Schillinger and Shamanism:

A Synthesis for Music Therapies

A PROJECT

SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL

OF THE UNIVERSITY OF MINNESOTA

BY

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IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF LIBERAL STUDIES

December 2011

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To my father, Oscar Steve Stephani, an extraordinary pianist and organist. I will always remember his playing of Rachmaninoff, Debussy and Gershwin for me at home.

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Preface

The place to improve the world is first in one's own heart and head and hands, and then work outward from there.

- Robert M. Pirsig

Every journey begins with a first step, sometimes planned, sometimes by default so subtle as to be virtually invisible. I don't remember *when*, but I do remember *what* precipitated this journey. It was a familiar feeling—a sense of a vacuum in my life that called out from time to time to be filled. It said I had something important to do that I wasn't doing. I bounced from one project to another and from one spiritual practice to another, often with the sense of paddling upstream. While I gained from all of these experiences, the vacuum remained—until I began this project. I turned my boat around, stopped paddling against the current and began floating with it. I found that every step toward my goal was aided by others. The Universe seemed to tell me, "OK, Stephani…you finally got it. Now WE will help."

I was sitting on a beach in the Dominican Republic about eight years ago watching a sunset with my wife when I got the first inkling that I had turned downstream. The idea just popped into my mind. I turned to Nancy and said, "I'm going back to school." While I had completed several years of college many years ago, I had never finished. I was slightly ashamed that all five of my children had completed their education while I had not. Nancy was used to my coming up with cockamamie schemes, but I believe she also sensed that this might actually be something important—for both of us.

So without a definite goal, but having decided on a direction, I completed my undergraduate courses at age 73 and was granted a bachelor's degree with a major in Jazz Studies. Soon after that I serendipitously received a brochure about the College of Continuing Education at the University of Minnesota. I believe that it was the Universe showing me the right direction to take to continue my journey. Connie, Jo Ellen and Adam, at the College of Continuing Education, encouraged me to continue along that path. More importantly, Nancy also supported my decision. Although, at that time, I had no idea how important she would be in the completing of my course work and my final project.

From my instructors I learned to narrow my focus and develop my ideas more persuasively. My initial statement of purpose for entering the MLS program was returned with the caveat that I had better narrow my subject matter from "finding the purpose of life" to something more manageable, and I had one semester to do it.

In my first class, an introduction to music therapy, my thesis began to take shape. In each additional class I was able to find something that helped me bring this thesis into its present form. I hope, however, that this is not its final shape. My wish is that this argument is convincing enough to motivate others to take my ideas and build upon them with their own creativity and innovation.

Someone once told me that everything in the Universe is either expanding or contracting—nothing remains static for very long. With that in mind, I hope others will run with my ideas and take them to new expanded levels.

Acknowledgments

It's said that it takes a village to raise a child. It would seem that it also takes a village to "raise" a thesis—a village of experts, critics, editors and proofreaders. Those supporters whose knowledgeable suggestions and helpful critique have improved my writing and strengthened my arguments have been important. Also, with their praise and encouragement, they drew out the best parts of me and brought this thesis to a level that I didn't realize was possible.

More specifically, this project has been a collaboration between myself and many others who have unselfishly given of their expertise and time to make this thesis more meaningful and effective. They include my undergraduate professors and instructors at Metropolitan State University and those at the University of Minnesota, including Constance Hessburg-Odland, Mary Jo Lundblad, and Adam Reef at the College of Continuing Education, and my professors and instructors, Annie Heiderscheidt, Anita Gonzales, Scott Lipscomb, Guerino Mazzola, Arthur Harkins, John Moravec, John Tomsyck, Gerald Fry, Ilene Alexander, Martin Springboard, Kathy Marshall, and Sheila Smith.

A special thanks to Peter Lock, my LS 8001 professor, whose input was invaluable in the preparation of this project and to Donna Mae Gustafson, my advisor, who freely shared her knowledge of music and musicians. Thank you both for your supportive and insightful comments.

Another special thanks to Phillip DiTulio, who I believe to be the most knowledgeable expert on the Schillinger System of Musical Composition alive today. Phil patiently explained Schillinger's concepts to me during our private instruction. Lou Pine, probably the most knowledgeable person on the planet regarding Schillinger's life, deserves a special thank you for the hours spent helping me sort out Chapter Four about Schillinger. He helped me separate truth from fiction regarding this enigmatic man.

And finally, a thank you to my wife and partner Nancy Stephani for her contribution to this project as editor, proofreader and honest but loving critic of my writing. The words of Duke Ellington come to mind when describing a great musician he knew as being "beyond category". Nancy, you are indeed *beyond category!*

Introduction

Musick has Charms to sooth the savage Breast.

To soften Rocks, or bend a knotted Oak. I've

read, that things inanimate have mov'd, and,

as with living Souls, have been inform'd, by

Magick Numbers and persuasive Sound.

William Congreve

William Congreve penned the words "Magick numbers and persuasive Sound" over three hundred years ago in 1697, yet today his words aptly describe the two main elements of an innovative approach to music therapy I am exploring in this investigation. Sound, as used in modern music therapy, has been shown in study after study to be a viable way to improve the emotional states of patients with disorders ranging from autism to insomnia. While these studies usually produce positive results, unfortunately no definitive reason for their success is apparent at this time. The precise reason for the improvement is not known, and therefore cannot be codified to produce reliable future results. We do not know what elements of music—what combinations of rhythm, melody, and harmony will create a positive result. We are still looking for those magick numbers and persuasive sounds that will sooth the savage beast. In this study I am advancing a system of musical composition developed in the Twentieth Century that may be those "magick numbers." When it is combined with an element of rhythmic *entrainment* [1], an ancient shamanistic practice now used in some music therapy, this compositional system will create an innovative modality to achieve predictable and

desirable results in future music therapy settings. I believe that an exploration of these elements will begin to answer the question of how music therapy works and how results can be consistently repeated.

From the Greek era to the present, there has been speculation and numerous attempts to develop a system that correlates mathematics to music, and music to a specific state of mind. A Russian-American, Joseph Schillinger (1895-1943), developed and taught a system of musical composition that did precisely this, and is applicable to music of almost any genre. Moreover, shamanistic healing rituals incorporate a 30,000-year-old system of repetitive percussive sound, called entrainment, that is still in use today. A blending of these two systems, Schillinger and entrainment, would answer the two main questions of my thesis: How can a codified system of musical composition be created that will produce positive results in medical settings on a consistent basis, and how can the music therapy technique of rhythmic entrainment be combined with that system to enhance its effectiveness? I will argue that the Schillinger System of musical composition has been used successfully in American film music to elicit predetermined emotional responses in movie audiences. I will further argue that combining particular melodies, composed according to Schillinger's principles, with rhythmic entrainment dating back to ancient times will create music that can produce effective and reliable results in music therapy settings.

