of its compositional structure. This may also involve a clear image of the score in the mind’s eye, allowing for accurate score-reading.
2. Audiation – ability to internally hear and comprehend music that is not physically present. This may be the most important aspect for musicians as it has strong implications for intonation, timing, and communication.
3. Photographic ear – voluntary access to individual notes within a memorized, or just heard piece of music. An ability to replicate the music in the mind’s ear.

The effects of these mental representations of what the music will sound like can create a feeling of what it will be like to physically play the music. For example, a participant reported the following: "… the other week when I was about to do that concerto, I listened to it on a recording the night before and I could imagine every single movement in my hands as I listened," (Holmes, 2005, p. 227). Not only is this important for musicians in general, but more specifically, the relevance for singers is evident because the ways in which they understand and produce sound is entirely internal.

For musicians, each note, and each means of producing that note, directly correlate to the way in which the note is physically executed. In support of this, Kalakoski states that "mental imagery not only stands at the intersection of memory and perception, but also at the intersection of several sense modalities," (2001, p. 54), demonstrating that imagery is multi-sensory in its functions and applications.

Thus far, the topics discussed have been based in theory and not necessarily practice. How can imagery be applied in everyday life? How can this knowledge be used to improve singers' performance? In the following section, imagery's applications to real-world situations will be outlined.

2.14 Imagery Applied

Early applied imagery research in the sport context typically involved measuring quantitative changes in athletic performance from pre- to post-test where participants are divided into groups that have completed one of the following tasks: physically practicing a skill, imaging a skill, or participating in a control activity. Generally, the results showed

that the physical practice group improves most from pre- to post-test, with the control group showing minimal improvements. Interestingly, the imagery practice group demonstrates improvements in performance, though not to the same extent as the physical practice group, but significantly more than the third group (control).

In the past decade, researchers have built upon these findings to investigate the effects of adding a fourth group combining imagery practice with physical practice. That is, athletes undertake their regular physical practice and then add imagery practice to this regular physical practice. The results reveal that improved performance increases when this is done compared to physical practice or imagery alone (e.g., Blair, Hall, & Leyshon, 1993; Smith, Wright, & Cantwell, 2008; Wright & Smith, 2009). These results are strengthened by review articles (e.g., Weinberg, 2008) and meta-analyses (e.g., Driskell, Cooper, & Moran, 1994; Feltz & Landers, 1983) that have investigated the extent to which imagery improves sport performance.

In 2001, Holmes and Collins created a model of imagery known as PETTLEP (see Figure 3), which is perhaps "the first ever evidence-based account of imagery in sport psychology to adopt an explicitly neuro-scientific rationale," (Wakefield, Smith, Moran, & Holmes, 2013, p. 106). Aiming to guide practitioners' use of imagery during interventions, this model uses the acronym PETTLEP to denote seven considerations when using imagery: Physical, Environment, Task, Timing, Learning, Emotion, and Perspective. It aims to target certain aspects of performance in order to improve performance and employs imagery in multi-sensory and multi-situational ways. For

example, a performer may form an image of his or her performance using real-time as opposed to slow-motion or fast-motion. Moran and MacIntyre (1998) investigated the kinesthetic imagery experiences of elite canoe-slalom competitors; participants were asked to mentally travel through their most recent race as if they were actually paddling. They found that the time taken to image the race was highly correlated with their race completion time. To simplify, imaging in real-time produces similar results to the actual race time, which suggests that real-time imagery is an effective strategy to improve the timing aspect of performance for this population.

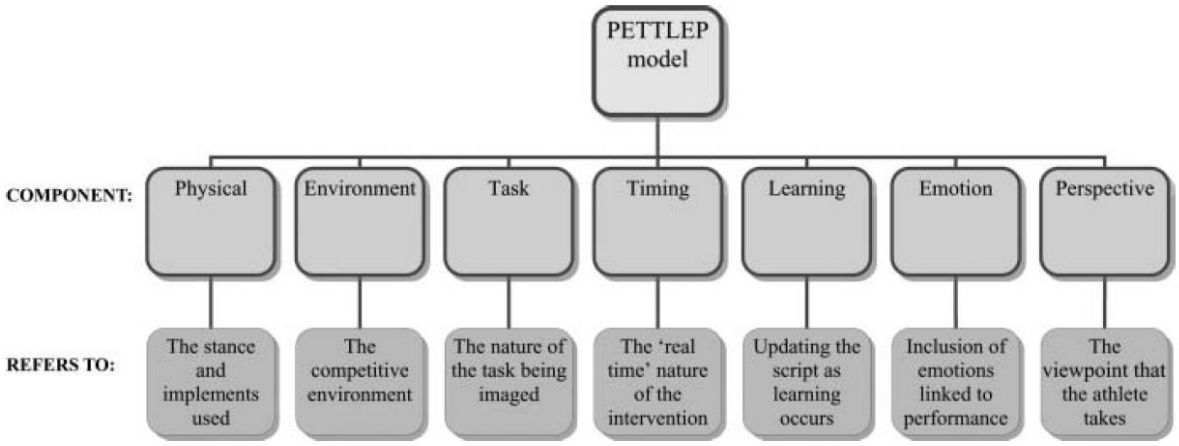


Figure 3 – PETTLEP Model (Retrieved from Wakefield & Smith, 2012, p. 3). This figure shows the seven considerations that can be used to improve performance.

In 1941, Rubin-Rabson conducted one of the first experiments with imagery in a musical setting. Results showed that including imagery with physical practice enhanced learning of piano music by memory in nine high-level pianists. After initial testing, participants also experienced a superior performance in retention. Since then, the benefits of imagery

for improving different aspects of musical performance in relation to mental practice are supported in studies by the following authors: Bernardi et al., 2013; Bernardi, Schories et al., 2013; Cahn, 2008, Clark & Williamon, 2011; Coffman, 1990; Lim & Lippman, 1991; Ross, 1985; Theiler & Lippman, 1995. For example, Ross (1985) investigated the use of imagery and mental practice on trombone players' performance in a group of thirty university-level trombonists. Results showed that improvements in pitch, rhythm, and articulation improved pre- to post-test and these were compared between participants who rehearsed through physical practice, imagery, or combined physical practice and imagery. Wherever imagery was employed, participants were given the cues to "mentally see, feel, and hear" themselves playing the music. Physical practice combined with imagery resulted in the greatest performance gains, which suggests that including imagery along with a physical practice schedule can be beneficial for musical performance.

To further tout the use of imagery as a performance-enhancing tool, Coffman (1990) examined changes in performance speed and the frequency of pitch and rhythm errors in the piano-playing performance of eighty university students majoring in music, after physical practice, imagery, or a combination of both conditions. Participants were given the same cues as Ross (1985), where they were instructed to "see, feel, and hear" themselves performing without physical movement during their imagery sessions. All three practice conditions resulted in significant improvements in performance speed compared to a control group, although imagery alone was less effective than physical practice. Most notably, alternating between physical practice and imagery was as

effective as physical practice alone. This would indicate that imagery may be used to reduce time spent in physical practice (possibly decreasing discomfort or injury that may accompany repeated movements in continual practice), without influencing performance gains. Additionally, if imagery was added to the regular numbers of hours spent in the practice room, a superior result may be obtained.

No studies have been conducted to investigate PETTLEP's utility for musicians, let alone for singers. Wright et al. (2014) began the conversation with a review about how PETTLEP could be incorporated into musical settings. For example, regarding the Physical element of the PETTLEP model, there is sufficient evidence to encourage musicians to practice imagery alongside an auditory recording of the musical piece being imaged (e.g., Brown & Palmer, 2013; Highben & Palmer, 2004; Lim & Lippman, 1991; Theiler & Lippman, 1995), as it may make the imagery experience more realistic. However, whether an audio recording of the musician's own performance, the performance of a master player, or perhaps of an auditory metronome would produce the greatest performance gains has yet to be investigated. Similarly, when considering the Timing and Learning aspects of the PETTLEP model, Wright et al. (2014) suggest that practicing imagery at a slower tempo or chunking the music into manageable pieces are both good pieces of advice for beginner musicians. As the novice develops over time, the tempo of the imagery can be increased and the whole sequence can be imaged together. Keep in mind that these are merely suggestions and empirical research into how they can be implemented would be a welcome addition to the knowledge base. Since PETTLEP was suggested to be more beneficial for easier musical tasks, a future direction could

incorporate the model's influence on beginner musicians. A final consideration for implementing PETTLEP into imagery intervention settings, whether musical or sporting, is that Holmes and Collins (2001) intended for the model to act as a guideline and not a rule on practical issues that should be considered in the design of imagery interventions.

The more aspects of the PETTLEP model that are targeted will not necessarily lead to better performance in those areas. It is important to note that the imagery intervention should be tailored through experiment and study and should include those aspects of the PETTLEP model that are most relevant to the performer (Wakefield & Smith, 2012). While researchers have found the PETTLEP model to be more effective than traditional visualization-based methods (Smith, Wright, Allsopp, & Westhead, 2007), PETTLEP's utility in musicians and singers requires further research.

Thus far, the relationships between mental practice and performance have been outlined, followed by pertinent theories of imagery, details of its function, and its applications in the field. The next section will delve into imagery in sport, music, singing, dance, and acting.

2.15 Imagery in Sport

As stated in Nordin and Cumming (2005), earlier studies applying imagery to other fields have neglected the vast amount of research available in sport psychology, which is why a brief overview of imagery in sport performance will be given here.

According to Munroe-Chandler and Hall (2007), athletes at all levels use imagery. Since imagery has become an important line of inquiry in sport psychology in the past three

decades, numerous studies have been published to establish its efficacy in sport performance (e.g., Slimani, Chamari, Boudhiba, & Chéour, 2016a; Callow & Waters, 2005; Moran, 2004). Imagery has a long history of enhancing various aspects of performance, such as relaxation via imagery scripts (Fenker & Lambiotte, 1987); performance anxiety and its direction, either positive or negative (Page, 1995); self-confidence in training and competition (White & Hardy, 1998); improved structure to imagery use, which can involve specific images for specific performance goals, or a regimented imagery routine (Evans, Jones, & Mullen, 2004); and enhanced skill performance in a variety of sports (Lindsay, Spittle, & Larkin, 2019). To lend further support, many theories (discussed above) and models have been developed to explore imagery's influence on performance (see Martin, et al., 1999; Holmes & Collins, 2001; Cumming & Williams, 2012, 2013, 2014).

One such model is the applied model of imagery use in sport (Martin, et al., 1999), which suggests that athletes create images to accomplish desired sport outcomes (e.g., skill-learning, cognitive re-structuring, and arousal control). According to the model, anxiety and confidence can be controlled by using certain types of imagery content. For instance, to combat performance anxiety, an athlete may use MG-M imagery (images of being confident and mentally tough) to ameliorate negative thoughts related to cognitive anxiety and raise levels of confidence.

Nordin and Cumming (2008a) tested the predictions of the applied model of imagery use by examining its effectiveness amongst 155 athletes in 32 different sports. Results

revealed that for the cognitive functions of imagery (cognitive specific, i.e., skill acquisition, and cognitive general, i.e., strategy), the model proved to be effective in its predictions. However, for the motivational functions, the results were more blurred. It seems that "what you see is not what you get" when it comes to motivational imagery. There is a certain degree of overlap between motivation specific, motivation general-mastery, and motivation general-arousal imagery and their performance outcomes. The authors advocate for further studies to not only ask participants whether they interpret an image as serving a particular function, but also, the extent to which the image serves said function. Additionally, given this overlap between functions of images, the authors suggest that participants be permitted to choose more than one function for each image. Finally, the authors recommend testing the model by assessing athletes' perceived effectiveness of each function and what the image is effective at achieving. These suggestions demonstrate the need for further detailed testing of the applied model of imagery use (Martin et al., 1999).

Koehn, Stavrou, Young, and Morris (2015) answered this call when they examined the moderation and mediation effects of the applied model of imagery use. The study aimed to explore the relationship between imagery use and imagery ability during competition. A secondary aim was to discover how imagery influences athletes' cognition and motivation during an ideal competition setting with respect to flow, which is "a state of consciousness where one becomes totally absorbed in what one is doing, to the exclusion of all other thoughts and emotions," (Jackson & Csikszentmihalyi, 1999, p. 5). The study resulted in some relevant findings for music performance: the use of cognitive imagery

had direct and indirect effects on flow, while the use of motivational imagery was explained by the imagery ability of the user, (Koehn et al., 2015, p. 983). The former may be applied to more cognitively driven sports, such as shooting or archery, while the latter may be of significance for cyclists and long-distance runners reaping the benefits of motivational imagery. However, further research is needed to determine the significance of imagery use and imagery ability amongst different sport types.

The question of imagery ability and sport types is relevant to musicians. How would these results be reflected in the music performance literature, if at all? Does imagery use and ability vary by instrument and type of competition? For instance, is there a musical activity that relates to a marathon runner being more inclined to use motivational imagery? Perhaps an audition pianist who must be present for daily auditions and accurately sight-read for hours on end would use motivational imagery? This is an interesting topic that requires further research to make any supported claims.

2.16 Examples of Imagery Improving Sport Performance

Studies from as far back as 1987 were cited above to demonstrate imagery's efficacy in sport performance. The author would be remiss in neglecting to mention an example involving golf, one of the most cognitively dominant sports in the domain. Researchers have demonstrated an overall positive impact on golf performance in studies employing imagery interventions (Nicholls & Polman, 2005). As an example, successful putting is positively associated with imagery (Ploszay, Gentner, Skinner, & Wrisberg, 2006). In Woolfolk, Parrish, and Murphy's (1985) investigation into a putting task, they discovered

that students with little to no golf experience who imagined the ball directly rolling into the hole before a putt resulted in improved putts by 30.4%. Conversely, those who imagined the ball missing the hole missed 21.2% more often. While the participants were not experts, this study lends support for imagery's utility in novice skill-learning. More recent research corroborates imagery's efficacy in beginner golfers by combining it with physical practice to result in a superior approach shot (Brouziyne & Molinaro, 2005). In terms of expert golfers, Jack Nicklaus reported going to the movies inside his head before every shot (Nicklaus, 1976). He used imagery to help him focus on the destination of the ball and the process of how to get it there. These reports demonstrate the necessity of imagery for golfers and how it can positively influence performance.

As the line of inquiry has expanded over the years, imagery's applications to sport performance have grown more detailed. For example, in 2016, Westlund Stewart and Hall investigated the outcomes of cognitive-general imagery on decision-making abilities in curlers. Results revealed that one participant improved their response accuracy, while the other two participants improved their response time. Although not all participants improved in the same areas, the results demonstrate the need for considering individual responses in such imagery interventions. These findings lend support to those of Guillot, Nadrowska, and Collet (2009) and White and Hardy (1998), indicating that implementing CG imagery into an athlete's routine can improve performance.

In 2017, Simonsmeier and Buecker sought to uncover the relationships between imagery use, imagery ability, and performance in young athletes. The study consisted of 80

gymnasts who were assessed on the five functions of imagery. Results indicated that cognitive specific imagery use, motivational general-mastery imagery use, and goal imagery ability were significant predictors of performance at competition.

Moreover, Fazel, Morris, Watt, and Maher (2018) researched three different imagery delivery types on free-throw shots and self-efficacy in young basketball players who were separated into four groups: routine imagery (same scene in all sessions), progressive imagery (simple images to increasingly complex images), retrogressive imagery (complex images to increasingly simple images), and a control condition. They found that retrogressive imagery was the most effective at improving free-throw shots and less-skilled players seemed to benefit more from this method as compared to the other two delivery methods, while progressive imagery was the least effective method. Overall, imagery had a positive effect on participants' self-efficacy.