1. Entrainment, as used in my thesis, is defined as changing brain wave and heart rate frequencies for therapeutic purposes by the use of pulses of sound, usually a percussive drum beat. Further definition and history are provided in Chapter Two

Map of My Study

Unless readers of this thesis have music therapy training they will have no knowledge of the entrainment component of my thesis. Further, most professionals and non-professionals in the music therapy field would probably have no knowledge of the Schillinger component. So it behooves me to carefully define those terms I will be using in this argument. Also, it is necessary to guide the reader through a series of logical steps that will lead to the potential acceptance of the concepts of my thesis.

I start with the idea that the mind-body approach to healing has already gained traction in the mainstream medical community. Numerous citations from credible medical professionals confirming this are included in the next chapter. From there, my path leads the reader to the concept of entrainment, one of the components of the modality I am advocating. I explain why it works and how it has been successfully used in modern music therapy. I also relate personal experiences my wife and I have had in shamanic ceremonies that utilized entrainment. Then I will introduce the idea that a certain arrangement of musical intervals can have a generally predictable emotional effect on the listener. This idea, first historically articulated in early Greek music theory, has been perpetuated in various forms until modern times. Next, I will establish the credibility of Joseph Schillinger's system of musical composition and show how a psychological component of his system has aided film composers in producing pre-determined emotional responses from movie audiences by the arrangement of melodic intervals into specific patterns. My final task is to show how a system used in films can be successfully modified for use in medical settings and how the addition of an entrainment component to the music will enhance the outcome of the therapy.

Throughout the thesis I include diagrams that will help to clarify those concepts that may not be familiar to some of my readers.

CHAPTER ONE

The mind-body approach to healing

"The physician's belief in the treatment and the patient's faith in the physician exert a mutually reinforcing effect; the result is a powerful remedy that is almost guaranteed to produce an improvement and sometimes a cure."

Peter Skrabanek and James McCormick (1989)

In building a firm foundation for my thesis, It is important to first establish that our emotions and beliefs *can* and *do* affect our health. While this idea has been around for millennia, it is now being integrated into modern healing technologies. The relationship between mind and body can be positively affected either by external stimuli, as I am positing, or by the causative action of an enlightened patient. This will not only help the healing process of the individual, but can do so in a cost effective way that will begin to heal the financial sickness of our medical delivery system in the United States. This system, in fact, is pricing itself out of the reach of many Americans. It has become a system that, while being the world's most expensive, is lagging far behind many other industrialized nations in its effectiveness. According the latest World Health Organization report, *World Health Statistics, 2011*, of the 193 member states reporting to WHO, there were 38 counties with lower infant mortality rates than the United States. In the category of probability of dying between the ages of 15 and 60, there were 43 counties with lower rates than the United States quoted in the same report. Many, if not most of the countries with better health statistics, offer *free* health care to their citizenry. While this investigation is not a political tome, I wish to include these remarks to

emphasize that the music therapy modality I am arguing for in this thesis, and other inexpensive mind-body approaches to healing, may contribute to more financially available medical care to the people of the United States in the future.

The Placebo Effect

One of the areas that lend credence to a mind-body approach to healing is the phenomenon called the *placebo effect.*[1] It amazes me that dedicated, ethical scientists, using the most advanced technological measurement devices and statistical models, can dismiss this effect in a control group not receiving the treatment offered to the experimental group. Should there not be an attempt made to discover the mechanism that creates this phenomena? Last year the American Cancer Society, in an online paper entitled, "Placebo effect: What is the placebo effect?" said that this effect seems to affect one out of three patients [in studies] (2010). According to *Wired Magazine*, in 2007 and 2008, the US Food and Drug Administration failed to approve half of the new drugs tested because of their inability to get better results than sugar pills (Aug 23, 2009). Irving Kirsch and Guy Saperstein analyzed 19 clinical trials of antidepressants and concluded that the "expectation of improvement, not adjustments in brain chemistry, accounted for 75 percent of the drugs' effectiveness" (quoted in Aldrich, 1998). An article in Scientific American entitled "Placebo effect: A cure in the mind" said, "Placebos have helped alleviate pain, anxiety, Parkinson 's disease, inflammatory disorders and even cancer" (Niemi, 2009).

[1] *The placebo effect* is the measurable, observable or felt improvement in health or behavior not attributable to a medication or invasive treatment that has been administered. The first discussion of the placebo effect is attributed to H.K. Beecher, who in 1955 did a meta-study of 15 studies which showed that 35% of 1,082 patients found satisfactory relief by a *placebo* alone. See Beecher, "The placebo effect", *The Journal of the American Medical Association* (1955).

Thus for years the placebo effect has been behaving badly, disrupting results of medical studies and creating positive results for no apparent reason. Possibly the only element the patients participating in these studies have in common is their *belief* that they will be healed. It would appear that if the mind believes that the body can be healed, the commensurate activity of the body's immune system then will often do so. This has given rise to an increasing acceptance, in traditional medical practice, of the idea that the mind can have an effect, either positive or negative, on health. This has come to be known as the *mind-body* approach to healing.

Mind-body approach to healing

Someone once told me that magic and miracles were the result of natural laws not yet discovered. Recently, medical science has begun to discover scientific principles for the relationship between emotion, thought and health. These principles may explain occurrences such as the sudden, and seemingly miraculous, remission of a life-threatening cancer. The mind-body connection is no longer considered a parapsychological event, or a new age "treatment du jour" in medical scenarios. The *Scientific American* article quoted above said, "Researchers have decoded some of the biology of placebo responses, demonstrating that they stem from active processes in the brain."

In a Public Television series and companion book of transcripts, called *The New Medicine,* aired on March 29, 2006, doctors and professors of medicine from prestigious institutions such as the Duke Center for Integrative Medicine, and Harvard Medical School, were interviewed regarding the mind-body approach to healing. One

interviewee, Dr. Ronald Glaser, who is Professor of Molecular Virology, Immunology, and Medical Genetics at the Ohio State University College of Medicine, was quoted in the broadcast saying, “When you are stressed the brain releases a hormone that circulates through your bloodstream releasing other hormones including adrenaline…and cortisol.[2] Cortisol has the effect of tuning down your immune system” (Blumer & Meyer, 2006, p.15). In the same program and book, Dr. Mimi Guarneri, Medical director at Scripps Center for Integrative Medicine, said, “The constant flow of stress hormones [like cortisol] has the effect of keeping your immune system turned down, and in the long term makes you more vulnerable to disease and infection”. She added, “Researchers have been able to show that highly stressed people produce fewer antibodies to a vaccine in their blood stream because their weakened immune system cannot react to the invading organism” (pp. 15-16).

Another medical professional echoing the above comments is Dr. Pamela Smith (2011) who says that one of the consequences of too much cortisol in the body is decreased immunity. She continues to say that stress reduction techniques, including music, are key components of treatment (pp. 60-61).

Blue Cross of California did a study of 900 pre-hysterectomy patients that was also reported in the PBS program and book. Half were given a relaxation tape or CD to listen to for a week before surgery. The results showed an average savings of $2000 per patient in the experimental group at a cost of $17.95 per patient. The experimental

2. *Cortisol* is a hormone produced by the adrenal cortex that mediates various metabolic processes. It has anti-inflammatory and immunosuppressive properties, Cortisol levels in the blood may become elevated in response to physical or psychological stress. It is also called *hydrocortisone*. (Merriam Webster Dictionary).

group spent a slightly shorter average time in the hospital and required less pain medication. Blue Cross did a follow-up of the reactions from the study. They received hundreds of letters and phone calls thanking them for the experience. Many described "…heart-wrenching experiences about feeling extremely anxious, unable to cope with the waiting period prior to their surgery. Then, after listening to the tape or CD, they were able to focus their energy on preparing themselves [and their immune system?] for this surgical procedure and felt more confident…the bottom line of this trial was a revelation for even the most skeptical" (pp. 94-95).