The use of varied imagery delivery methods bears mentioning because of its relevance to music performance. As demonstrated in the subsequent sections, Nordin and Cumming (2005) found that dancers use complex, layered images in their practice, although not enough is yet known about them. Layered images, as described by participants in Nordin and Cumming's (2005) study, are "created by first imaging skills, and thereafter adding qualitative elements such as emotions and characterization," (p. 410). These types of images can easily be applied to singing. For example, when looking at the final scene of Bizet's *Carmen,* specifically, the line "Libre elle est née, et libre elle mourra," which translates to "free she was born, and free she will die." The singer portraying Carmen

may want to execute a *crescendo* on the first word “libre”, i.e., the skill. She will first imagine that skill and then add elements of emotion, such as anger, outrage, righteous indignation, on top of that skill to echo the character and/or the scene, i.e., the layers. Fazel et al.’s (2018) and Nording and Cumming’s (2005) findings on imagery delivery methods and layered images, respectively, may be echoed in the music performance literature and warrants further research.

2.17 Coaches’ Influence on Imagery

Regardless of performance outcome, there is research to suggest that a close-knit environment in which the athlete feels supported by their coach may enhance their sport performance and development (Davis, L., Appleby, Davis, P., Wetherell, & Gustafsson, 2018; Bianco & Ecklund, 2001). According to Dahlkoetter (2007), as a means of creating feelings of speed and power, coaches instruct their athletes to use mental images during their training sessions, (e.g., when running or walking, if an athlete happens upon an unforeseen hill, they can use the mental image of a magnet attracting them seamlessly to the crest). On the other hand, negative social interactions with their coach have a more negative effect (Newsom, Rook, Nishishiba, Sorkin, & Mahan, 2005). With respect to the coach-athlete relationship, researchers have attempted to understand the athletes’ environment (Jowett, 2007; Davis, Jowett, & Lafrenière, 2013) and other research has studied coaches’ encouragement of imagery use among athletes (Olson, Short, & Short, 2007; Lauer, Zakrajsek, Lerman, & Lauer, 2020).

In 2007, Olson and colleagues explored how coaches advise their athletes on imagery use during practice sessions. They found that coaches encourage imagery use most often in practice compared to any other setting. They also found that the most cited reason for imagery use was for MG-M (i.e., images of mastery and mental toughness). Consequently, it appears that coaches are aware of the potential benefits of imagery use by their athletes. However, they may need to be trained in how to use imagery with their athletes. The same can be said for voice teachers and their students. Further research on the coach-athlete relationship and voice teacher-singer relationship is needed.

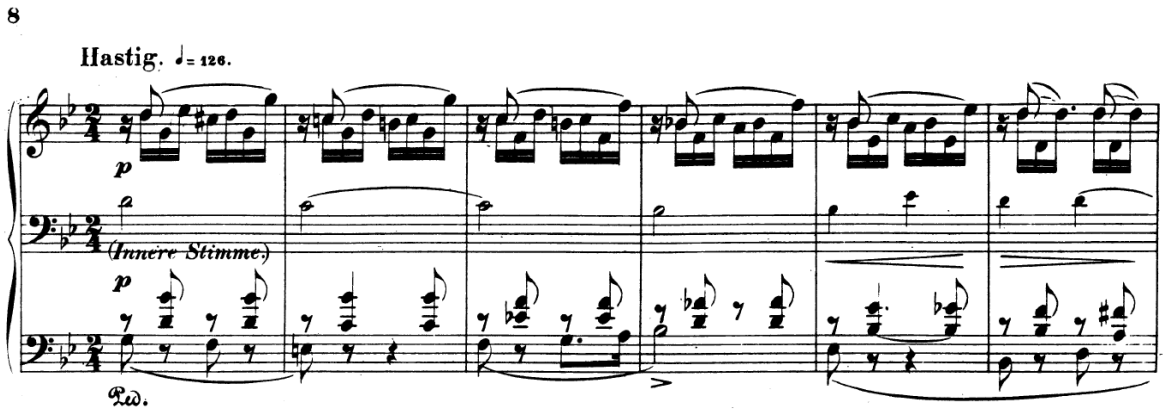
2.18 Imagery in Music

Imagery of music, or imagining music, or experiencing music through all the senses is a universal construct that most people can relate to simply from everyday life experience. Humans imagine music in a variety of situations, such as when remembering a familiar piece, or when experiencing earworms (i.e., involuntary musical imagery; IMI). Musical imagery has been explored in musicians (Schürmann, Raij, Fujiki, & Hari, 2002; Kleber, Birbaumer, Veit, Trevorrow, & Lotze, 2007) and in non-musicians alike (Zatorre, Halpern, Perry, Meyer, & Evans, 1996; Halpern & Zatorre, 1999). According to Bailes, Bishop, Stevens, and Dean (2012), musicians imagine music in periods of mental rehearsal (Holmes, 2005), while score-reading (Brodsky, Henik, Rubinstein, & Zorman, 2003), and for composition (Covington, 2005; Bailes, 2009; Bailes & Bishop, 2012). Famous composers, Schumann, Mozart, Berlioz, Tchaikovsky, Wagner, and Brahms, all spoke of their imagery use and how it influenced their compositional methods. Mozart stated that, in his mind, his pieces were already completed and that "it rarely differs on

paper from what it was in my imagination" (Agnew, 1922, p. 283-284). More recent research corroborates this through Keenan's (2009) work where prominent American composer, Jake Heggie was interviewed:

> It is not so much the text but the theme that comes first. The situation, the drama, the particular point in time when something is happening or is about to happen that's what inspires me. Really it's a matter of my living with that thought and that space and the words for as long as I feel necessary. And then I just get a sense of when it's time to start writing things down. This is sort of an internal clock; there isn't really a process… And if things develop, they develop very naturally. It's with this sense of shape and direction and architecture in my head that I write. (2008)

Evidence of composers' imagery use abounds across the classical music canon. For example, in Robert Schumann's *Humoreske,* op. 20 for solo piano, there is a third stave wedged between the conventional treble and bass staves labelled as "Innere Stimme" or inner voice (Keller, 2012; Ostwald, 2010). This musical line is intended to be imagined and supposedly represents Schumman's future wife Clara Wieck singing one of her own compositions. One can assume that doing so influences the character of the written parts.



Retrieved from Schumann's *Humoreske,* op. 20 for solo piano (1839) via IMSLP.

Furthermore, in *Music and Imagination,* composer, Aaron Copland discusses the sonorous image, or the way music sounds (1980). He defines the sonorous image as "nothing more than an auditory concept that floats in the mind of the executant or composer; a pre-thinking of the exact nature of the tones to be produced," (p. 21). Similarly, Schumann advised young composers not to physically attempt a piece on an instrument until it had been fully conceived in the mind. These examples demonstrate how composers have employed imagery in their score-writing across history.

Performers' use of imagery has a considerably larger presence in the literature. While examples from pianists, Artur Rubinstein and Wladyslaw Szpilman have already been cited in previous sections, Hines (1982) quoted dramatic soprano, Birgit Nilsson saying, "If you think more and sing less, you know, think how you want the voice to sound, then half the work is done," (p. 201). A more typical example was given by Persson (1993):

> I find often that to get me into the mood of a piece, say the Pathétique Sonata [by Beethoven] and the opening of that, you think something sad. You think sadly, not necessarily something that has happened to you, but you think of the experience of sadness before you play that chord. I suppose one could also think of something specific. But that "feeling of sadness" – and that's what I'm trying to say – is a subconscious thing and you are just trying to bring it out. (p. 197)

Composers and performers use imagery. As such, they should be trained to use imagery to enhance its positive outcomes. In 1921, Jacques-Dalcroze wrote: "Musical training should develop inner hearing – that is, the capacity for hearing music as distinctly mentally as physically. Every method of teaching should aim, before anything else, at awakening this capacity," (p.98). Given the many functions of imagery, future directions

of the research could involve imagery training sessions for musicians to hone their mental practice skillset.

2.19 Empirical Investigations of Imagery in Music

According to Keller (2012), “Although topics related to musical imagery have occupied researchers for some time (Godøy, & Jørgensen, 2001; Hubbard, 2010; Reisberg, 1992), little scientific work has dealt specifically with the role of imagery in music performance and/or music training (2012, p. 206). One of the earliest studies was Rubin-Rabson’s (1941) investigation into imagery outcomes on pianists, where she found that imagery had a positive effect on memorization. Subsequent studies like the ones conducted by Ross (1985) and Coffman (1990) both investigated imagery’s effects on music performance and found that physical practice and combined mental (imagery) and physical practice were the most effective practice methods. Recall from the Mental Practice in Music section that Bernardi and colleagues (2013) investigated mental practice methods in pianists.

In all these studies, imagery in music was examined with respect to mental practice, physical practice, or a combination of the two. Musicians can apply these findings so that they may optimize practice time; have a better understanding and mental representation of their pieces; and/or refrain from excessive physical practice and consequently, prevent the risk of playing-related injuries. These can be accomplished through combining physical and mental practice, without any performance losses.

In 2004, Highben and Palmer took a slightly different direction from previous research when they investigated pianists' performance in four practice conditions: physical practice, practice with no auditory feedback, practice with no motor feedback, and mental practice with neither auditory nor motor feedback. Results indicated that removing auditory and motor feedback was negatively correlated with learning and retention. However, those that reported a high proficiency in auditory skill were the least affected by the second practice condition. This suggests that auditory imagery abilities are positively associated with the learning of novel piano pieces from notation alone.

In a similar vein, Brodsky and colleagues (Brodsky, Henik, Rubinstein, & Zorman, 1999, 2003; Brodsky, Kessler, Rubinstein, Ginsborg, & Henik, 2008) developed a new method of testing for auditory imagery in professional musicians. The experiment in 2003 was threefold and asked participants to read a variation of a melody from the score without singing or humming for a maximum of sixty seconds, followed by hearing the original theme or a similar but mismatching theme without seeing the score. The participants were then asked to discern whether the heard melody was the same as the notation of the read score. The researchers posited that the task could only be completed correctly if participants had created auditory representations of the music in their minds. In the first two experiments, the participants performed worse when attempting to visually discern the embedded melody while distracted by phonatory activity. In the third experiment, they found that musicians were significantly better and faster at recognizing a melody when the music was heard aloud. This suggests that trained musicians may still not be

expert enough to recognize a well-known theme when presented visually (Brodsky et al., 2003). The implications require further research.

These studies demonstrate that the literature has, thus far, produced mixed results. As seen in the sport performance literature, imagery practice is no substitute for physical practice, but it may produce optimal results when combined with physical practice, or supplemented for physical practice in times of necessity (e.g., rehabilitation, injury, travel). One of the limitations of these studies is that imagery training and time to incorporate imagery into practice is rarely provided. Future research could incorporate imagery training, thereby providing further insights into musicians' imagery use and the effectiveness of its use.

As mentioned in Theories of Imagery, some researchers have examined the emotion-imagery-metaphor relationship in musicians. For example, Woody (2000) looked at college-level musicians and their means of developing expressivity in their performance practice. Some participants cited extramusical (i.e., outside of music) sources, or life situations, as factors influencing their expressivity. When asked how they might share their knowledge of developing expressivity in a younger cohort, many participants advocated for a pedagogy aimed at felt emotion or extramusical meaning; singers were more likely to support this approach, perhaps pointing to the influence of text in vocal music. The results also shed light on the possibility of a two-stage process of learning expressive performance; "that is, the initial execution of prescribed expressive devices gives way to 'spontaneous' implementation of expressivity induced by strong moods,

mental imaging or external emotionalising," (Woody, 2002, p. 217). More simply, a student must first learn expressive devices such as *crescendi* and *decrescendi* in the studio or practice room outside of the performing context and once learned, may employ them during live performance at whim.

But what happens during performance to spontaneously create these images, feelings, and/or sensations to influence expressivity? In the following section, the types of imagery that musicians most commonly cite are discussed.

2.20 Types of Musical Imagery

A performer is tasked with knowing the ins and outs of a musical piece in order to generate accurate mental representations (Lehmann, 1997; Lehmann & Davidson, 2002) to create a performance that is rooted in technical skill and musical expression (Fine et al., 2015). Musicians create these mental representations or images primarily through three main senses: visual, auditory, and motor/kinesthetic. According to Bailes et al. (2012), mental images of melody and pitch have demonstrated aspects of auditory (Deutsch, 1970; Keller, Cowan, & Saults, 1995), verbal (Keller et al., 1995), and motor processing (Mikumo, 1994; Finney & Palmer, 2003). Similarly, Saintilan (2014, p. 310), reported the following: "This type of multimodal imagery for music has been described as having a combination of visual, aural, and kinesthetic aspects," (Hallam, 1997; Holmes, 2005; Hubbard, 2010; Kalakoski, 2001; Meister, et al., 2004; Palmer, 2006). Thus, visual, auditory, and motor/kinesthetic imagery will be discussed in this section.

Visual imagery involves optical mental representations of objects, events or movements ("Imagery", 2016; Thomas, 2014). Musicians can use visual imagery during score-analysis and score-reading "to observe the global parameters of musical notation, such as clef, key signature, meter, and tempo," (Bravo & Fine, 2009, p. 245). Visual imagery allows a musician to learn a piece's compositional structure, both in the foreground and background, and to recognize melodic, harmonic, and rhythmic patterns, and points of tension and resolution. Furthermore, "When expert musicians see a score, the analysis they do may involve hearing the music internally and understanding its structure, therefore creating an association between seeing and hearing" (Bravo & Fine, 2009, p. 246).

When reading a score, audiation is a common occurrence in trained musicians, if not an inevitable one (Brodsky et al., 2003). According to Fine and Bravo (2011), 90% of music performers reported always or almost always hearing music internally while reading a score away from the instrument. Additionally, Stachó (2018) stated that musical imagery research in the performance domain usually centers on auditory imagery (e.g., Hubbard, 2013; Repp, 2001). Auditory imagery involves acoustic mental representations of objects or events (Cahn, 2008; "Imagery", 2016; Thomas, 2014), which are necessary in all aspects of performance preparation, such as sight-reading or sight-singing, memorizing music, and polished performance (e.g., Repp, 2001). In fact, Aleman, Nieuwenstein, Boecker, and de Hann (2000) found that musicians excel in musical mental imagery in comparison to non-musicians and that musical imagery is increased in advanced musicians, suggesting a cortical plasticity in the population. However, other types of

imagery, such as visual, are not enhanced in musicians. As discussed in the previous section, musicians' auditory imagery abilities are positively correlated with success at learning novel piano pieces (Highben & Palmer, 2004), better post-practice performance (Bernardi et al., 2013), and increased encoding and recall of musical sequences (Brown & Palmer, 2013). These results indicate that auditory imagery may provide significant benefits for musicians' performance.

According to a guitarist in Holmes's (2005) study, "… the other week when I was about to do that concerto, I listened to it on a recording the night before and I could imagine every single movement in my hands as I listened" (p. 227). This quote demonstrates how auditory imagery and motor imagery are connected. The participant used auditory imagery to replicate the concerto in the mind's ear and simultaneously used motor/kinesthetic imagery to mentally rehearse the movements as he listened. Recall that Mielke and Comeau (2019) define motor imagery as involving mental representations related to movement but without movement execution ("Imagery", 2016; Thomas, 2014), while kinesthetic imagery involves mental representations related to the feeling of movement without actual movement execution: a type of motor imagery (Kleber, et al., 2007; "Imagery", 2016; Thomas, 2014).

From their work in notational audiation, Brodsky and colleagues (1998, 1999, 2003, & 2008) suggested that auditory and motor imagery are integrated in the brain. For example, Bailes et al. (2012) explored motor imagery and its influence on musical changes in volume. Participants imagined figures moving from a walk to a run as the

loudness of the example increased. From this, they suggested that motor representations contribute to musical changes in loudness.

From these examples, it seems that these types of imagery are interrelated and that there is a certain degree of overlap between them. They are involved in separate systems, but simultaneously interact in the brain. Consequently, musical imagery does not have to pertain to motor, somatosensory, auditory, or visual aspects of imagery on an individual basis, rather, it integrates them all. Further research should investigate imagery type and task performed (i.e., instrument-specific).

Thus far, empirical evidence for musical imagery and the types that may be involved have been discussed. But how are imagery ability and function measured in musicians?

2.21 Methods of Assessing Musical Imagery Ability

Several questionnaires and inventories have been used for assessing imagery ability and function in musicians. These include a shortened form of Bett's Questionnaire upon Mental Imagery (Sheehan, 1967); the Vividness of Visual Imagery Questionnaire (VIMQ; Marks, 1973); Advanced Measures of Music Audiation (AMMA; Gordon, 1989); the Auditory Imagery Scale (Gissurarson, 1992); the Movement Imagery Questionnaire Revised (MIQ-R; Hall & Martin, 1997); the Functions of Imagery in Music Questionnaire (FIMQ; Gregg, Clark, & Hall, 2008); the Embedded Melody Paradigm (Brodsky et al., 2003, 2008); the Clarity of Auditory Imagery Scale (Willander & Baraldi, 2010); the Bucknell Auditory Imagery Scale (BAIS; Halpern, 2015); the Pitch

Imagery Arrow Task (PIAT; Gelding, Thompson, & Johnson, 2015); and Notation-Evoked Sound Imagery in Musicians (NESI; Wolf, Kopiez, & Platz, 2018).

While discussing the advantages and disadvantages of each measure is beyond the scope of this monograph, there are several points that bear mentioning. First, there are systemic flaws when dealing with questionnaires like the ones listed above, such as participants self-reporting their imagery usage. This can create problems when aiming to compare scores across participants (Guillot & Collet, 2005). Additionally, many of the tasks performed in these assessments rarely relate to real-life musical tasks that musicians typically engage in. For example, Halpern's BAIS (2015) involves 28 self-report ratings on the vividness of an imagined sound and how well the participants imagine the sound changing. Some of the imagined sounds refer to music, but many do not have any musical connection. Furthermore, the populations of these tests often combine performance and non-performance majors as well as singers and non-singing musicians (e.g. Gregg et al., 2008). From the author's viewpoint, after studying imagery in music it is clear that musicians certainly use imagery to some extent. However, performance majors are likely to use it differently than non-performance majors and instrumentalists are likely to use it differently than singers, at least in certain respects. Whether or not general and instrument-specific musical imagery assessments should be developed is a future direction of this research.

As a criticism of the current pool of assessment tools, some researchers have suggested that imagery ability not be viewed and assessed as a single construct, rather, that it has

three distinguishable, observable, and measurable features (Denis, 1991; Moran, 1993). These involve "vividness, which refers to the clarity of an image; controllability, relating to the ease and accuracy with which a person can manipulate an image; and accuracy of reference, or the extent to which the image accurately reflects the object it represents," (Clark et al., 2012, p. 358). Whether this rings true for musicians is also a future direction of the research.

Musical imagery is a multi-faceted and multi-sensory tool with a variety of functions available for musicians' use (e.g., Connolly & Williamon, 2004; Gregg & Clark, 2007; Gregg, Clark, & Hall, 2008). However, many of the questionnaires cited above test for only certain aspects of imagery (e.g., melodic, temporal, or vividness); there are few measures that address all aspects (Clark & Williamon, 2011). As such, further research is needed to accurately assess imagery ability and function.

2.22 Imagery Recommendations

While suggestions for incorporating imagery into a musician's practice regime have been scarce (Clark et al., 2012), the following recommendations have been made for musicians:

> Practice regularly, especially in the morning, when concentration and focus levels are greatest; Given how mentally taxing imagery is, it is better to carry out short regular mental rehearsal sessions than long, infrequent sessions. Start with relaxation exercises so that clear signals can be communicated between mind and body. Mentally rehearse specific skills or qualities you are working on in your technical training, close to or above your current level of performance. Keep your imagery positive; move toward what you want to focus on when developing and rehearsing mental representations and avoid ruminating on possible mistakes or errors. Use all of your senses so that you believe that you are actually in the

> situation executing the skill. Notice how you visualize; whether you typically use, or prefer to use, an internal or external perspective of yourself performing. (Connolly & Williamon, 2004, p. 227)

2.23 Imagery in Singing

Before delving into imagery's applications to singing, a brief note on context is necessary. The history of vocal pedagogy is long and storied, hearkening back to the *bel canto* tradition, which began in the late 16th and early 17th centuries. In 1602, Caccini's *Le nuove musiche* marked the earliest school of *bel canto.* However, the *bel canto* period's ending is less concrete. "The period from the middle of the 17th century to the beginning of the 19th century is thought of as the golden age of *bel canto* (Randel, 1986). The *New Grove* echoes this by suggesting that the *bel canto* period includes the early 19th century (Jander, 1980a). Celletti's *A History of Bel Canto* (1991) maintains that Rossini (1792 – 1868) was the last composer of the bel canto style. While according to Stark (1999), listeners often equate *bel canto* with composers Rossini, Donizetti (1797 – 1848), Bellini (1801 – 1835), and even early Verdi (1813 – 1901). Clearly, there is some overlap in ideas on where the *bel canto* period ends.

Because of its oral history, voice pedagogues have attempted to illuminate the hallmarks of *bel canto* for centuries. Two such pedagogues are Manuel Garcia II (1805 – 1906) and Giovanni Battista Lamperti (1839 – 1910), giants of the field and to whom voice teachers still defer today. While they were two singing teachers with markedly different methods, they had similar backgrounds. They were both sons of famous singers and singing teachers, i.e., Manuel Garcia I and Francesco Lamperti, and subsequently became famous singing teachers themselves. Thus, the Garcia school and the Lamperti school were

formed. While outlining each pedagogue's style in detail is beyond the scope of this monograph, it is important to convey how each of them approached singing since they still influence voice pedagogy today. Garcia was a proponent of the physiological approach, while Lamperti favoured the imagistic side of singing. Both schools are valid and still referenced today.

Up until the 19th century, singing was largely an oral tradition, passed down from teacher to student, and rooted in an imagistic approach. Garcia was the first to marry this tradition with science. He maintained that the singer should have "some exact scientific notions on the formation and the action of the vocal organ," (Mackenzie, 1890, p. 75-7). Garcia's approach, as discussed in Stark's (1999) *A History of Vocal Pedagogy,* was physiological in nature, as he was the first to talk about onset, i.e., how a tone is begun, in singing.

Contrastingly, Lamperti's approach was imagistic and lacking in specific anatomical vocabulary. Although responsible for both *Technics of Bel Canto* (1905) and *Maxims on Vocal Wisdom*, as transcribed by his student, Earl Brown (1974), Lamperti is best known for the latter. The pedagogical approach of the Lamperti school was grounded in "timbre, resonance sensations, and breath control, often with no clear distinction between these separate functions," (Stark, 1999, p. 43). In his *Maxims,* he states that to sing well you must continually feel "hollow-headed," "full-throated," "broad-chested," and "tight-waisted." Though taken out of context, these suggestions certainly lean towards an imagistic approach that is rooted in metaphor and simile.

Some modern voice teachers echo the Lamperti school in their directives, for example, teachers often say “feel like you are a tree, rooted to the ground,” “feel like you have tentpoles screwed in,” and “feel like you have a string coming out of the crown of your head.” These common directives all involve some kind of comparison to achieve a desired outcome, i.e., metaphor. Recall from earlier in this chapter under What Imagery is Not that metaphors can be seen as conceptual processes in which we comprehend one concept (target domain) in terms of another concept (source domain), as described by the conceptual metaphor theory,” (Schaerlaeken et al., 2019; Johnson, 1987; Lakoff & Johnson, 1980). These directives are not wrong. They just use imagery in a limited form. To reiterate, imagery from the author’s standpoint most certainly does involve metaphor and simile. It is just not interchangeable with metaphor and simile.

Moving forward to the 20th century, voice pedagogues attempted to find an interactionist approach that fit nicely between the Garcia and Lamperti schools. Voice pedagogue, Richard Miller built on the tradition of the teaching of singing by incorporating specific and objective language in his explanations of vocal functions paired with practical examples into his methodology. According to Kiesgen (2007),

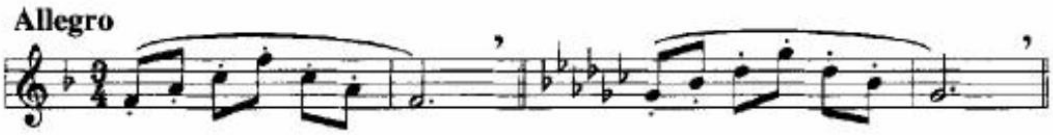
> Perhaps his most significant contribution is that he made us rethink the way we evaluate singing. Traditionally singers and teachers have listened to the sound and made decisions about the voice based almost entirely on whether they like the sound or not. Richard has asked us to consider the function first, assuring us that a voice that is functioning well will indeed produce the best possible sound. (p. 261)

In Miller’s *Structure of Singing* (1986), he compiles the tenets of the traditional teaching of singing, explains their function in specific, anatomical language, and he then provides

a series of exercises that readers can use to train the voice until they can make the necessary adjustments to sing well. This layout is mirrored in his other works. For example, in his *Training Soprano Voices* (2000) he outlines specific examples to develop agility in the voice (see Examples 5.1 and 5.2 below). He writes, "Having acquired skill in the onset and developed an understanding of *appoggio* breath management, the singer next turns to rapid staccato passages built on triads. For most sopranos these figures commence in upper middle voice and move upward by semitone, progressing sequentially from the key of A through that of D…" (2000, p. 57). Because of his attention to vocal function, the author believes that Miller leans more toward the Garcia school.

EXAMPLE 5.1.

EXAMPLE 5.2.



Retrieved from Miller's *Training Soprano Voices* (2000, p. 57).

Turning to imagery, it is important to note that Miller is referring to a voice pedagogy and Lamperti school perspective and not a sport psychology one. Miller is not a

proponent of such metaphorical and imagistic language like the Lamperti school. For example,

> Putting the tone "up the back of the throat wall and over into the forehead," "into the masque," "down the back of the throat," "out the chimney on top of the head," or "out the funnel at the back of the neck," "singing on the breath," and "spinning the tone" are useless admonitions, inasmuch as none of these things can be done. (Miller, 1998, p. 41-42)

Instead, he prefers to establish proper vocal function before incorporating imagery into teaching. For example, "After the singer has learned to coordinate breath management and proper laryngeal resonatory responses, an image may be useful to unify those functions. Using imagery beforehand may cause more confusion," (1989, p. 15). He only advocates for technical, i.e., imagery geared towards improving vocal technique, imagery if it can lead the singer to a sound that is free and repeatable.

In sum, Miller's style seems to coincide with the Garcia school, adding in a splash of the Lamperti school after vocal functions have been properly coordinated. He has also contributed to the field by adding prescriptive exercises to achieve freedom in the voice.

"Singing in the field of classical music involves both technical-motor and a strong emotional engagement in order to transport the musical intention and to communicate artistic, emotional and semantic aspects of the song or aria," (Kleber et al., 2007, p. 889). While classical singing shares many aspects with speech, such as vocal tract manipulation, articulation of meaning, reading and recalling words, intonation, tone, stress, and rhythm, there are inherent differences between the vocal demands of the singing voice and the speaking voice. These include the stylistic accuracy required in

classical singing amongst various eras (e.g., French Mélodie, German Lieder, Baroque Opera, or Contemporary music). Each style poses its own challenges in musical pitch, meter, rhythm, vocal range, *vibrato*, *sostenuto*, and dramatic expression. As such, singing requires a deft control of the voice in comparison to speech (e.g., Natke, Donath, & Kalveram, 2003). While singing demands extensive co-ordination of the motor system to exercise such aspects like fine laryngeal control, vocal tract tuning, and breath management (Watson & Hixon, 1985), studies exploring cerebral aspects of singing are scarce and are often comprised of non-musicians.

One exception is the work of Kleber and colleagues (2007) when they compared classical singers' overt (actual singing) and imagined singing of "Caro mio ben," a well-known aria by Giordani. Sixteen participants were asked to sing the first six phrases of the aria and then imagine the same aria without any vocal output. The results revealed a good deal of overlap amongst the cortical and subcortical areas during overt and imagined singing. While overt singing stimulated areas primarily responsible for complex motor sequences and sensory control, most of these areas were also stimulated during imagined singing – perhaps demonstrating the importance of imagined rehearsal for physical performances.

Voice teacher, Giovanni Battista Lamperti (1838 – 1910), in his *Maxims on Vocal Wisdom* (1974, p. 28), stated that *The Golden Rule of Singing* is "to know the result before we act." To achieve this, one must believe that one can accomplish a task before the attempt. Once that task has been mastered, chances of further success are greatly

increased. For example, if a singer imagines herself succeeding, like singing a perfect high C, that will assist her in reaching an optimal level of arousal for performance.

As described by Bandura (1997), self-efficacy is defined as situation-specific self-confidence. It is rooted in social cognitive theory and it posits that those with high self-efficacy perceive performance as something to be mastered rather than avoided. To illustrate, if one feels confident about their musical skills as a musician, their performance will improve. Or, from the author's viewpoint, imagery is an avenue for a self-fulfilling prophecy. If one expects to succeed, chances of success are that much greater.

> Mental imagery provides the very plan and purpose of vocal expression. The formation of the sounds of the voice and their adequate projection are direct outpicturings of these underlying concepts, and vocal expression is therefore said to be governed by the singer's powers of visualization and mental imagery… Basically, it is the MIND that sings, not the voice. You can say or sing only what you think. Therefore, you can sing only as beautiful a tone as you can think, since your voice always follows your thoughts… Hence we must learn to sing in thoughts, for the tone is embedded in the idea that produces it. (Fields 1972, p. 2)

To reiterate, during performance, singers must be able to do many things at once. First and foremost, they must sing well, act well, communicate with the audience, incorporate stage direction, deal with props and sets, co-operate with other actors, listen to the music, follow the conductor, all while maintaining mental focus. Since singing is a highly cognitive task, it is equally valuable for singers to invest as much time in mental training techniques as they do in physical ones.

2.24 Empirical Investigations of Imagery for Singers

Acoustic and perceptual methods have been used in previous research to investigate pedagogical instructions for the voice, such as forwards/backwards vocal placement (Vurma & Ross, 2002, 2003) and open throat technique (Mitchell & Kenny, 2004a, 2004b, 2006; Mitchell, Kenny, Ryan, & Davis, 2003). Aside from Kleber et al.'s aforementioned study on overt and imagined singing (2007), few studies have explored imagery's effects on singing performance; however, there are three exceptions.

In 1993, Carter interviewed eleven nationally and internationally renowned professional singers for her dissertation and asked them about the nature and function of their imagery use. The study revealed that, in general, imagery was an important aspect of the process of singing for all participants. However, participants were not in agreement on the scope of imagery's involvement in their singing. Post-analysis, 36 distinct functions of imagery were identified. These were then distilled into six categories of detailed imagery use: kinesthetic awareness, communication, technique, expanding the textual landscape of a song, expression and interpretation of vocal literature, and teaching students. This last category from Carter's study is also a finding that emerged inductively from DeSantis et al. (2019), where participants were clarifying whether the questions referred to personal imagery use or teaching. While this study is thorough and comprehensive, it is rooted more in cognitive psychology than sport psychology, which makes sense because imagery in sport psychology had not yet become as prominent a topic in 1993 as it is today. However, imagery, as described by these singers, is considered a valuable tool for

them to build and maintain vocal technique, and to unearth the emotional underpinning of both text and music.

The second exception is Callinan-Robertson, Mitchell, and Kenny's investigation on halo imagery in young female singers (2006). The concept was formed from a pedagogical interpretation of Mathilde Marchesi's instruction to direct the sound to the vault of the larynx. It incorporates visual imagery of a halo where singers are instructed to envision placement of their sound at the crown of their head. Four mezzo-sopranos sang an excerpt from Gluck's "Che farò senza Euridice" in four experimental conditions, singing with and without halo imagery from pianissimo *(p)* to mezzoforte *(mf)* and then from mezzoforte to fortissimo *(f)* via Long-term Average Spectra (LTAS). "Long-term average spectra (LTAS) identify consistent features in the sound over time (Jansson & Sundberg, 1975) and average out short-term variations in phonetic structure (Löfqvist & Mandersson, 1987), which is particularly useful for analyzing singing," (Callinan-Robertson, Mitchell, & Kenny, 2006, p. 40).