A recent paper regarding a mind-body approach to healing was in the January 2011 issue of *Minnesota Medicine,* a publication of the Minnesota Medical Association. In an article entitled "Demystifying Mindfulness" Karen Lawsen, an associate professor at the University of Minnesota Center for Spirituality and Healing, related how medical professionals are using an approach called Mindfulness-Based Stress Reduction (MBSR) to mitigate the stress caused by being in a healing profession. It is based on a meditative body scan, moving attention through the body and observing any sensation, and Hatha yoga, a physical practice of stretches and postures. Among the benefits are "a decrease of daily hassles, and psychological stresses" (37-38), that have been shown to depress the immune system.

What I've attempted to demonstrate in this chapter is that a mind-body approach to healing no longer requires thinking outside the box of scientific credibility. In the next chapter I will be exploring how the mind body technique of entrainment has been used for healing since ancient times by diverse cultures, and how it is becoming mainstream in contemporary music therapy. In future chapters I will be demonstrating how

entrainment fits innovatively into the Schillinger System of composing music to design music for therapy.

Chapter Two

Entrainment uses from the ancient to the modern

Entrainment Defined: Entrainment dates back to the earliest Shamanistic healing rituals. It can be defined as the interaction between two separate vibrating objects in close proximity to each other that synchronizes their rate of vibration into the stronger frequency over a period of time. Healing therapy entrainment uses auditory rhythmic pulses that affect and entrain autonomic body frequencies, such as brain waves and heart rates, into more desirable rates that have been shown to support the immune system and accelerate healing. Additional information on entrainment's "discovery" by Western science and its use in modern medicine is explored in this thesis.

Brain Waves Defined: As defined by modern science, *brain waves* are the ranges of electrical activity in the brain and are generally indicative of specific psychological and/or physical states in an individual. The following table describes the brain waves as they are generally defined by researchers, their frequency ranges in cycles per second, or Hertz (Hz), and what they usually indicate about an individual's mental and physical state (Goldman, 2006, pp. 220-21).

NAME	FREQUENCY RANGE	PHYSICAL and MENTAL STATES
Beta	12Hz - 38 Hz	Normal daily activities.
Alpha	8Hz – 12Hz	Normally associated with a relaxed state before sleep and when first waking up.

Theta	3Hz- 8Hz	Experienced in light sleep and meditation.
Delta	0.2Hz-3Hz	Experienced in deep sleep and meditation. This is the state where the body does most of its self-healing.

There is a brain wave with a higher frequency than beta called gamma. Its frequency is between 40Hz-70Hz, however, this state is not relevant for this paper.

While some may feel that entrainment is born of modern research and technology, anthropologists theorize that it has been used for millennia by indigenous shamanistic cultures throughout the world as a healing tool. These cultures have used the vibrations of a drum, metal bowl, gong, bell or other instrument to influence the vibrations of the body, such as brain waves, into states that allow the body to better heal itself (Goldman, 2006). This is a prime example of the mind-body approach to healing which is now gaining traction as a companion to allopathic treatment in modern medicine. With the mind-body approach to healing beginning to be accepted in Western medicine, the ancient methods of shamanistic entrainment are becoming more relevant. In the last fifty or so years various studies, examples of which I have included in this project, have been successfully completed showing that entrainment is an effective aid to traditional Western medicine and can expedite healing by positively affecting the human immune system.

Entrainment: its first uses

Western science is prudent in not rushing to accept healing techniques until they have been researched and studied, even though they may have been used successfully

for thousands of years by practitioners of alternative healing techniques. Because they have been embedded in ritual, these techniques have often been relegated to the realm of sorcery and witchcraft. However, as these techniques were used successfully in the past, modern medicine is discovering they may still have some significant beneficial components. In later sections of this investigation we will show how these ancient entrainment technologies are the same as those found to be beneficial in modern times in music therapy studies.

Anthropologists believe the first shamanic use of entrainment for healing originated with the Tonkus peoples of Asia between 20,000 and 30,000 years ago (Gaynor, 1999). Their healing techniques spread to all parts of Asia. It is interesting to note that the same frequencies were, and still are used by shamans in parts of the world completely cut off from one another, and separated by large continents and bodies of water (Strong, 1998). The frequencies believed to be used are approximately four Hz, or pulses per second, which are in the theta meditative range of brain wave activity (Goldman, 2006).

Shamanism is currently being taught at the University of Minnesota through the Center for Spirituality and Healing. In these courses examples of entrainment drumming use a steady drum beat of approximately 4Hertz (Hz.), or four pulses per second, a rate that is still being used by contemporary shamans. These shamans use this technique to enter the trance state for their ritual and healing. (Ingerman, 1999). During this trance state shamans “travel” into other dimensions to communicate with the spirit would. This frequency of 4Hz. is at the low end of the Theta range, as defined by the International Federation of Electrophysiology and Clinical Neurophysiology, and is characterized by a

relaxed state of sleep and meditation. This range would be a very desirable state for a pre-surgery patient to reach, as the normally anxious state typified by such a patient, is found at the higher end of the beta range of 20Hz. This anxious state typically releases hormones that suppress the immune system, as has been stated earlier in this thesis and further cited on subsequent pages of this thesis.

The early practitioners of entrainment may not have realized that they were affecting such things as alpha, theta and delta brain waves, or that those brain waves and certain heart rates were related to specific physical and psychological states of health. However, by trial and error, or intuition, or perhaps by “divine revelation”, those particular rhythms were found to advance healing, and thus were used by shamanic groups in diverse parts of the world. Science has now found that these frequencies are identical to those used in modern entrainment therapies (Goldman, 2006). The rhythmic pulses generated by drums and other percussive instruments induced a trance in the shamans as well as inducing a healing state in their patients (Gaynor, 1999).

Personal experiences with entrainment

In 2003 my wife and I were fortunate to be able to witness shamanic entrainment in action as we were part of a small group of Minnesotans who had obtained a Treasury Department license to travel to Cuba to study Santeria, the religion of many Cubans. Santeria is a shamanic religion originating with the Yoruba people of Africa. It was brought to Cuba by the slave trade. As the plantation owners forbade the slaves from practicing their ethnic religions, the resourceful slaves gave the names of Catholic

Saints to their gods, called Orishas, and worshiped those gods in the guise of the Saints in public. However, in private they worshiped the Orishas in accordance with their ethnic heritage.