Each adjudicator was asked to listen to the sixteen samples of each participant, with and without halo imagery and the two *crescendo* conditions from *p* to *mf,* and *mf* to *f.* According to expert raters' assessment of the audio LTAS samples, completing singing tasks with halo imagery resulted in statistically significant samples that were rated higher for overall vocal quality and vibrato. However, their method of assessing vocal quality may be in question. According to Kenny and Mitchell (2006, p. 55), "LTAS measures may not be consistent with perceptual ratings of vocal quality as such measurements

cannot define a voice of quality." Furthermore, the small sample size was trained in the use of 'halo imagery' from their voice professor and first author as an interpretation of the Marchesi method. In the author's assessment, aside from confirming the expectancy hypothesis, neither the voice professor nor the participants were trained in imagery, thus casting doubt on the effectiveness of the imagery training and the strength of the entire study.

The third exception investigated vibrato changes following breathing imagery (Moorcroft, Kenny, & Oates, 2015). Six singers were instructed to sing eight bars from Villa-Lobos's *Bachiana's Braisileiras No. 5* aria following 'breathing imagery,' which they defined as 'directing the breath both as far above the larynx and as far below the larynx as possible' to establish a more relaxed pre-singing state. Spectrograms were assessed pre- and post-test for changes in vibrato and the results indicated that breathing imagery produced significant improvements in vibrato rates. However, the study did not incorporate imagery training for the participants.

Aside from their limitations, these studies highlight the disparity between the understanding of the term 'imagery' in music and other fields in that each field seems to have its own specialized meaning of the term "imagery." This confusion was first brought to the author's attention during the interview process of "Investigating the Circumstances under which Singers use Imagery," (DeSantis, et al., 2019). For example, at the end of the interview one participant stated, "Then I guess I didn't understand your imagery explanation at all. I thought it was more like 'feel like you're a tree.' Those kinds of

things that other teachers say. I didn't realize you were basing it on physical…" (p. 12). This participant demonstrated the need for clarification of imagery amongst the performance fields. In voice pedagogy, imagery is often viewed as a supplement for the teacher to explain anatomical concepts, such as inhaling on [a] as if surprised to co-ordinate the breath and the larynx. These directions assist voice students to develop a kinesthetic awareness of their vocal mechanisms and bodies by way of influencing vocal production. They can also lend support to the following principle: imagining a task prior to execution will lead to a better performance (Sackett, 1934).

While not referring to imagery from a sport psychology perspective, voice pedagogue, William Vennard, stated the following: "Learning to sing is a slow and patient undertaking, in which a good ear is the prerequisite, the imagery is an aid supplied by the teacher, and the experience is gradually accumulated until it is so powerful that merely calling up the memory will reproduce it," (1967, p. 80). As a singer and a singing teacher, the author is in complete agreement with Vennard in this respect. Imagery is an aid supplied by the teacher, but with a significant caveat – the singer and singing teacher's understanding of imagery needs to be augmented with the wealth of knowledge supplied in sport and dance psychology, or more broadly, performance psychology. Regardless of the discipline, singers, instrumentalists, dancers, actors, and athletes are all performers. There is much to learn from one another. Imagery from a sport psychology perspective may be underrepresented in the musical literature and future research should endeavour to decrease or eliminate this altogether.

2.25 Practical Applications

According to Saintilan (2014), imagery is necessary for performance. Emmons and Thomas (1998, p. 161) define imagery as "when used by a singer, imagery is a conscious utilization of the senses to create impressions that will aid the performance. Imagery differs from dreaming only in its *conscious* and *deliberate* use." Western classically trained singers often resort to psychological techniques to elicit the complex and often subconscious co-ordinations that are required to produce optimal vocal results. Imagery is one such technique, "the discipline of singing and vocal pedagogy… has consistently and historically used mental imaging techniques to achieve its objectives," (Cleveland, 1989, p. 41).

Mental representations or images are some of the most important tools in a singer's toolbox. Since singers cannot strike a key, strum a guitar string, depress a valve, or externally work on any part of the vocal mechanism to produce sound, they instead must rely on the use of mental images. "This concept of vocal imagery is as effective as the voice teacher's imagination is creative," (Daniel, 1993, p. 29).

Previous voice research has confirmed the prevalence of imagery-based (Lamperti style) approaches in the voice studio as a complement to science-based approaches (Tait, 1992). In fact, from a survey of over five hundred voice teachers across North America, most prefer a blended approach in their teaching (Ware, 2013). To reiterate, while not referring to imagery from a sport psychology perspective, Vennard (1967) advocates for combining scientific fact and imagery:

> Scientific language is inadequate in teaching an art, and we fill out the deficiency with poetic imagery. As long as we do not confuse fancy with fact, this can be a means of finding truths which are yet beyond our understanding, but which may nonetheless have practical usefulness. (p. 147)

James McKinney, author of *Diagnosis and Correction of Vocal Faults* agrees with Vennard:

> A…problem may arise from the mechanistic and psychological controls employed in the act of singing. Extreme advocates of the mechanistic approach believe that singing is largely a matter of getting the right parts in the right place at the right time, and that correcting vocal faults is accomplished by calling direct attention to the parts which are not working well. At the other extreme are those who believe that attention should never be directed to any part of the vocal mechanism – that singing is a matter of producing the right mental images of the desired tone, and correcting vocal faults is achieved by learning to think the right thoughts and by releasing the emotions through interpretation of the music. As is often the case, the truth lies between these two extremes and is a composite of both approaches. (1994, p. 31)

The author echoes this sentiment by blending the Garcia and Lamperti schools, taking some of Miller's exercises, and augmenting that with imagery from a sport psychology perspective to improve performance in singers.

Voice teachers should look at new ways of blending these approaches for their students. By using imagery, a teacher can help their student to understand the language of music and help them to improve their singing. In his treatise on using imagery for the 21st century student, Clements (2008) states the following: "As educators it is challenging to make teaching styles remain relevant in terms of the images that are chosen as well as the manner in which they are delivered," (p. 3). As such, Clements goes on to discuss questions the teacher can use to develop an image vocabulary for their students. For example, 'What kind of sports/physical activities do you like?', 'What hobbies do you

enjoy?' or 'What kind of music do you listen to?' The first is important because of the parallels between sports and music. In *Complete Handbook of Voice Training* Richard Alderson states the following:

> The singer who waits poised, ready to sing the proper word at the proper pitch has the same kind of mental and physical preparation as a batter waiting for a ball to enter the strike zone. The body is balanced, the breath controlled, and the mind alertly and silently measure the time and amount of force to do the job. (1979, p. 20-21)

By asking these types of questions, the teacher facilitates a dialogue between themself and the student. Not only does the answer matter, but the way in which they deliver the response is of equal importance. To illustrate, a teacher asks a student how they perceive their voice to sound. Some students may be able to give depictions of their vocal production that are in line with that of the teacher's perception. While some students may not be able to describe their tone at all. Whether or not the answer yields concrete information is irrelevant. But the way they answer can shed light on how the singer's imagination works. Certain students may have more vivid imaginations while others may need help in exploring mental representations. Both types of students may be successful in imagery use and ability, but the time required to cultivate these images may be different. To this end, Cleveland states, "Because voice students respond so differently to the use of imagery, we as voice teachers should employ a large arsenal of tools, imaging and otherwise, to better meet the needs of the various cognitive processes of our students," (1989, p. 41). By developing a vocabulary of images and implementing them to explain pedagogical concepts, the teacher is better equipped to individualize lesson plans for each student.

In addition to developing an image vocabulary, Clements (2008) advocates for creating appropriate images. Many images are used in the voice studio (e.g., sniffing a rose, making a tone yellow or blue). These images have often been inherited from teacher to student with the cycle continuing. This is a rich oral tradition in the voice pedagogy world, but it is not without its issues. For example, some of these images may be misinterpreted or passed down without explanation. Because of this, Clements advocates for creating new, detailed, student-centered images to address the main pedagogical functions in voice: posture/alignment, respiration/breathing, phonation, resonation, and articulation.

While an important teaching aid in the studio, imagery is so much more than a supplement to voice teaching. The possibilities are vast and involve a variety of implications for singing, such as vocal technique, musicianship, drama and characterization, performance anxiety and goals, and many more. For example, Moorcroft et al. (2015) cited breathing imagery as a distraction from negative self-talk, improving posture, and regulating breathing, which then assists with stress management. Applied to the voice studio, a teacher may liken breath support to pulling taffy: there is resistance in the action, but it is smooth and stretched – just continuous relaxation of the materials when the pressure is released. When given to a student, this image may assist in their understanding of breath support.

Furthermore, imagery can be used to aid in vowel modification when approaching higher notes. For example, sopranos are often instructed to modify [i] to [y] above the pitch F_5

(top of the staff). They can use imagery to think more [y] than [i] in the note so its sound is less horizontal. Additionally, Story (2016) advocated for vowel modification to influence acoustic characteristics of singing. Figure 4 shows a modified vocal tract shape of [i] and how it can increase the frequency of the singing formant, i.e., approximately 3 kHz (see Glossary). This is important because it represents the ability to be heard over an orchestra without amplification. If methods exist to increase these frequencies, then singers may ultimately improve their audibility – a crucial aspect of classical singing.

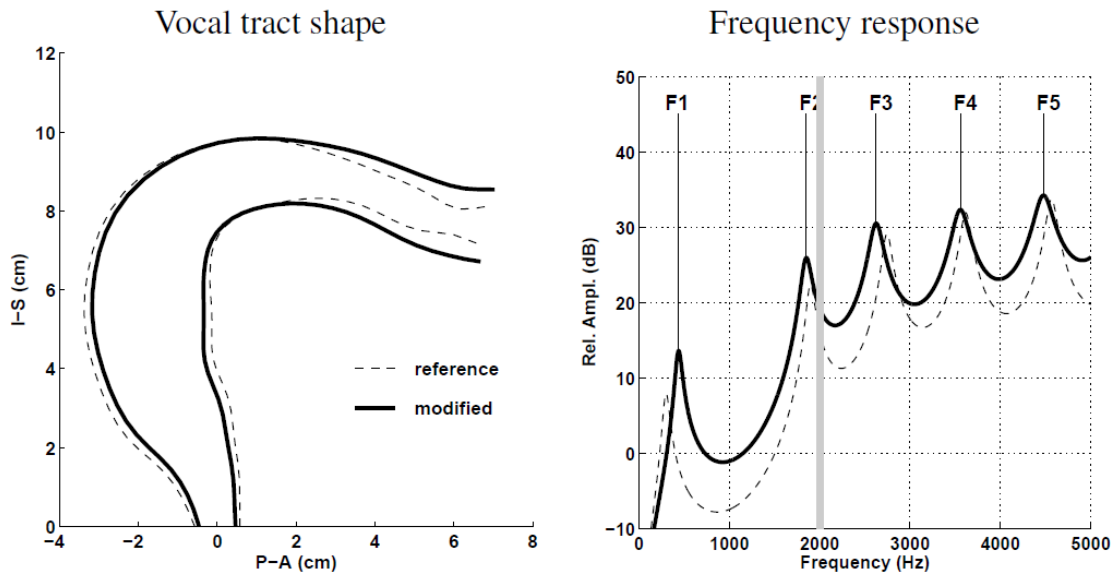


Figure 4 – A demonstration of modifying an [i] to raise F1 (Story, 2016, p. 8).

Furthermore, imagery can be applied to different aspects of vocal technique, such as tone colour, placement, throat position, and vibrato. In reference to tone colour, imagery can influence vocal tract tuning (Story, 2016). As discussed in the previous paragraph, a singer may be asked to modify the [i] vowel in singing to a [y] so it sounds less shrill. Singers can use imagery to practice this modification away from the instrument by

imagining seeing the lips come slightly forward to create the [y], imagining that feeling, or by hearing the difference in a recording and attempting to replicate it during practice. In terms of placement, imagery can enhance forward/backward placement to influence resonance (Vurma & Ross, 2003). For example, sometimes novice singers try to imitate opera singers and they often sound dark and hoot-like. The instructor may want to use imagery to get the voice placed more forward, i.e., "make a sound like a witch" or "make a sound like a siren." With respect to throat position, imagery can facilitate open throat technique to avoid vocal constriction (Mitchell & Kenny, 2004b). The authors refer to the surprise breath as an option to achieve an open throat. Singers can use imagery, i.e., imagining the surprise breath during practice time to better coordinate the open throat. Imagery may be able to affect vibrato rates. For example, Moorcroft et al., 2015 found that breathing imagery 'directing the breath above and below the larynx,' normalized vibrato. These are all suggestions from the author of this monograph and as such, further research is needed to fully explore imagery's applications to vocal technique.

According to Wolf et al. (2018), "Apart from its role during practice, musical imagery is also relevant for the unrehearsed performance of music, the so-called sight-reading" (p. 210). Imagery abilities can help musicians to anticipate sounds so that they may accurately reproduce them without rehearsal. This is supported by Lamperti (1974) when he said that mentally anticipating internal sensations, such as sound, and the physical co-ordinations that produce them, leads to control of the voice.

Some studies have explored the factors that contribute to learning unfamiliar music. For example, Fine and colleagues (Fine, 2002; Fine & Younger, 2004) researched singers' ability to sight-sing intervals or unfamiliar melodies and investigated the possible influence of other singers, accompaniment, and auditory representations on this ability. Similarly, Brodsky et al. (2003) used an embedded melody paradigm task that asked participants to recognize the familiar melody via silent reading. If so, then they were able to create accurate auditory representations of the music. Furthermore, other studies found that notation-evoked imagery was the second most significant predictor of sight-reading performance after directly practicing sight-reading (Kopiez & Lee, 2008; Kopiez, Weihs, Ligges, & Lee, 2006). Through these studies, researchers have suggested that musicians have the capability to produce musical images containing detailed information about pitch, tempo, and melodic and harmonic relationships.

Before producing these musical images, one must first have a firm understanding of the musical score and its structure from years of study. In Bernardi et al. (2013), musicians used formal analysis as one of the mental practice techniques to improve performance. Analysis and performance share an interesting relationship. One possible model of this relationship is where analysis reigns supreme over performance to determine how the music should be performed, as performance is more emotional and intuitive in nature (Swinkin, 2007). Using this model, the performer must defer to analysis to reach an informed interpretation of the piece (Narmour, 1988; Berry, 1989). However, modern theorists find this model too authoritarian because a performer, on their own, may reach a

naturally compelling interpretation of a work, which can then influence the analytical underpinning as much as the reverse. The relationship is bi-directional.

Swinkin (2007) suggested that within this second model, analysis and performance combine to inform performers' interpretations and to create true synergy in performance. Through his work, he advocates for the performer to conduct a formal analysis of the piece away from the instrument (mental practice). From there, the performer gains insight into not immediately observable structural relationships within the piece. He recommends Schenkerian analysis, an analysis method for tonal music that shows relationships between the different structural levels of the music, i.e., foreground, middle ground, and background. Because of these features, features in which performance is also firmly grounded, Schenkerian analysis is highly compatible with performance. A future aim of this work might be to look at imagery as a moderator in the model of analysis and performance through the vehicle of Schenkerian analysis.

Memory can be a significant inhibitor to successful performance. If musicians can create accurate mental representations of the music and exert control over them, then it stands to reason that this ability extends to influence memory. For example, in Saintilan's study on memorized music in instrumentalists (2014), participants were asked to play a piece from memory and speak about their methods of memorization. Some musicians reported inner singing or subvocal singing in their minds while others spoke of inner performing in their minds. The most prevalent images experienced were of sound, movement, or both. The findings of this study support the claim of Miklaszewski (2004) that memorization of

music is achieved through mental representation of the sound of the music. This study suggests that musicians may be able to use a mix of imagery types to aid in memorization. For example, if mentally rehearsing for a recital, a singer may review the text in their head before going to bed whilst hearing the music in the background, incorporating both visual and auditory imagery. This example is supported by Wilson and Tallarico (1983) when they found that memorizing before bed was more effective than after waking. Musicians could use imagery before bedtime to aid in memory and recall in preparation for a performance.

Once the groundwork for singing performance has been laid (i.e., having a solid vocal technique, learning music and memorizing it), the singer must then perform in public. According to Hemsley (1997), the mark of a true expert is the ability to create the impetus for singing – joy and passion, without letting tension arise, or relying on the conductor, orchestra, or audience to inspire one to sing.

> Activating the impulse to sing as a pre-emptive strike for singing is something that all singers must learn to do for themselves whether they are practising or performing. The best way to activate the impulse is to have a clear mental picture of the poetic, dramatic, and musical content of the phrases they intend to sing. (1997, p. 44)

These mental pictures can be used as a springboard to inspire the singer to perform. To illustrate, if embodying The Queen of the Night in Mozart's *The Magic Flute*, a singer may use kinesthetic images of other malevolent characters to emulate their movements and influence staging, for example, Maleficent from Disney's *Sleeping Beauty*. Or if portraying the title role in Bizet's *Carmen*, a singer may use images of Sofia Loren to

influence her comportment on stage. Regardless of the character, imagery's influence on characterization is vast and requires further exploration.

Imagery can also be used to enhance performance goals and reduce anxiety. According to Emmons and Thomas (2008, p. 464), "skillful imagery employs all the senses to recall previous good performances, to see future successes." Recall the author's personal example in the Why Imagery? section: a singer is about to make their stage entrance and suddenly they have the classic 'what's my line?!' panicked moment. There are two possible outcomes: The first involves heart palpitations beginning immediately and panic ensuing, resulting in the singer tripping over their words and making an utter fool of themselves. Or the second option, where the singer remembers to focus, that they have done this many times before, and tells themself to trust that they can do this job. By cultivating and rehearsing an imagery routine such as "Inhale, exhale, imagine calming scenery, like a meadow, picturing a bathroom pep talk where I remind myself of previous success," imagery can help the performer to instantaneously choose the second option. The performer experiences these images through the visual, auditory, and kinesthetic, senses. The images occur in the mind's eye, ear, and sensory receptors. The performer has the presence of mind to make this choice because of imagery training. In this scenario, imagery is implemented as an emergency brake to reduce performance anxiety and to fuel the energy required for performance. Naturally, using imagery to address performance anxiety extends beyond that of a stage entrance. It can be applied in a variety of settings, including auditions, competitions, recordings, especially video recordings because the singer must simulate live performance with the same energy in a

recorded performance without the audience to trigger it. It can even be used as part of a pre-performance routine to prevent the aforementioned ‘what’s my line?!’ scenario from happening.

Although anxiety is frequently measured in sport psychology (Hoover, 2017), the same cannot be said for the music domain (Burin & Osório, 2016). “The current state of knowledge in both academic and clinical psychology regarding music performance anxiety (MPA) is slim,” (Helding, 2016, p. 83). Many famous musicians have been plagued with severe MPA, such as Frederic Chopin, George Harrison, Maria Callas, and Barbara Streisand (Helding, 2016; Kenny, 2011).

Kenny (2011) defines MPA as follows:

> Music performance anxiety is the experience of marked and persistent anxious apprehension related to musical performance that has arisen through underlying biological and/or psychological vulnerabilities and/or specific anxiety conditioning experiences. It is manifested through combinations of affective, cognitive, somatic and behavioural symptoms. It may occur in a range of performance settings, but is usually more severe in settings involving high ego investment and evaluative threat (audience) and fear of failure. It may be focal (i.e. focused only on music performance), or occur comorbidly with other anxiety disorders, in particular social phobia. It affects musicians across the lifespan and is at least partially independent of years of training, practice and level of musical accomplishment. It may or may not impair the quality of the musical performance. (p. 61)

Singing is a highly cognitive task that requires expertise in a variety of skills. The mechanisms involved in vocal function are also likely to be influenced by any tension that accompanies MPA (Arneson, 2010). Because of this, it is incumbent upon the voice teacher to be knowledgeable in MPA and be able to offer guidance in finding treatment. This will result in a more successful relationship between teacher and student.

According to Emmons and Thomas (2008), what separates an excellent performance from a mediocre one is the singer's ability to deal with psychological stress. "This ability might include such elements as self-confidence, concentration, motivation, and effort. Consistently, however, one crucial factor is the ability to handle the stresses and strains of the performing situation," (p. 461). They go on to suggest ten recommendations for managing performance arousal and anxiety. The fourth in the list is of particular importance because it involves imagery.

> Imagery is an effective skill for coping with mental anxiety. Skillful imagery employs all the senses to recall previous good performances, to see future successes. Imagery is also utilized for mental rehearsal, using various images to enhance meaning and quality in performance. Its use before and during performance has proved to be extremely effective for some singers. It does, however, take practice. Sit quietly; relax without any interruptions; use all your five senses on your audition pieces or parts of pieces; or see yourself performing well in the chosen venue. Since imagery is best practiced in short bursts rather than long, continuous periods of time, it will be advantageous because the practice can be done anywhere, anytime. (2008, p. 464)

The author of this monograph believes that the mental skills involved in singing are just as important as the physical skills. Mental skills are easy to learn if proper instruction is provided and daily practice ensues. Thus, singers and teachers of singing should be instructed in imagery and its many applications.

Now that a popular performance deterrent like anxiety has been addressed, however briefly, the question remains: how to encapsulate ideal psychological conditions for performance? As a personal example, one of my most memorable moments of experiencing flow state was at a performance last summer where I sang "Glitter and be gay" from Bernstein's *Candide.* I was on the verge of a bad cold and really did not feel

like singing an extended mad scene with many high, chirping notes. But I told myself to focus, embody the character, and have fun. I got completely lost in the music – in a good way. I forgot about being sick. I became Cunegonde, laughing hysterically with wild abandon, and I even sang an optional F6. I was on top of the world, I could do no wrong. I was unstoppable. There are terms to describe these experiences: being in the zone, being on fire, being in rhythm, in the groove, in the moment, playing unconscious, and even the runner's high (Gannon, 2016). Csikszentmihalyi (1990) refers to it as "flow" or a psychological state that combines an increased feeling of control with decreased self-consciousness.

In flow state, the performer can achieve new heights that they never thought possible. As performance excellence is always the goal, it would be valuable to replicate the conditions for this flow state so that every performance could be as exciting. One of the ways to induce a flow state would be to implement imagery because of its similarities and associations, both conceptually and empirically, to flow (Jackson & Csikszentmihalyi, 1999; Pates, Karageorghis, Fryer, & Maynard, 2003; Koehn, Morris, & Watt, 2014). While few studies have examined imagery's influence on flow state in musicians, McCarther, in his Getting in the Zone Parts 1 and 2 (2018a & 2018b), used Csikszentmihalyi's work (2014) to make recommendations for singers. First, he advocates for finding a balance between the perceived challenge of a particular task and one's skill at completing that task, otherwise known as the challenge/skill ratio. In the subsequent articles, he makes recommendations for maintaining attention and setting goals. Neither article mentions imagery outright, but it is arguable that imagery can at

least be used to focus attention, set goals, and influence pre-performance routines. The last of these is supported by Pain, Harwood, and Anderson's (2011) intervention in competitive soccer. Personalized pre-performance music and imagery scripts were given to participants to facilitate flow state and performance. Results indicated that asynchronous music and MG-M imagery had a facilitative effect on flow and perceived performance. While recommendations for attaining flow state exist for both solo and choral singers (McCarther, 2018a & 2018b; Walters; 2016), little is known about group differences between professional and amateur singers' flow attainment and their implications. A future direction of this research would be to apply this study to singers of varying experience levels and examine the effects of imagery and music on flow.

In sum, a brief overview of imagery's practical applications to music and singing has been presented. Future researchers are encouraged to expand this line of inquiry so that more musicians may understand the term "imagery" and how it can be applied in performance.

2.26 Imagery in Dance

In dancers, imagery is widely used to shape movement and they consistently report using imagery for the specific purpose of enhancing their movement quality (Hanrahan & Vergeer, 2000; Nordin & Cumming, 2005; Krasnow, 1997; Vergeer & Hanrahan, 1998). For example, they use images of "strong emotions to lend a dramatic element to a performance or detailed anatomical images to increase jump height or improve posture," (Pavlik & Nordin-Bates, 2016, p. 55).

Over the past two decades, imagery in dance has been under scholarly inquiry for its aid in student learning of various movements and technical improvement (Pavlik & Nordin-Bates, 2016). In 2005, Nordin and Cumming interviewed several dancers on their imagery use with the 4 Ws framework (Where, When, What, and Why) developed by Munroe, Giacobbi, Jr., Hall, and Weinberg (2000). Where consisted of the location at which the imaging occurred while When accounted for the timing. What described the types of imagery reported and Why accounted for the imagery functions for the participants. The results revealed that dancers use imagery for many reasons, but the main reasons were for technique, characterization, and confidence. These findings are echoed in the recent work of DeSantis et al. (2019) with singers.

Much of this field of inquiry stemmed from psychology and its applications to sport. Earlier dance studies failed to consider the wealth of information available from sport psychology, which is why there is a lack of consensus among dance researchers (Nordin & Cumming, 2005). In a later study, Nordin and Cumming (2006a) derived the following definition from sport research:

> Imagery is an experience that mimics real experience or approximates a desirable sensation. We can be aware of 'seeing' an image, feeling movements as an image, or experiencing an image of smell, taste or sounds without experiencing the real thing. Sometimes people find that it helps to close their eyes. It differs from dreams in that we are awake and conscious when we form an image. (p. 85)

This definition allows for the inclusion of imagery in situations that may or may not happen in the real-world, such as metaphor. According to Pavlik and Nordin-Bates (2016), the most prominent aspect of imagery for dancers is that any image can be used to inspire artistry. Most commonly, dancers use imagery to create movement, by way of

metaphor. Metaphorical imagery can be used during times of improvisation, choreography, and performance (Nordin & Cumming, 2008b). For example, in Nordin and Cumming's work (2005, p. 403) all dancers reported the use of metaphorical images including "images of color, objects that are not present, actions that cannot actually be performed, the environment, and themes." One participant gave these examples: "big pillows of air underneath your arm… a piece of paper between your thighs to keep your legs together…" Metaphor is important for dancers because it helps to create a specific movement quality as well as to imagine the performance so that they remember the movements correctly (Pavlik & Nordin-Bates, 2016). This is similar to a singer using the image of smelling a flower to influence their inhalation.

More recent research has used sport psychology as a foundation for imagery's application to dance and from this, certain conclusions can be drawn: all dancers of all levels and backgrounds use imagery. Specifically, the more experienced a dancer is, the more they use imagery (this is echoed in sport, surgery, and music); dancers use imagery more than athletes, specifically for roles and movements, technique, and goals (Nordin & Cumming, 2008b); and dance teachers use imagery more than athletic coaches because they seem to focus their teaching on improving students' technique and creativity (Overby, Hall, & Haslam, 1998; Vaccaro, 1997). Figure 5 shows the differences in imagery changes for dancers at different levels of experience, whereby one can conclude that the more advanced student uses imagery more than the less advanced student.

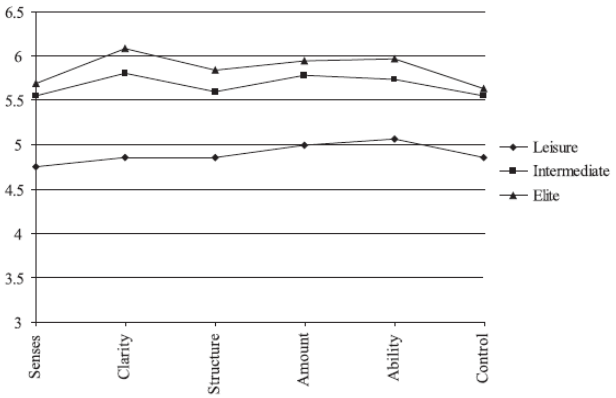


Figure 5 – Differences in imagery changes for dancers at different experience levels (Nordin & Cumming, 2006c, p. 31).

Until recently, imagery in dance was primarily centered on teaching, learning, and perfecting movement quality. But findings from sport research indicate that certain types of imagery are related to improved self-confidence in training and competition (Martin, et al., 1999; Hall, Munroe-Chandler, & Cumming, et al., 2009). Using this as a foundation, dance psychology researchers have found imagery to be related to psychological factors like self-confidence in dance. As an outcome of these studies, dancers may not only use imagery to improve their physical movement but may also use it to improve their mental states.

Anyone who performs has experienced some form of anxiety prior to and/or during a performance. What sets the expert apart from the novice is how one perceives that anxiety – helpful or hindering.

Given its potential for managing anxiety and improving confidence as outlined in the applied model of imagery (Martin et al., 1999), the presence of audition anxiety among

dancers establishes the need for further exploration of the role of imagery in the anxiety-performance relationship (Monsma & Overby, 2004). By examining the correlation between imagery and anxiety in the dance audition setting, further understanding of the potential outcomes that image content can have on raising or lowering anxiety in preparation for high-stakes situations will emerge. This applies to musicians and singers as well.

In 2004, Monsma and Overby conducted a study on the relationship between imagery and competitive anxiety in ballet auditions, which, prior to 2004 was not discussed. There were several aims to this investigation, which was, in part, a replication of research conducted in the athletic domains (Moritz, Hall, Martin, & Vadocz, 1996; Vadocz, Hall, & Moritz, 1997). "The ability to control audition-related affect can minimize performance decrements thereby increasing the potential for success," (Monsma & Overby, 2004, p.11). According to Monsma and Overby, "Performance anxiety and mechanisms for its management are understudied in the context of dance," (2004, p. 11). Given the amount of potential benefits gained by using imagery for audition anxiety management, further investigation is needed in the various performing arts.

There are many factors that contribute to audition anxiety, including, but not limited to peer-to-peer comparison, subjective assessment of technical skills, artistry, physicality, and possible employment offers (Hanin, 1995; Ostwald, Baron, Byl, & Wilson, 1994; Taylor & Taylor, 1995). This is also relevant to musicians who often must audition for roles and other performance opportunities. Monsma and Overby (2004) suggest minor

modifications to the CSAI-2 to better account for the audition context in the performing arts for those looking to explore this topic further.

In conclusion, Nordin and Cumming (2007) claimed that research on imagery for dancers is in its infancy. Because of the similarities in which both dancers and singers use imagery, several aspects of dance imagery warrant further study: metaphorical images, new imagery dimensions, processes during imagery, and obtaining and creating images (Hanrahan & Vergeer, 2000; Nordin & Cumming, 2005). Dancers could retrieve images from outside sources such as media, pictures, memories, remembering a certain feeling, or developing triggers like watching other dancers or listening to music. Furthermore, complex images and their many layers should be explored, such as forming the basic image of a skill, like a pirouette and then adding a qualitative aspect like an emotion (Nordin & Cumming, 2005).

Turning to acting, the following section is placed after dance because of dance's link to both sport and music – it is both an athletic event and an art form. As the singer brings life to music, the actor brings life to the text. To the author's knowledge, no empirical investigations have explored imagery and its effects on acting performance, although, imagery is often directly or indirectly referenced in the acting literature.

2.27 Imagery in Acting

> Only when an actor has thought about, analysed, and lived the entire role and a broad, distant, clear, colourful, alluring perspective opens out before him can his acting, so to speak, take the long view and not the short view as previously. Then he can play not individual tasks, speak not individual phrases but whole thoughts and passages.
>
> - Konstantin Stanislavsky, translated by Benedetti (2010, p. 458).