Today, as Cubans no longer need to worship in secret, we were invited to a Santeria ceremony that took place in the backyard of a Cuban home on a hillside overlooking Havana. At nightfall, after a feast, three musicians arrived and began playing on two conga drums and a cowbell. As a musician, I was intrigued with the complex rhythms played. Raoul, the *Padre de Santos*, or priest of this small congregation, went into a trance and began speaking to various individuals, supposedly passing on messages from their dead relatives and ancestors. Although this is difficult to describe, explain, or prove, I believe that Raoul had entered into an altered state of consciousness. (Perhaps I was induced into a state to be receptive to that observation by the pulse of the percussive instruments.) The aspects of the ceremony most relevant to this thesis are the rates of the rhythms used by the congas, and especially the cowbell. As a performer of Afro-Cuban jazz, I recognized them as being about the same (four to eight beats a second) as the theta brain-wave frequency. As the theta range is indicative of a meditative state, this may have contributed to Raoul entering his trance. I left amazed but refreshed, and in retrospect I sense that I was experiencing a reaction to the entrainment effect of the percussion we heard.

An extraordinary post-script to this experience occurred in 2010. My wife Nancy and I were invited for Thanksgiving dinner at the home of Cuban friends, Nachito and Aurora Herrera, their children and brand new grandchild, Carter. After dinner the five week old baby boy was being rocked by his aunt in an effort to sooth his crying and lull

him to sleep. The more he was rocked the louder he cried. Aurora, the grandmother, begin a loud and very steady beat on a conga, about three to four beats a second, just a few feet from the baby. I thought this was crazy. If they wanted the baby to sleep, why pound loudly on a drum? After less than a minute, the baby stopped crying and looked over his shoulder at Aurora. As she continued to play his eye lids began to flutter and then he fell sound asleep. After a few more seconds Aurora stopped playing and Carter remained fast asleep. She explained that playing that particular rhythm on a Bata drum, one of three drums used for Santeria ritual, was a technique used by those who practice Santeria to relax an infant into a state of sleep.

Although this is another anecdotal experience, it further reinforces my own beliefs in the power of entrainment and how it can be used in music therapy settings. A pure scientist would say that beliefs and anecdotal experiences do not a proven theory make. And I agree. However, one can't deny that experiences like this add impetus to the need for doing the scientifically designed studies that may support the theory. We must never forget how many great discoveries of the modern era, such as flying, radio, and TV would have been thought of as fantasy or sorcery not that many years ago. I regularly engage in a web seminar with fellow participants from various parts of the US as well as Australia, England and South America. We communicate at the speed of light. In past centuries we would have been accused of being witches or warlocks.

Another form of entrainment

While many Shamanic religions use percussive instruments to produce a pulse of sound several times a second to achieve entrainment, another technique is used in

parts of Asia (Gaynor, 1999). Before Buddhism came to Tibet, the prevailing religion, called Son, devised the use of sound bowls, gongs and bells. The sound bowls are activated by rubbing a wooden stick around their edge, much as one might rub one's finger around the edge of a crystal glass, generating a high pitched sound. This entrainment principle was based on the fact that the metal bowls, bells and gongs emitted slightly different frequencies at the same time, either because they were made of different metals, or because they were purposely tuned to slightly different frequencies. When combined, the waves interfere with each other producing what's called a *beat*, or sound pulse, several times a second. This is known scientifically as wave interference. Dr. Gerald Oster of the Mt. Sinai School of Medicine describes this beat phenomenon in the 2006 Goldman book, *Sonic Entrainment.* He said that if two independent sound sources are used, for example a tuning fork of 100 Hz (cycles per second) and another of 108 Hz, they produce a tone that waxes and wanes in a pulsating "wah-wah" sound (2006). As the beats are pulsing in the Alpha and Theta brain wave frequencies, they accomplish the same therapeutic benefit as a percussive drum beat in the same frequency. This is part of the therapy Dr. Michael Gaynor, Director of Oncology at the Strand-Cornell cancer prevention Center, uses along with traditional remedies, like chemotherapy, to treat his patients[1] (2006). In modern music therapy nomenclature wave interference technique is called *binaural* entrainment. The percussive drum method is called *monaural* entrainment and is the type I would use in the music composition method of my thesis.

[1]. More on the Doctor Gaynor's treatment is found in later sections.

Chapter Three

Music in healing: ancient to modern

We should always remember that sensitiveness and emotion constitute the real content of a work of art.

Maurice Ravel

Chapter One explored the mind-body approach to healing, the idea that emotion affects health, and the increasing acceptance of this idea by modern medicine. This chapter deals with the concept that music may have the capacity to influence emotion and thus encourage the positive emotional states that seem to enhance healing. Through the years, much has been written about the psychological effect of music on the individual. As stated earlier, anthropologists have told us that the rhythmic component of music has been used for healing in Shamanic cultures since the dawn of time (Thorpe, 2011). Aristotle expressed an opinion, commonly held in his time, that music was not merely a system of symbols, but actual reproductions or recreations of emotion. Aristotle referred to these emotions as “moral tempers” (Ferguson, 1935). Later students of Aristotle felt that by arranging half and whole steps[1] into particular patterns, or modes, specific emotions could be induced[2] (Washington, 1967). Plato, in the *Republic,* said that playing music in a particular *harmonia* [melodic style] would incline one toward the specific behavior, be it love or war, that was associated with it

1. In Western scales the distance between C and C# would be considered a half step and the distance between C and D would be a whole-step.

2. For those musically inclined, examples of modes and how the Greeks thought they affected the listener are found in Appendix G

in this system.

Aristotle also said, “From all this it is clear that music is capable of creating a particular quality of character in the soul…”(Barker, 1884-89, p.176). Later, during the Middle Ages, some cultures believed music to be so important to healing that in order to be a doctor one was also required to be a musician (Conrad, 2011). These are a few examples of how creative minds, for several millennia, have attempted to find a correlation between the act of listening to music and the apparent emotional and physical changes experienced by the listener.

Eduard Hanslick, an eminent Viennese music critic during the mid-1800s, is quoted in a paper by Robert Laudon, Emeritus Professor of Musicology at the University of Minnesota. Hanslick said that the “intensive influence of music on our nervous system supports music’s claim to a superabundance of power greater than that of other arts” (2006, p. 125). Hanslick stated that music psychology recognized the “mesmeric compulsion of the impression which certain chords, timbres [qualities of sound], and melodies make upon the whole human organism” (p. 125), but admitted that there was no extant explanation of why or how the complexities and relationships of sounds affected a listener. Hanslick’s writings certainly lend credence to the idea that music not only influences the mind, but the body as well.

In more modern times, musicologists and psychologists have researched and written about the phenomenon of music affecting emotion. In his book, *A History of Musical Thought* (1935), Donald M. Ferguson, for whom the music building at the University of Minnesota was named, tells us that music is a mode of thought, a way of

thinking in tones (1935). He goes on to say that a single tone, no matter how sonorous, communicates no emotional meaning. However, melodies, or specific sequences of tones, have the ability to stimulate in our minds different types of emotional awareness. In other words, music must have *motion* in order to communicate *emotion*. This becomes more obvious when one realizes that both words, *motion* and *emotion*, are derived from the Latin word *movere*, to move. As we shall see when we study Schillinger's Psychological Dial, this movement of music can be constructed in ways that will communicate and stimulate similar emotional responses in individual listeners. Apparently, certain arrangements and movements of notes, or *motions* of music, can stimulate specific intended *emotions* in a listener.