Konstantin Stanislavsky was a Russian actor, director, and teacher, and he was the first to codify and outline a technique for acting. The Stanislavsky System of acting gained prominence in the first half of the twentieth century and it radically altered actor-training in the West during the 1920s and 1930s. It laid the groundwork for method acting used by Marlon Brando, Robert De Niro, and Dustin Hoffman. Stanislavsky's attempt to outline a technique that was both mind and body-centred for acting had a great influence on acting standards in theatre and the system still holds true today. According to Clare (2017),

> His fundamental belief was that truthful acting came from living through the given circumstances of the part. The problem was that actors did not necessarily know how to do this and had a tendency to "represent" or show themselves off instead of "experience" or "live through". His system was intended to remedy this. Training to use it was all-encompassing and included relaxation, attention, and imagination as well as learning how to divide up the text, find objectives appropriate to both part and actor, and prepare for performance. (p. 46)

While imagery is not directly mentioned in the quotes above, it can be argued that Stanislavsky is referring to imagery as a means of building a character.

Michael Chekhov was a Russian-American actor, director, author, and he was also Stanislavsky's student. He expands on the Stanislavsky system and discusses detailed examples of incorporating image work, although, imagery is not said outright, into the

actor's training. For example, he advocates for active collaboration with Creative Images, which are "images that lift you from a passive state of mind to a creative one," (1953, p. 22). The actor must ask detailed questions to actively collaborate with these images:

> Suppose you are going to play Malvolio in *Twelfth Night.* Suppose you want to study the moment when Malvolio approaches Olivia in the garden, after having received a mysterious letter which he supposed to be "from her." Here is where you begin to ask questions such as "Show me, Malvolio: how would you enter the gates of the garden and with a smile move toward your 'sweet lady?'" The question immediately incites the image of Malvolio to action. You see him in the distance… Should not Malvolio at this moment be more dignified? Was he not too old? Would it not be better to "see" him as rather pathetic? Or maybe at this moment, when he believes he has achieved the aim of his whole life, he reaches the point where his mind is shaken and he verges on madness. (p. 23-24)

The questions outlined above create a visual portrait of the character and a landscape of the scene in which Malvolio plays. Chekhov continues in this fashion by encouraging the actor to shape a character through asking such questions, thereby revealing different possibilities of acting to suit their taste or the director's. Through this study, the images involved change under the actor's questioning, changing here and there until the actor is satisfied. When these images arouse the emotions, the desire to act emerges and an organic and true-to-self interpretation of the character may arise.

Chekhov even goes so far as to mention kinesthetic images to influence a character's comportment on stage when he asks the reader to imagine playing the role of a lazy, sluggish, and awkward person: "as soon as you have outlined those features and qualities, compared with your own, try to imagine what kind of body such a lazy, awkward, and slow person would have," (Chekhov, 1953, p. 78). The actor creates an honest portrayal

of the character by imagining that the body of the character that they have just created in their mind shares space with their own physical body.

Further evidence of imagery for acting exists in Uta Hagen's (1991) work. Hagen was one of the world's most renowned stage actresses and also advocates for using the creative imagination in acting. "The realistic actor learns that, at will, he can induce specific, imagined stimuli to produce an organically correct behavioral response in order to arrive at the essence of the experience," (1991, p. 77). Again, while imagery is not directly referenced, one could use imagery to induce the imagined stimuli that Hagen suggests. For instance, a common stage direction is to imagine the death of a loved one to influence characterization in a particularly sorrowful scene. The actor could use specific images of that event (whether real or made up) to create these imagined stimuli. Hagen goes on to advise actors to "look for imaginative identification with all the facts and circumstances about the character's past that can be gleaned from the play and from relevant research," (1991, p. 259). When this information is not provided, the actor must use their imagination.

While imagery for acting has not been empirically explored, the above examples from the literature demonstrate a need for further research. Future scholars can use them as a steppingstone so that they may build upon their work in adapting imagery for actors. This inquiry would have implications for singers as well. Singers are musicians, but they are also actors. While the text they must deliver is often accompanied with music, there are also instances where unaccompanied spoken dialogue is in the libretto, e.g., in a *singspiel*

or operetta. The work on imagery for actors would be especially helpful for character building and text delivery and this would translate to singers.

In sum, there is an evident taxonomy problem in the use of the word “imagery” in the various domains discussed here: music, singing, sport, dance, and acting. The sport and dance domains seem to be harmonious in their understanding of this term. The same cannot be said for music, singing, and acting. Based on the dissent among these fields, it is incumbent upon the author to provide a succinct, but also working definition of imagery as the field of singing psychology is still new.

In line with Mielke and Comeau’s (2019) tree diagram in Figure 1, imagery is a large component of mental practice, although not synonymous with mental practice. It is a mental training technique that can be used in a variety of situations, such as the practice room, during lessons, in competition, auditions, recordings, and in performance. It has many functions: to reduce anxiety, to improve a skill, to inform a character. While visualization is the initial sense that may first come to mind when interpreting the word “imagery,” it involves the other senses as well.

Recall from White and Hardy (1998) that it is a conscious experience that involves the use of one or more of the senses to create, or recreate, a particular sporting skill or situation. Likewise, imagery can be used to create, or recreate a particular singing skill or situation. Create or recreate is the most important aspect of this definition. A singer can use imagery to create the ideal performance and use that as a goal (motivation specific). Or they can remember an ideal performance and use imagery to recreate it so that they

may continue to have ideal performances. It is the author's hope that this work will act as a cross-disciplinary bridge to the many fields that incorporate imagery so that a more comprehensive understanding of the term becomes widespread in the literature and everyday use.

Chapter 3

3 Methodology

This study built upon previous research on singers' imagery where findings indicated that they use imagery for vocal technique, performance anxiety and goals, and characterization reasons (DeSantis et al., 2019).

3.1 Participants

Participants included professional singers who perform regularly (minimum of five public performances per year) and student-level singers (undergraduate or graduate) studying classical voice at a North American university. Professional singers were recruited through a variety of media such as the author's personal contacts, social media outlets, university affiliation (if any), music publications such as NATS (National Association of Teachers of Singing), and through the professional music network of the author. Student-level singers were recruited through physical posters, their university affiliation, and their personal contact with the author. All participants or potential participants knew that participation in the study was entirely voluntary.

Of the one hundred and thirty study participants, there were 63 professionals and 67 students with 98 identified as female, 29 identified as male, and 3 identified as other. Ages ranged from 18 through 65 (M=30.02, SD=9.78).

3.2 Survey Design and Development

The specific survey items were informed from a variety of sources including DeSantis et al.'s (2019) work, Hall and colleagues' development of the Sport Imagery Questionnaire

(1998), and Nordin and Cumming's (2006a) work on the Dance Imagery Questionnaire. The survey was reviewed by experts in the sport psychology and singing fields to establish face validity. Once complete, the survey was then reviewed by those of a similar level of experience to the inclusion criteria for the survey, (i.e., students and professionals), to test for any lack of clarity in the questions. This was a study-specific questionnaire where no formal agreement ratings or clarity scales were obtained.

Prior to completing the questionnaire, participants were asked to read the following definition of imagery:

> Imagery is an experience that mimics a real experience, (White & Hardy, 1998, p.389). It occurs in our mind's eye and it differs from dreaming in that we are awake and aware of generating images. It is a conscious experience that involves the use of one or more of the senses to create, or recreate, a particular skill or situation (White & Hardy, 1998). For the complete definition provided to the study participants, see Appendix B.

The questionnaire contained 30 items relating to the use of imagery for singing in technique (8 items), performance anxiety and goals (12 items), and characterization (10 items). An example of a technique item is "I imagine performing specific skills (e.g., a melismatic passage, a high C) to the best of my ability." An example item of performance anxiety and goals is "I imagine myself restructuring thoughts and feelings that may hinder my performance (e.g., thinking of nervousness as excitement)." And an example item of characterization is "I use imagery to experience the emotions I need for performing my role (e.g., jealousy, love, anger)." The participants were asked to rate their response to each item on a 7-point Likert scale with 1 being *rarely* and 7 being *often*, a method employed by many other imagery use studies (see Overby, 1990; Barr & Hall,

1992; Bradley & Partington, 1997; Hall, Rodgers, & Barr, 1990; Overby, Hall, & Haslam, 1998; Rodgers, Hall, & Buckolz, 1991; Salmon, Hall, & Haslam, 1994). The questionnaire can be found in Appendix B.

3.3 Procedure

Ethical approval was obtained from the Research Ethics Board at Western University (see Appendix C). The survey was administered through a secure online medium available at Western University – Qualtrics Survey Software Core XM. All participants received a letter of invitation, gave informed consent (see Appendix A), and received a comprehensive definition of imagery before proceeding to data collection (see Appendix B). The survey took approximately ten minutes to complete.

3.4 Data Analysis

Once the data were collected and organized, any missing values were replaced with the series mean for that item. Following the work of Hall and colleagues' development of the Sport Imagery Questionnaire (1998) and Nordin and Cumming's (2006a) work on the Dance Imagery Questionnaire, the analytic techniques in those studies were also employed here, specifically referring to the use of Confirmatory Factor Analysis (CFA). The factorial validity of the scales was examined with CFA using AMOS 24.0 software (Arbuckle, 2016). CFA was chosen to determine whether the survey items accurately represented vocal technique, performance anxiety and goals, and characterization. It was determined that the assumptions pertaining to using CFA were met. When employing CFA, sample size is a consideration. Typically, adequate sample size can be determined

by one of the following: "N ≥ 200; ratio of N to the number of variables in a model (*p*), N/*p* ≥ 10; the ratio of N to the number of model parameters (*q*), N/*q* ≥ 5; and an inverse relationship between construct reliability and adequate N," (Myers, Soyeon, & Jin, 2011, p. 412). The present sample size was only 130, but the author of this monograph believed that this was adequate. In many of the studies previously mentioned, sample sizes are less than 100 (e.g., Bernardi et al., 2013).

Initially, a three-factor model was hypothesized (i.e., vocal technique, performance anxiety and goals, and characterization) with items restricted to load on their corresponding factor. The goodness-of-fit of the hypothesized model was tested using multiple indices (Hu & Bentler, 1999): the chi-square statistic ($\chi 2$), the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean residual (SRMR). The $\chi 2$ statistic is sensitive to sample size and must be interpreted with caution. For CFI and TLI, values above 0.90 have been reported to reflect acceptable fit (Marsh et al., 2004). According to Hu and Bentler, RMSEA values equal or less than .06 are desired. Also, SRMR values less than .08 denote acceptable fit. Additionally, modification indices were examined to identify items that potentially cross-load or were problematic.

Crohnbach's Alpha Coefficient (α) was calculated to determine if each subscale (factor) item measured the same underlying concept. Descriptive statistics were calculated for each subscale. Independent samples t-tests were conducted to assess any differences in imagery use between the two groups (students and professionals). Levene's Test

determined equality of variances was assumed ($p > .05$), however, sample sizes were relatively similar (students, N = 63; professionals, N = 67).

Chapter 4

4 Results

The initial three-factor CFA model revealed a poor fit to the data: $\chi 2$ (405) = 996.09, p < .01; CFI = .80; TLI = .78; RMSEA = .09; and SRMR = .09. Therefore, it was decided to test a four-factor model separating the subscale ‘performance anxiety and goals’ (12 items) into two separate factors. These two factors were labeled performance anxiety regulation (9 items) and goals (3 items). The four-factor model demonstrated superior fit scores for all fit indices compared to the three-factor solution. After the four-factor model was selected, the model was trimmed to remove all troublesome items until the model attained a good level of fit on the indicators (see Figure 6). The resulting fit indices were: $\chi 2$ (93) = 143.33, p < .01; CFI = .93; TLI = .91; RMSEA = .065; and SRMR = .06.

CFA can be employed to determine item retention and deletion, indicating which items represent a construct and which do not (Clark & Watson, 1995). Survey items were retained based on the loading on their respective factors. Each removed item was examined in terms of why it may not have loaded as expected. Some of the survey items were too wordy. For example, one item originally representing performance anxiety and goals in the 3-factor model was “I imagine plans and strategies for unforeseen circumstances during performance (e.g., emergency breaths during a run).” Aside from wordiness, this item is flawed in that it mentions both plans and strategies. Perhaps participants responded to only one of these. As expected, this item did not reach the minimum acceptable loading value. Additionally, certain items represented more than one subscale. For example, the item “I use imagery to feel balanced and grounded to the

floor," was initially intended to represent characterization, but it could also be interpreted as representing technique. Voice teachers often give cues such as "bear down" or "feel yourself rooted to the ground" during lessons and therefore, this could have been interpreted as a technical reason. As such, the fourteen items were chosen for removal because of their wordiness, ambiguity, and failure to accurately represent the subscale for which they were intended.

The items comprising the final 16-item version of the questionnaire are shown in Table 2. There were four items assessing singers' use of technique imagery, three items measuring imagery for goals, four items assessing singers' imagery for regulating performance anxiety, and five items measuring characterization imagery. The singers reported employing characterization imagery most often, followed by goals, technique, and performance anxiety regulation. The descriptive statistics of the final 16 items and the subscales of the four-factor model are presented in Tables 2 and 3, respectively.

Crohnbach's α determined that the items of each subscale (i.e., technique, goals, performance anxiety regulation, and characterization) share covariance and likely measure the same underlying concept with values of .632, .813, .822, and .793, respectively. As is depicted in Table 2, no significant differences in reasons for using imagery were found between professionals and students ($p > .05$).

Individual Item Descriptives				
		Mean	Std. Deviation	Sig.
Technique				
I imagine performing specific skills (e.g., a melismatic passage, a high C) to the best of my ability.	P	4.87	1.896	0.616
	S	5.03	1.660	
I imagine the process of singing (e.g., inhale, support, phonate)	P	5.02	1.818	0.92
	S	5.05	1.502	
I imagine how to adapt to the performance environment (e.g. performance space, acoustics)	P	4.44	1.812	0.219
	S	4.04	1.870	
I imagine focusing on the challenging technical parts of singing (e.g., a melismatic passage - one syllable over many notes)	P	5.32	1.512	0.466
	S	5.12	1.572	
Goals				
I Imagine myself working hard to achieve my goals in singing	P	5.35	1.788	0.012
	S	5.72	1.485	
I imagine achieving my dreams and goals for singing (e.g., getting a certain role, getting a position in a company)	P	4.95	1.736	0.204
	S	5.69	1.549	
I imagine what it will take to reach my goals in singing (e.g., continuing to take lessons, daily practice)	P	4.68	1.740	0.314
	S	4.98	1.647	
Performance Anxiety Regulation				
I imagine myself handling future performances well (e.g., proper behaviour in an audition)	P	5.43	1.720	0.692
	S	5.31	1.588	
I imagine myself having my anxiety under control while performing	P	4.54	2.070	0.516
	S	4.76	1.801	
I imagine myself restructuring thoughts and feelings that may hinder my performance (e.g., thinking of nervousness as excitement)	P	4.32	2.031	0.68
	S	4.46	1.980	
I imagine myself being calm and relaxed for performance	P	4.86	1.731	0.945
	S	4.84	1.789	
Characterization				
I use imagery to embody the different qualities required for a role (e.g., having a commanding presence, being demure and coquettish)	P	6.14	1.330	0.472
	S	5.99	1.161	
I use imagery to focus on what I need to express while performing	P	5.78	1.431	0.516
	S	5.94	1.413	
I use imagery to trigger certain emotions (e.g., image of death to prompt sorrow)	P	5.57	1.729	0.438
	S	5.31	2.032	
I use imagery to find inspiration for my character	P	5.62	1.580	0.707
	S	5.72	1.369	
I use imagery for staging my pieces (e.g., finding organic staging)	P	4.83	1.922	0.333
	S	5.13	1.705	

Table 2 – Individual item characteristics amongst professional (P) and student (S) participants.