In a later book, *The Why of Music* (1969), Ferguson makes the case that musical motion can communicate human emotion. He draws parallels between the tensions and releases of music and the tensions and releases of the human body. He says:

> Tensions and motions, the bases of musical syntax, are also the essential factors [of emotion in music]. I think the psychologists will say they're the *elements* of emotion: at least as a physiological response to an exciting stimulus. In a sense then, they provide the syntax of what you might call the emotional attitude assumed toward the stimulus" [the music] (p. 46).

He goes on to say:

> We have two elements of musical suggestion: tonal tension and rhythmic motion. We are assuming that these correspond to, and therefore may possibly portray,

the nervous tensions and motor impulses we feel when we are confronted by and deeply concerned for some object of experience (pp. 48-49).

I would posit that it is the physical experiencing of these tensions and releases through musical motion that precipitate the emotional responses we feel. It is similar to the way the tension of confronting danger precipitates an emotion of fear. The more imminent the danger, the more intense is the tension and the more negative the resulting emotion. Similarly, the tension of hunger is released by eating which precipitates the emotion of wellbeing. The better the food tastes, the greater is the release and the positive emotion. I am arguing that these emotional responses are common to all or most of those experiencing the same event.

If the above is true, is it then possible to compose musical motion that will produce a sequence of tensions and releases that will cause the listener to experience the particular emotion correlating with those elements? As we will see, Schillinger connects a listener's specific emotional response to a specific arrangement of melody supported by other musical components such as rhythm and harmony. Ferguson points out that if music can be understood as a medium of communication as well as art, it will be judged as a more valuable idiom (1960). It is obvious that Donald Ferguson felt that music was a medium for the communication of emotion as well as a personal esthetic experience and that this communication of emotion would be understood and responded to in a similar manner by a wide variety of listeners.

Justin London, of Carlton College, tells us that, "an expressive piece of performance is one that recognizably embodies a particular emotion, and indeed may

cause a sympathetic emotional response in the listener" (2010, pp. 3-6). In other words, I believe London is telling us that listeners will recognize and respond to the particular emotion composers purposefully, and intuitively synthesize into their music. He quotes Psychologist Carroll Pratt who explains: "Music can be agitated, restless, triumphant, or calm since it can possess the character of the bodily movements which are involved in the moods and emotions that are given these names" (p. 3). Pratt was referring to Peter Kivy, professor of philosophy at Rutgers University, who developed a physiognomy[3] of musical expression and thus claims that music is expressive of basic emotions by its resemblance to human utterance and behavior.

In Western music, many who hear the last movement of Tchaikovsky's Sixth Symphony, The Pathétique, will experience what Sederer called a deep anguish at the beginning of the last movement leading into profound remorse as the movement ends. There is speculation that this symphony was written as a farewell note by Tchaikovsky. If true, it lends credence to one theory that he died, not from disease, but by his own hand shortly after the symphony premiered. Or, possibly, he may have had a premonition of his impending death. Some may feel that art can create a misleading representation of an artist's emotions as, indeed, can any form of communication. Still, Tchaikovsky himself has been quoted as saying that anything you need to know about his emotional life lies in his music.

This raises a question. Did Tchaikovsky, like all great composers, have an

3. *Physiognomy*: originally**,** the art of determining character or personal qualities from the features or form of the body, especially the face. *Physiognomy* as used here is defined as the use of *musical* features, rather than physical features, to establish emotions intended in music.

intuitive sense of recognition of the patterns of melody, harmony and rhythm that would elicit the emotional responses that he intended through the combinations of tensions and releases inherent in his music? Further, are these the kinds of patterns that Schillinger analyzed and synthesized mathematically into his system? This is explored in more detail in the next chapters.

Modern medicine's growing acceptance of music as an aid to healing

As early as the 1800s, researchers in Europe and America were studying how music directly affected respiratory rates, pulse and blood pressure (Miles, 1997). A more recent meta-study of over 200 music-related studies reported that anxiety, pain and the amount of pain medication were all reduced by as much as 50% in experimental subjects who listened to music (Hallam, 2003). As demonstrated in the Public Television production, *The New Medicine*, first mentioned in Chapter One, the idea that music affects the mind, which then affects the body and its capacity for self-healing, has been gaining traction in modern medical circles. Research reveals how closely emotional health is related to physical health. The medical professionals quoted in the PBS program speak directly to the potential benefits to the immune system of therapies that induce relaxation, thus acting as an aid to the immune system and to healing. As stated in Chapter One, scientific research has shown that anxiety increases the levels of Cortisol in a patient's bloodstream that will then depress the immune system. Therefore, it would seem that the benefits of a non-pharmaceutical method of inducing relaxation in a pre-surgery patient, as an example, would be obvious.

This phenomenon may partly explain why Michael Gaynor (1999), Director of Medical Oncology at the Strand-Cornell Cancer Prevention Center, is having success using Tibetan sound bowls in addition to standard allopathic cancer treatments. In his book, *Sounds of Healing*, Dr. Gaynor says he is an advocate of this type of complementary therapy. As mentioned in the Chapter Two, these bowls are "played'' by rubbing a wooden dowel around the rim, much like rubbing a moistened thumb around the rim of a crystal glass. The different metals in the bowl vibrate at slightly different frequencies creating a "wah-wah" effect called a beat several times a second. This is a form of the binary type of entrainment discussed in the last chapter where the "beat" is similar to the repetitive percussive pulse of a shamanic drum. Because of the difficulty in finding some of the metals used in the original combination of metals (which included gold), he now uses crystal bowls in his therapies that create the same effect in a listener. He relates examples of how he uses the sound bowls along with standard conventional treatments. He feels this therapy has been responsible for the remission and often complete cures of cancers and other diseases in many of his patients that had previously been diagnosed as terminal by other doctors. It is Dr. Gaynor's opinion that his therapy, used as an adjunct to allopathic modalities, allows patients to better heal themselves. Further, he believes that in cases that had progressed too far for a cure his therapy at least allowed patients a more peaceful mindset as they faced their inevitable passing (1999). While there are apparently no scientific studies to back up Dr. Gaynor's claims, one might venture to think that given his professional status as Director of Medical Oncology at a prestigious cancer facility, he would not advocate such innovative and potentially controversial ideas unless he had evidence based on his

personal medical practice. However, a critical thinker might wait for the results of such scientific studies before making up his or her mind as to the viability of sound as a viable adjunct to traditional cancer treatments. (Or, a critical thinker might undertake such studies.) Dr. Gaynor's method is not part of the system I am advancing. However it demonstrates how one medical professional is using one subset of the mind-body approach to healing. The system I am positing is another subset of that approach.

In a more recent example Dr. Anne Heidersheidt of the center for Spirituality and Healing at the University of Minnesota is currently conducting a study to determine the feasibility of using a relaxing DVD featuring images of nature and soothing sounds of the Native American flute. Heiderscheit's two previous studies showed the viability of using music to reduce stress and anxiety in patients supported by mechanical ventilation and to reduce stress at mealtime related to eating disorders.