Subscale Descriptives					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Sig.	Lower	Upper
Technique Subscale	P	4.9127	1.31150	0.62	-1.22889	2.05194
	S	4.8098	1.04360			
Goals Subscale	P	4.9947	1.55480	0.062	-2.87326	0.07026
	S	5.4618	1.26490			
Performance Anxiety Regulation Subscale	P	4.7857	1.59050	0.826	-2.30010	1.83945
	S	4.8432	1.38911			
Characterization Subscale	P	5.5873	1.21540	0.882	-2.19755	1.89146
	S	5.6179	1.14080			

Table 3 – Subscale characteristics amongst professional (P) and student (S) participants.

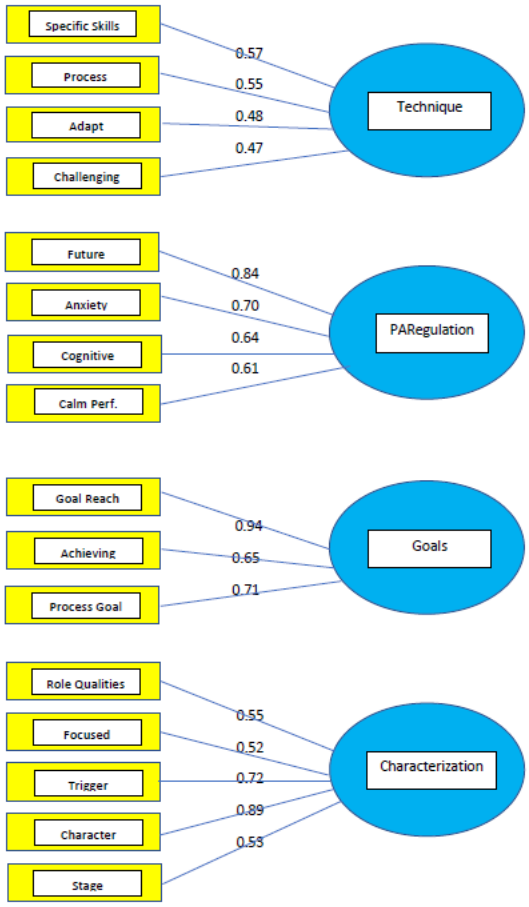


Figure 6 – The Four-Factor Model depicting the reasons why singers use imagery.

Chapter 5

5 Discussion

The present study investigated the reasons for singers' imagery use by administering a survey to 130 singers. More specifically, based on the work of DeSantis et al. (2019), singers' use of imagery for vocal technique, goals, performance anxiety regulation, and characterization was examined. Another aim of the study was to investigate the differences in imagery use between university students and professionals, which follows from the work in sport. Sport research has demonstrated that both quantitative and qualitative differences exist between performers at varying levels of experience (Hall, 2001), and more specifically, that high-level athletes use imagery significantly more than their novice counterparts (e.g., Callow & Hardy, 2001; Cumming & Hall, 2002a, 2002b). Early dance imagery studies have yielded similar findings (Bradley & Partington, 1997; Brassington & Adam, 2003).

The survey results indicated that singers of all levels employ imagery. While the differences across subscale ratings were relatively slight, singers used imagery primarily for characterization reasons, followed by goals, vocal technique, and performance anxiety regulation. Characterization may have emerged as a primary reason for using imagery because of the inherently dramatic nature of singing. The singer enlivens the text and music with their voice. In order to do that effectively, the singer must have a clear dramatic intention. Stage directors often ask singers to think about their character's superobjective, (i.e., what the character is pursuing) throughout the entire piece of music and individual scenes (Brandt, Scheie, Carlin, & Gallagher, 2016). They are also

instructed to identify the superobjective from beat to beat. A beat is a unit of action on stage that is distinct in nature (Stanislavsky & Benedetti, 2010). It would stand to reason that singers use characterization imagery in these situations to create a clearer image of the character both for themselves and for the audience. By asking questions like "What is my superobjective?" the singer can use Chekov's (1953) aforementioned Creative Images by way of creating a more detailed vision of the character. As Uta Hagen so aptly put it,

> This process is to me like the drafting of a musical score in which the actor composes the character's theme, orchestrates it, defines the phrases, individual beats, and the arrangement of the notes he will eventually play with spontaneity at each performance, putting to use his finely honed inner and outer techniques. (1991, p. 257)

In terms of using imagery for technique, singers may not have employed this as much as characterization because of the level of participants. First year undergraduate students were the least experienced in the sample, but they are not absolute beginners. Therefore, they may not use imagery as much for technique as for other reasons. Future studies may want to include non-singers, recreational singers, and singers not trained in the *bel canto* tradition.

These findings are similar to those cited in the sport and dance imagery literature, with singers using imagery for both cognitive (e.g., technique) and motivational (e.g., performance anxiety regulation) reasons. Specifically, these findings resemble those of Nordin and Cumming (2005) where dancers used imagery for technique, characterization, and confidence.

While a three-factor model with technique, performance anxiety and goals, and characterization subscales was originally proposed, after the data analysis it was found that the survey items were better suited to a four-factor model. This follows from Nordin and Cumming's (2006a) work where their questionnaire also better suited a four-factor model. Performance anxiety and goals was divided into two factors: goals and performance anxiety regulation. The goal items in the survey were relatively general (e.g., I imagine myself working hard to achieve my goals in singing) and therefore, encompassed a variety of goal types. According to Vidic and Burton (2010), goals need to have two key characteristics to be most effective: focus (i.e., process, performance, or outcome goals) and temporality (i.e., short- and long-term goals). In sport, process goals address aspects like how practice will be conducted (e.g., how many hours will I practice today); performance goals target achieving certain levels of performance (e.g., I want to increase my jump by 3 cm over the next month); and outcome goals relate to winning and succeeding against others (Burton & Weiss, 2008; Kingston & Hardy, 1997). Athletes, and likely singers, tend to focus on outcome goals and these types of goals are most related to performance anxiety regulation. For example, if the goal is to win, performance anxiety must be controlled. This likely explains why in DeSantis et al. (2019) the singers discussed performance anxiety and goals together. The goal items in the present survey are more general and include process and performance goals, which are not related to or dependent on regulating performance anxiety. Therefore, goals and performance anxiety regulation separated into two distinct subscales.

In the sport domain, the combined use of process, performance, and outcome goals has revealed positive results in skill acquisition and enhancing goal effectiveness among tennis (Vidic & Burton, 2010) and soccer players (Filby, Maynard, & Graydon, 1999). Future singing studies could investigate goal-setting programs and the efficacy of combining process (e.g., keeping the air spinning), performance (e.g., improving contact with the conductor while still communicating with the audience), and outcome goals (e.g., winning a competition).

In contrast to previous dance and sport imagery research, where participants were often categorized by competitive level, (i.e., recreational, provincial, national) the fact that no significant differences in imagery use were found between professionals and students in this study seems surprising. There are a few reasons why this may have occurred. This finding could be a result of the definitions of student (undergraduate or graduate in a voice program in North America) and professional (one who performs in public at least 5 times per year) rendering the participants in both groups close in age (M=30) and level of experience. In opera, 30 is considered relatively young as it is the typical age limit for many young artist programs.

Moreover, the populations cited in the study by Cumming and Hall (2002b) competed at recreational, provincial, and national levels. As such, it could be argued that those in the student population of the present study were too advanced to generate results that were comparable to those of Cumming and Hall (2002b). Even the most inexperienced of the student population (e.g., a first year undergraduate) has at least some singing experience

to gain admittance to a university voice program; therefore, they may be closer to intermediates in experience level. Additionally, the student population included both undergraduates and graduates as a means of broadening the inclusion criteria. In hindsight, the graduate students may have been too close to the professional population in both age and experience.

While these earlier studies have shown that experience-related differences exist in imagery (Callow & Hardy, 2001; Cumming & Hall, 2002a, 2002b), Nordin and Cumming's (2006c) findings suggest that this is more or less a result of higher levels of imagery use among advanced performers and not a concrete imagery ability difference. Cumming (2007) corroborated this when she found that dancers at higher levels (intermediate and elite) imaged more often than their leisure counterparts, resembling earlier research outcomes in ballet (Brassington & Adam, 2003) and Highland dance (Bradley & Partington, 1997). This may be echoed in singing settings where the advanced singer might use imagery more than the novice singer or recreational singer. However, the advanced singer's imagery ability may not necessarily be greater than that of the novice singer. Conversely, an older singer who is pursuing singing recreationally may use imagery less often. It seems that imagery use depends on the experience level of the singer, but there is no way to tell without imagery ability data from singers.

As is typical for singing settings, there were more female participants (N=98) than male participants (N=29). Sport and dance imagery research have indicated that men and women rarely differ in their imagery ability and use (Hall, 2001; Nordin & Cumming,

2006c). Concerning gender differences in imagery use among singers in the present study, the only difference was on the characterization subscale, suggesting that females may use imagery more for characterization reasons than males. Because of the small sample size and given that gender differences in imagery use may be different in singing compared to sport and dance, further research is required to adequately explore this issue.

5.1 Strengths

This research fills a gap in the music performance literature. As demonstrated in the review, there is little empirical work on the mental side of performance in musicians, and even less in singers. By identifying the disparity among researchers surrounding the term "imagery," a dialogue has begun to encourage future scholars to investigate this field further.

Moreover, the author has not only thoroughly reviewed the extant literature in sport and music but has also investigated findings in relevant fields like dance and acting. As such, future researchers can use this study to continue the dialogue in cross-disciplinary research. This would, in turn, lay the groundwork for future performance psychology research.

Often with interdisciplinary studies the researchers tend to be heavily grounded in only one of the fields under investigation. As mentioned in the introduction, the author has demonstrated a thorough background in both sport psychology and singing, which bolsters the interdisciplinary approach of the current study. This study may act as a

springboard for future research in voice pedagogy, singing performance, and singing psychology.

This is the first study to consider imagery development in singers. To the author's knowledge, no other studies exist that empirically examine this construct in singers. It is the first instrument developed to assess reasons for using imagery among singers. The greatest strength of the study reported here is the systematic exploration of the key psychological skill of imagery within the relatively understudied area of singing.

5.2 Limitations

As a caveat, much of this research stemmed from the personal experience of the author and, therefore, may be biased. As this is the first study to consider singing imagery from a sport psychology perspective, there are several limitations that bear mentioning.

First, there is a demonstrated disparity between "imagery" from a musical standpoint and "imagery" from a sport psychology standpoint. Recall that some music researchers view imagery and mental practice as the same (Miksza, 2011), while others view imagery as under the umbrella term of "mental practice," (Mielke & Comeau, 2019). Without recorded data covering participants' understanding of imagery, their imagery ability, their views on imagery, the images they incorporated, or how the images were incorporated, it is difficult to interpret the findings with any certainty. For example, some participants from the preliminary study were confusing imagery with metaphor in singing, or visualization (DeSantis et al., 2019). Metaphor and the visual aspect of imagery are certainly important, but they do not fully account for the construct of imagery from a

sport psychology perspective. Without ensuring that participants understand what is meant by imagery, it remains difficult to determine if they are thinking of imagery as defined by the author.

While the survey method was chosen for its cost-effectiveness, ease of data collection, generalizability, and its potential for a greater participant pool, it has its disadvantages, such as item wording, question sequencing, and response format (Del Boca & Noll, 2000). Participants did not have the advantage of receiving immediate clarification like in an interview. However, if participants were able to ask questions, that may have contributed to researcher-led bias. There is always a risk that study-specific surveys will generate study-specific results. Nevertheless, this method is commonplace across imagery studies (e.g., Overby, 1990; Barr & Hall, 1992; Bradley & Partington, 1997; Hall, et al., 1990; Overby et al., 1998; Rodgers et al., 1991; Salmon et al., 1994). Not only was this questionnaire created specifically for this study, it was based on previous work by the author (DeSantis, et al., 2019). Participants may use imagery for other reasons than the ones referred to in the questionnaire. Consequently, the reader should interpret these findings with a degree of caution.

Retrospective recall of imagery was employed during the survey. While performers' ability to accurately report from several years ago is unknown, Cumming, Hall, and Starkes (2005) found that retrospective recall was reliable within a week, but any longer may not be entirely reliable. Given that no instructions were provided regarding the date of performances that participants should refer to, there is no way to discern if participants

were thinking of a recent performance, thus casting doubt on the accuracy of participant recall. Even so, retrospective recall is still considered to be one of the most feasible methods of studying imagery development because imagery occurs in the mind and is not visible to others (Nordin & Cumming, 2006c).

As demonstrated in dance imagery research (Nordin & Cumming, 2005, 2006a, 2006b, 2006c, 2007, 2008; Nordin-Bates, Cumming, Aways, & Sharp, 2011), another limitation facing singing imagery research is low participation rates. Sole income from singing is rare in Canada and professional singers are often working multiple jobs and may not have had time to participate in this survey. The situation is similar for students who may have heavy course loads along with part-time jobs, and course-mandated performances. Since it is challenging to find large numbers of singers willing to participate, it is difficult to make broad generalizations from such a modest participant pool (N=130).

5.3 Practical Implications

While practical implications of imagery in singing were briefly reviewed in Chapter 2, some implications from the current study should be stated. First, this study will make singers and teachers of singing aware of the construct of imagery from a sport psychology perspective. In singing, imagery is a multi-faceted word that is often used to supplement pedagogical instruction, or as a poetic device in art song text, or it is even used synonymously with “mental practice,” (Miksza, 2011). It is not immediately thought of as a component of mental practice (Mielke & Comeau, 2019) or even as a mental training technique simply because mental training education is scarce in performing arts

programs (Brinson & Dick, 1996; Hamilton, 1997). Introducing this type of imagery and other mental training techniques to singers and singing practitioners has the potential to influence music education in school settings and impact curriculum development. In so doing, singers and singing teachers would be better equipped to improve their own singing. This aspect is particularly essential to this field as singers cannot press a valve or strike a key to produce a tone. The instrument is internal. The singer must rely on mental images to sing.

Since many singers also teach singing, they may use this knowledge to not only improve singing in their students, but to enhance their teacher toolbox. As suggested by Clements (2008), asking a student probing questions promotes a dialogue between teacher and student. It also provides clues as to how their imagination works. This knowledge can not only enhance rapport between teacher and student, but it can help the singing teacher to individualize lesson plans, making for a more efficient and successful voice lesson experience for both singer and teacher.

5.4 Future Directions

For any cross-disciplinary research to advance, the investigator(s) should fully consider the breadth of findings available in the related fields, a suggestion echoed in the work of Pavlik and Nordin-Bates (2016) where they recommended that future dance imagery studies be conducted with in-depth deference to studies that have a strong foundation in imagery creation recommendations from both sport (Holmes & Collins, 2001; Wiliams, Cooley, Newell et al., 2013) and dance (Afremow, Overby, & Vadocz, 1997; Hanrahan,

1995; Vaccaro, 1997). Likewise, the future of singing imagery should follow suit by implementing the PETTLEP model (Holmes & Collins, 2001) into the study design since it is an effective guide when applied to sporting settings (e.g., Smith et al., 2007; Smith et al., 2008; Wright & Smith, 2009). However, its efficacy in music settings remains to be examined (Wright, Smith, & Wakefield, 2014). The PETTLEP model (Holmes & Collins, 2001) and its recommendations, "represent the most reliable in published literature to date," (Pavlik & Nordin-Bates, 2016, p. 57). Therefore, the model should be used to guide music imagery studies. Through the PETTLEP model, singing could not only be linked to sport and dance, but it could also be linked to neuroscience and psychology. This relationship could be mutually beneficial across disciplines, e.g., sport psychology has investigated relevant information to music, such as deliberate practice. Conversely, findings from music and dance, such as metaphorical imagery, may be of interest to sport researchers, particularly in the aesthetic sports like synchronized swimming or rhythmic gymnastics. It could even be argued that characterization is applicable to informal team roles in group dynamics research. For example, a common informal role on a hockey team is the enforcer, who is "one who is trusted to assert their physical presence and protect teammates when the opposing team uses aggressive tactics," (Kim, Coleman, Godfrey, Vierimaa, & Eys, 2020, p. 2). Perhaps the role a singer plays on stage and the role the enforcer plays on the ice are not so different in terms of the process of developing that role. A possible future direction for group dynamics researchers may be to investigate whether an informal team role like the enforcer on a hockey team might use imagery for characterization to intimidate others.

As Nordin and Cumming (2006c) suggested that experience-related differences are a result of higher-level participants' imagery use and not from imagery ability, future directions may seek to investigate this in singing settings by dividing participants based on experience level (e.g., novice, recreational, student, and professional) to determine if there are any group differences.

Despite imagery's many benefits, there are instances where it can be more hindering than helpful. As reported by Nordin and Cumming (2005), several dancers avoided imagery before their stage entrance so they may attend to tasks "on autopilot," (p. 413). The relationship between automaticity and debilitative and facilitative images occurring in singers is a possible avenue of this research.

As stated in Theories of Imagery, one of the most relevant theories of imagery for singers is Paivio's Dual-Coding Theory (1971). Given that this theory is nearly half a century old, it would behoove future researchers to develop a more up-to-date theory of imagery that could apply to singers. Much more qualitative data would be needed for this to occur. As a first step, the author of this monograph might look to expand upon the initial interview process that was employed in DeSantis et al. (2019) and incorporate more open-ended questions to uncover singers' views on imagery.

Future studies could be more thorough and consider incorporating imagery interventions that involve training participants to use imagery and then assessing their imagery ability. For example, imagery training experts could work with participants to develop their imagery ability, which then could be tested using a longitudinal design, (i.e., at the

beginning, halfway through the term of instruction, and at the end). By dividing the participants into two categories, (i.e., receiving the imagery and no imagery), measurements of skill development could be compared across these two groups. This would naturally lead to the need for a singing-specific instrument that measures imagery use, imagery ability, and imagery controllability in singers. Researchers could use the SIQ (Hall et al., 1998), DIQ (Nordin & Cumming, 2006a), and FIMQ (Gregg et al., 2008) as templates and then thoroughly test the questionnaire with large participant samples to ensure that they are valid and reliable. While finding large samples can be challenging, a way of mitigating this might be to broach this study in school settings, recreational voice studios, and opera companies. Subsequently, the imagery use data could be collected as close to the performance event as possible (e.g., directly following the performance) to reduce the chance of faulty memory recall influencing responses. Following that, researchers might want to consider comparing survey responses with a record of the original performance event in question, such as a training journal. Though ideal in theory, this type of approach is not always possible in practice (Cumming, Hall, & Starkes, 2005).

Once singers' imagery use and ability have been established, researchers can use this knowledge to develop targeted interventions aimed at improving specific aspects of performance. This idea builds on previous dance work where a link between mastery imagery and dancer self-confidence was revealed (Fish, Hall, & Cumming, 2004; Monsma & Overby, 2003). Singing studies could extend this line of inquiry by designing interventions aimed at increasing self-confidence and decreasing music performance

anxiety, the latter of which is often triggered by solo performances (Spahn, Walther, & Nusseck, 2016).

Finally, the subject of how singing teachers use imagery for themselves and for their students is worthy of further investigation. This suggestion came from a result that emerged inductively from the preliminary study where participants wished to clarify if interview questions referred to their own personal singing or to their teaching. There is precedent for this topic in the sport psychology literature where characteristics of how coaches advise their athletes to use imagery are studied (Ross-Stewart, Short, & Kelling, 2014). The implications gleaned from such studies could inform future voice teachers' education and pedagogical techniques.

5.5 Conclusion

A thorough literature review on imagery from a sport psychology perspective and its applications to singers has been conducted. A questionnaire to investigate the reasons why singers may use imagery has been developed. It is hoped that researchers will use this work to continue the discourse on singing psychology and to benefit the world of singing, including correlates of singing imagery that can provide a foundation for effective interventions. The present questionnaire has the potential to be a valuable tool for measuring imagery use in singers that could be employed by researchers and applied music psychologists. Further psychometric analysis should be undertaken, including replication of the present findings, an assessment of test-retest reliability, and an assessment of other types of validity (e.g., concurrent). This is a life-long research focus

that will, no doubt, yield plenty of intriguing pathways for research in singers and musicians in general. Ultimately, the author hopes to pioneer the use of imagery informed from sport psychology and other related fields as a means of improving performance.

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Appendices

Appendix A: Letter of Information and Consent

Letter of Information and Consent

Examining the Reasons why Singers may use Imagery – A survey

Invitation to Participate:

You are invited to participate in a research study conducted by student investigator, [redacted] You are being invited to help expand our knowledge and understanding on the reasons why singers may use imagery.

You are eligible to participate if you meet the following criteria:
(a) are 18 to 65 years of age
(b) can read and write in English
(c) give consent to participate
(d) are either a student-level singer, (i.e. enrolled in an undergraduate or graduate voice degree at a Canadian or American University), or a professional singer who has studied classical singing for ten years or more and meets the public performance criteria (average of 5 performances per year and receives a fee).

If you do not meet these criteria, you will be ineligible to participate at this time.

This letter of information should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, please contact the

student investigator [redacted] Please take the time to read this carefully and to understand any accompanying information.

Why is this study being done?

The purpose of this study is to examine the reasons why singers may use imagery. To do so, you will be asked to participate by answering the questions in the survey, which employs Qualtrics Survey Software.

How long will you be in this study?

The study will consist of one online survey, approximately 10 minutes in length, whereby the participant rates their use of imagery using a 7-point Likert scale with 1=rarely, and 7=very often. There are no right or wrong answers. Participants may choose to end the survey at any time.

What are the study procedures?

If you agree to participate, you will be asked to complete a survey that will include questions relating to the use of imagery for technique, performance goals and anxiety, and characterization in relation to singing.

What are the risks and harms of participating in this study?

There are no known or anticipated risks or discomforts associated with participating in this study aside from those of daily life.

What are the benefits of participating?

You are helping to increase the knowledge of the reasons why singers may use imagery. This could lead to future research where imagery can be targeted towards a specific aspect of singing, such as performance anxiety, and then used to reduce performance anxiety and to improve overall performance in singing.

Can participants choose to leave the study?

The participant may end the survey at any time before final submission. However, due to the anonymity of participants, it will not be possible to remove the participants' data once the survey has been submitted.

How will participants' information be kept confidential?

If you decide to participate in the study, the information that you share will remain confidential. Personal answers will only be used to examine the research questions of this study. Only the principal investigator [redacted], the co-investigator, [redacted] and the student investigator [redacted] will have access to the results of the surveys.

Your survey responses will be collected through a secure online survey platform called Qualtrics. Qualtrics uses encryption technology and restricted access authorizations to protect all data collected. In addition, Western's Qualtrics server is in Ireland, where privacy standards are maintained under the European Union safe harbor framework. The data will be then be exported from Qualtrics and securely stored on Western University's server.

All data will be stored anonymously and neither the researchers nor anyone else will be able to identify you as a research participant in the data set. The data will be stored on a secure server at Western University and will be retained for a minimum of 7 years. Your data may be retained indefinitely and could be used for future research purposes (e.g., to answer a new research question). By consenting to participate in this study, you are agreeing that your data can be used beyond the purposes of this present study by either the current or other researchers.

Aggregated data stemming from this research may be presented at academic conferences and/or published in academic journals. Neither your name nor your contact information will appear in any publications stemming from this research.

Are participants compensated to be in the study?

There will be no compensation for participants who complete the study.

What are the rights of the participants?

Participation in this study is voluntary. You are under no obligation to participate and if you choose to participate, you can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. You may choose to withdraw from the study by refraining from answering the survey or failing to complete it. You do not waive any legal right by consenting to participate in this study.

If you have any questions about your rights as a research participant or the conduct of this study, you may contact The Office of Human Research Ethics (519) 661-3036, email: ethics@uwo.ca

1-844-720-9816 (toll-free)

Examining the Reasons why Singers may use Imagery

[redacted] **Student Investigator**

[redacted] **co-investigator**

[redacted] **Principal Investigator**

I have read the letter of information and I agree to participate. I agree to allow my survey responses to be recorded in order to help answer the research questions examined in this study. All questions have been answered to my satisfaction.

I indicate my voluntary agreement to participate by responding to the survey. This letter is yours to keep for future reference.

Appendix B: Questionnaire

Imagery for Singers Survey Questions

These questions are modelled on results from "Investigating the Circumstances Under Which Singers Use Imagery," (DeSantis, Deck, & Hall, 2019). In this study, it was found that singers use imagery mainly for three reasons – technique, drama or characterization, and combatting performance anxiety. These reasons form the basis of the three categories of survey questions.

Demographic Information
Age – (Must be 18 years or older)
Gender – M/F/other
Undergraduate or master student enrolled in a voice program at a Canadian or American University
Professional Singer – one who has studied classical singing for ten years or more and currently performs publicly a minimum of five performances per year and receives a fee for these performances. N.B. performances do not have to be separate productions. A performance consists of one full-length performance of the role that one is singing. For example, if singing a five-show run of Rigoletto, then that counts for five performances. A performance may also be a concert or recital, basically any kind of paid performance where one has a significant amount of time onstage.

Definition of Imagery

"Imagery is an experience that mimics a real experience," (White & Hardy, 1998, p.389). It occurs in our mind's eye and it differs from dreaming in that we are awake and aware of generating images. It is a conscious experience that involves the use of one or more of the senses to create, or recreate, a particular skill or situation (White & Hardy, 1998). Imagery is multi-faceted and multi-functional and in addition to the definitions above, can serve as a blueprint (Sackett, 1934) for an individual to execute a certain skill, strategy, or pre-performance routine.

Imagery is employed extensively in various domains such as dance and sport. The purpose of the present survey is to examine imagery use by singers and to understand the reasons why they may use it in singing settings.

When thinking of imagery, one primarily thinks of it as a purely visual task. However, imagery is multi-sensory experience and is not to be confused with simple metaphor, e.g. "I imagine I'm a tree being rooted to the ground when I sing." Metaphor is certainly a part of imagery, but it is only a relatively small part.

Please rate the following questions on the 7-point Likert scale provided. These questions pertain to your own personal singing and are not related to any aspect of teaching. There are no right or wrong answers.

This survey uses a 7-point Likert scale with 1 being rarely and 7 being very often.

1	2	3	4	5	6	7
Rarely						Very often

Please rate the following items on this scale.

Technique

1. I imagine performing specific skills (e.g., a melismatic passage, a high C) to the best of my ability.
2. I imagine the process of singing (e.g., inhale, support, phonate)
3. I imagine how to adapt to the performance environment (e.g., performance space, acoustics)
4. I imagine focusing on the challenging technical parts of singing (e.g. singing a long, legato line)
5. I imagine key points in a piece musically (e.g., musical entrances/exits, difficult parts related to music direction)
6. I imagine the physical key points in a piece (e.g., stage entrances/exits, difficult parts related to stage direction)
7. I use imagery to aid in learning a piece of music (e.g., imagining a run note by note)
8. I use imagery to aid in memorizing a piece of music (e.g., making a story out of a song cycle)

Performance Goals and Anxiety

1. I imagine myself handling future performances well (e.g., proper behaviour in an audition)
2. I imagine myself being focused for a performance
3. I imagine myself working hard to reach my goals in singing
4. I imagine myself being excited for singing
5. I imagine achieving my dreams and goals for singing (e.g., getting a certain role, getting a position in a company)

6. I imagine myself feeling prepared for important performances (e.g., an audition or an opera)
7. I imagine myself having my anxiety under control while performing
8. I imagine myself restructuring thoughts and feelings that may hinder my performance (e.g., thinking of nervousness as excitement)
9. I imagine myself being calm and relaxed for performance
10. I imagine plans and strategies for unforeseen circumstances during performance (e.g., emergency breaths during a run)
11. I imagine what it will take to reach my goals in singing (e.g., continuing to take lessons, daily practice)
12. I imagine myself dealing well with any difficulties that may arise during performance (e.g., problem with costume, musically behind the orchestra)

Characterization

1. I use imagery to put on the different qualities required for a role (e.g., having a commanding presence, being demure and coquettish)
2. I use imagery to focus on what I need to express while performing
3. I use imagery to feel balanced and grounded to the floor
4. I use imagery to take on the characteristics of something else (e.g., being a graceful swan, being a lumbering buffalo)
5. I use imagery to enhance movement quality (e.g., stretching like an elastic, moving through water)
6. I use imagery to experience the emotions I need for performing my role (i.e., jealousy, love, anger)
7. I use imagery to communicate with the audience
8. I use imagery to trigger certain emotions (e.g., image of death to prompt sorrow)
9. I use imagery to find inspiration for my character
10. I use imagery for staging my pieces (e.g., finding organic staging)

Appendix C: UWO Ethics Approval

Date: 1 November 2019

To: [redacted]

Project ID: 114674

Study Title: Examining the Reasons why Singers may use Imagery

Short Title: Why do Singers use Imagery?

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting

Date: 06/Dec/2019

Date Approval Issued: 01/Nov/2019 16:22

REB Approval Expiry Date: 01/Nov/2020

Dear [redacted]

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review. This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

[illegible]	[illegible]	Document Date	Document Version
Email Script 10.14.2019 - 114674	Recruitment Materials	14/Oct/2019	2
Imagery for Singers Permission to Post Letter 10.20.2019. - 114674	Recruitment Materials	20/Oct/2019	1
Imagery for Singers Survey Questions 10.14.19 - 114674 Letter of Information and Consent 10.14.19 - 114674			
	Online Survey	14/Oct/2019	2
	Implied Consent/Assent	14/Oct/2019	2
	Recruitment Materials		
	Recruitment Materials		
Recruitment Flyer 10.20.19 - 114674	Recruitment Materials	20/Oct/2019	2
Recruitment Flyer 11.1.2019 - 114674		01/Nov/2019	3
Third Party Script 10.14.2019 - 114674		14/Oct/2019	2

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

[redacted] Research Ethics Officer on behalf of [redacted] NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Appendix D: DMA Performance Event 1 Description

Three performances of the role of The Queen of the Night in Mozart's two-act opera, *The Magic Flute* with University of Western Ontario Opera.

Dates: January 27, 2017 at 8 pm, January 29, 2017 at 2 pm, and February 4, 2017, at 8 pm.

Stage Director: Theodore Baerg

Conductor: Tyrone Patterson

Appendix E: DMA Performance Event 2 Recital Program

February 10, 2018
8 pm, von Kuster Hall
Brianna DeSantis, *soprano*
Simone Luti, *piano*

Black Widow

Excerpt from Black Water — Jeremy Beck (b. 1960)

The Letter Scene from Miss Havisham's Wedding Night — Dominick Argento (b. 1927)

Intermission

It was not the wind — Colin McMahon (b. 1993)

Francisco Barradas, violin

Katie McBean, viola

Patrick Theriault, cello

Try me, good King — Libby Larsen (b. 1950)

Glitter and be gay — Leonard Bernstein (1918 – 1990)

This recital is in partial fulfillment of the requirements for the Doctorate of Musical Arts in performance degree.

Appendix F: DMA Performance Event 3 Description

Two performances of The Governess in Britten's two-act opera, *The Turn of the Screw* with University of Western Ontario Opera.

Dates: November 15, 2018 at 8 pm and November 17, 2018 at 2 pm.

Stage Director: Michael Cavanagh

Conductor: Simone Luti

Curriculum Vitae

Name:	Brianna DeSantis
Post-secondary Education and Degrees:	University of Windsor Windsor, Ontario, Canada 2009-2014 B.H.K. The University of Western Ontario London, Ontario, Canada 2014-2016 M.Mus. The University of Western Ontario London, Ontario, Canada 2016-2020 D.M.A. Candidate
Honours and Awards:	Province of Ontario Graduate Scholarship 2016-2017, 2017-2018, 2018-2019, 2019-2020 Social Science and Humanities Research Council (SSHRC) CGS-M 2015-2016
Related Work Experience	Teaching Assistant The University of Western Ontario 2015-2020
Publications:	DeSantis, B., Deck, S., & Hall, C. (2019). Investigating the circumstances under which singers use imagery: A pilot study. *Psychology of Music.*