While music has been used in medical settings with varying degrees of success for thousands of years, there remains a persistent question; *how* and *why* does it work? Without this knowledge there has been no way to codify a system of creating music that would produce successful results on a consistent basis. In the next chapters I will present a method of composing music for therapeutic settings that could produce consistent results using a combination of components from the Schillinger System of Musical Composition as well as entrainment technology.

Chapter Four

Joseph Schillinger (1895-1943)

Musical form is close to mathematics -- not perhaps to mathematics itself, but certainly to something like mathematical thinking and relationship.

Igor Stravinsky

Few individuals have created such a powerful impact on American composers while remaining virtually unnoticed by the general public, even by many musicians. This is the enigma of Joseph Schillinger. Who was he? How did he influence American composers to such an extent within the brief span of his 15-year American career, and why has he received so little recognition?

It is not an easy task to assemble a definitive account of Joseph Schillinger's life. He was born in 1895 in Ukraine, which at that time was part of Russia. He lived his first 33 years in the turbulent times preceding the Russian revolution and during the first years of Soviet rule. Historical documents from that era are difficult to find. Much of what is documented in this country was written after his death in 1943 by his students and by his widow, Frances Schillinger, who may have been motivated by financial concerns. To many of his students Schillinger was bigger than life, however, to his critics he was a charlatan whose system diminished creativity. While his bravado and lifestyle were questionable at times, most people who knew him, and actually studied his system, thought that he was a brilliant innovator who codified mathematically a system that worked with virtually any genre of art, from visual to musical. The application of mathematical formulae to the making of art was something Schillinger believed that

artists did intuitively in their paintings and music. Schillinger explained this theory in *The Mathematical Basis of the Arts* (1948) that, along with *The Schillinger System of Musical Composition* (1946), was published posthumously from his voluminous notes.. *The Mathematical Basis of the Arts* covered many components and manifestations of creative activity while *The Schillinger* System *of Musical Composition* was specific to music.

It is known that Schillinger was the product of the same renowned Russian music education system that produced Prokofiev and Rachmaninoff. Like them Schillinger was a composer. However, he became better known as a teacher and theorist. He expressed his ideas in the form of precise written theories using mathematical expressions. These theories evolved into the Schillinger System of Musical Composition. I will be emphasizing a component of this system called the *Psychological Dial* [1] in this discussion.

According to historian Warren Brodsky (2003), Schillinger was educated at the Saint Petersburg Imperial Conservatory of Music, well known for producing truly professional musicians. Starting in 1918, he held several important positions, including Dean and Professor at the State Academy of Music and Head of the Music Department, Board of Education, in Kharkov, Ukraine. Schillinger was a consultant to the Leningrad (formerly Saint Petersburg) Board of Education from 1922 to1926. While he held a number of academic positions, a high point in his career occurred in1927 when he entered a state competition to create music for the tenth anniversary of the Soviet Union. His composition, *Symphonic Rhapsody,* was chosen over the work of other

1.The Psychological Dial is used to write music that has *specific* emotional implications that generally impacts listeners in the same way.

composers, including *Symphony No.1* by Shostakovich. The anniversary celebration featured his work along with that of Beethoven. This inspired Shostakovich to good-naturedly create and send to Schillinger a doctored photograph showing Schillinger and Beethoven sitting together on a park bench “with Ludwig giving Schillinger a friendly supportive hug” (Appendix A).

There is some speculation as to why Schillinger left Russia in 1928. One possibility is that he was in trouble with the Russian authorities. S. Frederick Starr in his book *Red and Hot* (1994) speculates that Schillinger was interrogated by the Soviet police concerning a paper he had written about jazz. The Soviets felt that the promotion of “decadent” jazz was endorsing capitalism and the subjugation of the American worker. That same year, Schillinger was invited to speak on contemporary Russian music by the American Society for Cultural Relations with Russia. He may have simply used this invitation as an excuse to leave Russia and partake of capitalism, which he did quite successfully. In 1932, at the height of his teaching career in the United States, it is thought that he taught over one hundred lessons a week, many by mail, at $10.00 a lesson. This was a huge sum to be earning during the Depression (Brodsky, 2003, p 49).

Components of Schillinger’s system

Schillinger’s system of using a mathematical approach to creating patterns of music generated considerable controversy in the music establishment of his era. There were those who felt the system eliminated individual creativity, an idea not kindly

received by composers of the day. It is an element of this system, the Psychological Dial, that I am stressing in this thesis and will be exploring later in this chapter.

To get a true picture of Schillinger's system of musical composition, it is first necessary to take a look at his mathematical approach to creating musical patterns before delving into an exploration of the Psychological Dial. However, the length and focus of this project allow only a cursory look at the mathematical component of the system.[2]

The eminent twentieth century composer Henry Cowell summarizes Schillinger's system in a 1946 preface he wrote for *The Schillinger System of Musical Composition (1946):*

> The idea behind the Schillinger system is simple and inevitable: it undertakes the application of mathematical logic to all the materials of music and to their functions, so that the student may know the unifying principles behind these functions, may grasp the method of analyzing and synthesizing the musical material that he may find anywhere or may discover for himself, and may perceive how to develop new materials as he feels the need for them. The Schillinger system offers possibilities, not limitations; it is a positive, not a negative approach to the choice of musical materials. Because of the universality of the esthetic concepts underlying it, the System applies equally to old and new styles in music as well as "popular" and "serious" compositions (pp. ix-x).

[2]. Composers and musicologists who are interested in Schillinger's mathematical component should study his books. Also, The Schillinger Society website, www.schillingersociety.com has information and courses on learning Schillinger's system.

What inspired Schillinger's mathematical approach to composing music?

During the aftermath of the Russian Revolution, in the years when Schillinger was receiving his education and beginning his career, there was a movement toward a philosophy of art called *constructivism.* Russian constructivism, born around 1915, stressed, "… the application of rational, constructive methods in creative processes, in contrast to the irrational and spiritual processes generally used in art making. The Constructivist artist understood the artist not as an inspired genius, but as an engineer…" (Elder, 2008, p. 267). Francis Maes, in *A History of Russian Music,* tells how the constructivists tried to break down the barrier between life and music. This melding of life and music was the accepted viewpoint in post-revolutionary Russian ideology and may have influenced Schillinger's theory of music. Maes mentions that one example of constructivism was a composition by Joseph Schillinger, *The First Airphonic Suite* in 1929 (1996). Apparently other music of the era was quite bizarre as he continues:

> In music, constructivism stood for the abolition of traditional sounds by emphasizing industrial and urban acoustic effects. In 1922 a concert to celebrate the fifth anniversary of the October Revolution was given in Baku. The "instruments" were provided by the Caspian Fleet, factory sirens, two artillery batteries[4], machine guns, and airplanes (p. 249).

In one of his talks before the American Society for Cultural Relations with Russia

4.Reminds one of the cannons in Tchaikovsky's *1812 Overture.*

Schillinger announced that he was a constructivist.

Another possible influence on Schillinger was Sergei Taneyev (1856-1915), Russian pianist, composer, musical theorist, teacher and mathematician. Taneyev had the honor of premiering several of Tchaikovsky's piano concertos, including the Second and the Third. According to R. A. Leonard, Taneyev and Schillinger were both at the State Institute of Musical Science in Moscow, although not at the same time. Taneyev was famous for teaching composition to composers such as Scriabin, Rachmaninoff, Gliére and Conus. However, his major claim to fame came from his massive two-volume book, *Imitative Counterpoint in Strict Style,* summarizing his 20 years of work in that field. In the book's inscription Taneyev quoted Leonardo Da Vinci, "No branch of study can be claimed to be a true science unless it is capable of being demonstrated mathematically" (1977).

The connection between music and mathematics has been suggested since early Greek times. Legend says that Pythagoras, the Greek mathematician, uncovered one of the key aesthetic principles of music more than 2,500 years ago. While standing outside a blacksmith shop hearing the sound of hammers striking anvils, he wondered why he perceived that sound to be pleasant. He discovered that the anvils' sizes were in simple mathematical ratios to one another such as two to one and three to two. Thus, Pythagoras linked harmonious music to a mathematical elegance and logic that appears in music from the construction of instruments to the art of composition" (Mathews, 2011). During the fifth century later followers of Pythagoras created a scientific

approach to music expressing musical interval[5] as numeric intervals. They listened to tones produced by plucking strings of different lengths and found that the tone produced by plucking a string held in the middle was exactly one octave above that of plucking the whole string. They went on to mathematically calculate the notes that would be sounded by various string lengths (Asmir, 2011). In 1739 Leonhard Euler wrote *Tentamen Novae Theoriae Musicae.* He was hoping to integrate musical theory as part of mathematics. Although he was the pre-eminent mathematician of the 18th Century, this portion of his work went mostly unnoticed. It was described by his contemporaries as being too mathematical for musicians and too musical for mathematicians (Calinger,1996).

Perhaps it was through analysis of existing classical compositions that Schillinger, and other constructivists, began to see mathematical patterns that had been intuitively created by the great composers. I believe that the classical composers approached composition as pattern making, either on purpose or by default. Patterns can usually be described by mathematical equations. These patterns achieve a series of tensions, releases, and symmetries that take the listener on an emotional journey with just the right balance of predictability and surprise. (I believe that music that is too predictable is boring to a listener, and music that contains too many surprises is chaotic.) Schillinger may have analyzed this intuitive patternmaking and synthesized that data into a system that functions as a platform supporting a composer's creativity. This idea is supported in a biography included by the publisher in the1960 edition of *The Schillinger System for Musical Composition*. It states that Schillinger analyzed

5..Intervals are the spaces between notes. For example, in Western scales C to C# has an interval of one half step, C to D has an interval of two half steps or one whole step and C to F has an interval of five half steps or two and ½ whole steps

thousands of compositions by many composers including Bach, Mozart, Beethoven, Brahms, Wagner and others. “By applying advanced mathematical and scientific analysis he discovered that great music of all ages has been constructed according to accurate and precise principles, principles often unsuspected or unrecognized by theories of the past” (1960).

Schillinger was not alone in attempting to define musical patterns and phrases in mathematical terms. Other composers of the Twentieth Century, including Paul Hindemith and Arnold Schoenberg, also used mathematical systems to compose music. They, like Schillinger, were often criticized for doing so. Glenn Gould, the concert pianist, called their approach mathematical tomfoolery (Gutman, 2001-2003).

Igor Stravinsky (1882-1971) wrote in *Poetics of Music,* based on a series of Harvard lectures, that by limiting his choices he obtained unity out of chaos and became more creative. He wrote, “What delivers me from the anguish into which an unrestricted freedom plunges me is the fact that I am always able to turn immediately to the concrete things that are here in question. I have no use for theoretic freedom. Let me have something finite, definite…” (p. 64). It is comforting to note that even Stravinsky had trouble sorting through the infinite possibilities of music.

Joseph Schillinger died unexpectedly in 1943. Three years later, in 1946, Carl Fischer posthumously published Schillinger’s notes, accumulated during his years of teaching. The two volumes of *The Schillinger System of Musical Composition* were compiled by Schillinger’s friend Lyle Dowling, and by Arnold Shaw who later taught the first lecture course on the system at the Julliard School of Music entitled an *Introduction*

to the Schillinger System. The books comprise over sixteen hundred pages of a definitive approach to the creation of music including, but not limited to, the construction of melody, rhythm, harmony, counterpoint, and orchestration. They also include his theory of achieving pre-determined psychological effects. The system is based on pattern making by creatively using mathematics.

During his lifetime, as word of the system spread among musicians, bandleaders and composers, Schillinger became very much in demand as a teacher. His most famous student was George Gershwin. Charles Previn, a musical director, arranger, composer and conductor at Universal Studios from 1936 to 1944, wrote, "George Gershwin and I were friends from the very beginning of his career. In fact I conducted his first New York musical show, *La La Lucy*". So begins his narrative, relating the story of who first introduced him to the Schillinger system. He continues:

> One day on the train, I came upon George poring over what looked like algebraic and mathematical problems. "'What's this'", I asked him. "A new hobby?" "It's a hobby alright," he replied with a smile, "but it's also the most rewarding musical study I ever engaged in. It's Schillinger." To his friends and associates Gershwin was extremely generous in giving credit to Schillinger for his expanded resources, the product of four and a half years of hard study. But those years resulted in the composing of *Porgy and Bess*, which, after all, remains the best known folk opera today (1947, pp. 13-16).

Based on Gershwin's enthusiasm, Previn soon began taking lessons with Schillinger himself and credited much of his later success as Musical Director at Radio City Music Hall in New York to those studies.

While it is difficult to know how many composers studied seriously with Schillinger, and how much of what they learned was used in their music, Schillinger's notes listed the names of 92 students, including Oscar Levant, Benny Goodman, Tommy Dorsey, Glenn Miller, Alvino Ray and many film composers listed in the next chapter. Another student, Lawrence Berk, later started a music school in Boston called *The Schillinger House*[6.] He was forced to change the name due to an injunction obtained by Schillinger's widow, Frances. He added his son Lee's name to the end of his last name and thus we now have the *Berklee* College of Music. During its heyday, the Schillinger System for Musical Composition was taught in 40 different programs, some of them by individual teachers, and some at prestigious music schools like NYU, Julliard, and the Westlake School of Music in Hollywood. Many other composers and musicians, such as Eubie Blake and Frank Metis studied with Schillinger graduates, as did many film composers identified in the next chapter. Schillinger students came from diverse musical backgrounds and used the system to compose in diverse musical styles from classical to blues, jazz and rock 'n roll.

Henry Cowell, who wrote the preface to Schillinger's book, penned a number of letters to Schillinger's widow, Francis, that are archived at Friedheim Library, Peabody Institute of the John Hopkins University. He apparently was not only a good friend of Schillinger, but enthusiastically believed in Schillinger's system. In one letter he said, "I am devoted to the Schillinger system, and feel that anything I can do for it is not only a

6. A reproduction of a brochure Lawrence Berk used to promote *The Schillinger House* is found in the Appendix C

carrying of the great ideas of Joseph, but also a great boon to the musical world" (9-13-1945). In another of these archived letters, dated July 8, 1946, he tells Frances that he would be in New York to teach the Schillinger System at the "New School".[7]

Charles Stepney is a good example of someone in the field of popular music who successfully self-studied the system from Schillinger's books. He went on to become the songwriter, producer, and arranger for Minnie Ripperton, The Dells and Ramsey Lewis. However, he is best remembered as the "DNA" of the success of *Earth, Wind and Fire*. As their arranger, songwriter and producer, he was responsible for many of their gold and platinum hits. I was able to view a page from Stepney's personal Schillinger volumes that included his handwritten notes deciphering the system. It's a credit to Stepney that he was able to learn the system without a teacher.

Frank Metis, one of the leading music publication arrangers in New York, authoring 150 piano books as well as the 1959 hit song *The Enchanted Sea*, said in an article for the *Schillinger Society Newsletter*, "Many, many years ago, [I was] a fresh young arranger who had just completed a four-year study program of the then popular *Schillinger System of Musical Composition* at New York University" (2008).

While attempting to validate Schillinger's system it is important to examine the diverse viewpoints regarding whether he was an innovative genius, as his students declared, or a simply a "good salesman", as his critics claimed. Those composers who

7. The New School's official name was The New School for Social Research. It was founded in 1919 by progressive New York academics. It currently has an enrollment of 9,300 students and hosts the prestigious National Book Awards.

took the time to study and understand Schillinger's system were, like Cowell, exuberant in their praise. However, there were others who had a different opinion. During his career and after his death, Schillinger's system was attacked by those in the musical establishment who, apparently, did not take the time to study or understand the system. They felt that Schillinger's system was pedantic and antipathetic to musical inspiration.

An example of this kind of attack is in the New Grove Dictionary of Music. One of Schillinger's detractors, Claude Palisca, identifies "some interesting flashes in Schillinger's work" and goes on to say that much of it has been "properly discredited for its lack of vigor and misuse of mathematical terms" (Nauert, 1994, pp. 9-34). What Palisca probably didn't understand was that Schillinger re-purposed certain mathematical symbols and terms to make them more useful to his system. Like any new language, once understood they present no problem to a student and are an asset to the study of the system. This reaction from the musical establishment is reminiscent of the reaction Schoenberg received when he developed his twelve-tone system of composition.

Another example of this kind of attack was written by Elliot Carter and quoted in *A Guide to Research* by John F. Link (2000). In this review of Schillinger's *System of Musical Composition*, Carter disdains the book's "violent invective, dogmatic assertion, repetition of ideas and phrases, and a certain megalomania" which came "straight out of middle Europe in the early twenties, when the application of a mechanistically conceived scientific method to the arts was all the rage" (p.156). On the other hand, he admired the system for being "the most comprehensive tabulation of musical elements, devises, and procedures that probably has ever been made". Reading between the

lines, Carter's review may give some insight into the diverse reactions to Schillinger's work. The first part of Carter's review was almost completely subjective—an emotional reaction, while the later part of the review was objective. It would seem that Schillinger stepped on a lot of egoistical toes with his system and his personality. Also, one must remember that the investment of many years in the mastering of a traditional discipline can result in an inertia that resists radical change. It's unfortunate that that so many of Schillinger's critics reacted so subjectively, not having the objectivity to add a caveat, similar to the one in Carter's review, to their critique.

Meanwhile, those who mastered the system found it creatively liberating and were highly successful in its application. Of course, the system could be used to write either good or bad music. That was, after all, up to the creative prowess of the composer. Schillinger says on page 1356 of his two-volume book:

> My system does not circumscribe the composer's freedom, but merely points out the methodological way to arrive at a decision. Any decision which results in harmonic relation, is fully acceptable. We are opposed only to vagueness and haphazard speculation (1941).

Donald M. Ferguson said in *A History of Musical Thought*, "Genius is the agent, not the source, of such creations" (1935, p. v). I would suggest Ferguson was saying that artists are *portals* of creativity not the *genesis* of it. I would add that genius is in recognizing the tools inherent in the structure of the universe, in this case mathematical patterns, and using them creatively. I would argue further that all creativity flows from a greater source than any individual artist, and is translated into a form based on the

discipline of the translator, and the degree of mastery of the mechanics of that discipline, be it visual art, music or poetry. In other words, we don't create anything. We are simply the conduit for that creativity, and are usually that conduit by default. Adding to this thought is a quote from Aaron Copeland who said, "Inspiration may be a form of super-consciousness, or perhaps of sub- consciousness. I wouldn't know. But I am sure it is the antithesis of self-consciousness" (nd).

Schillinger was involved in many innovative endeavors. Along with Leon Theremin he developed the first "drum machine", the Rhythmicon. It was commissioned by Henry Cowell and paid for by Charles Ives. It had over 65,000 polyrhythmic possibilities (Brodsky, 2003). Further, he developed his Psychological Dial, the centerpiece of my thesis, to be a didactic aid for film composers to use to compose music that would elicit specific and predictable emotional responses from a movie audience. The Psychological Dial is described in detail in Chapter Five.

Schillinger's course was designed to take four years to complete and was taught either in person or through the mail. The cadre of successful composers who either studied directly with Schillinger or were second generation (students of students) includes a number of film composers who will be discussed in the next chapter. They used two components of Schillinger's system, the mathematical approach to the pattern making of musical phrases and the Psychological Dial, which is explored in depth in the next chapter.

Chapter Five

If I were not a physicist I would probably be a musician.

I see my life in terms of music. Albert Einstein

Schillinger's Psychological Dial

In most cultures, music is not only an aesthetic expression but also an expression of specific emotions to which a listener responds. As such, it is a language of emotion. As indicated in the quotation below, both Schillinger and Ferguson believed that there was a definite connection between music and the emotional responses it evokes. While Ferguson recognized these connections, he may have been unsure of their causality. Schillinger took things a step further as he began to codify the specific mechanisms used to express emotion, the actual grammar of the language of music. In a speech given by Schillinger in the late 1930s, he quotes Donald M. Ferguson as saying:

> If music is actually expressive, its patterns must be more than purely musical designs. They must somehow appear as patterns of emotion itself, or at any rate as somehow related to knowledgeable facts of emotional experience…I believe, indeed, that psychology is doubtful of the possibility of absolute musical design. For (sic) musical patterns are conceived and apprehended by the same mental powers which correlate other than musical objects.

Schillinger's simple and logical explanation of why music affects emotion is found in Book One of the *Schillinger System of Musical Composition.*

> Judgment based on mechanical [sensory] experience and mechanical orientation leads higher animals and human beings to certain expectations. In the case of absolute correspondence between the realization of a mechanical process and the expectations, the resulting reaction is balance (normal satisfaction). A result above expectation stimulates the intensification of activity (positive reaction) and at its extreme, ecstasy. On the other hand, the result of a mechanical process which is below expectation stimulates passivity (negative reaction) and at its extreme, depression. The two opposite poles of reactions brought to their absolute limit, stimulates astonishment (irrational or zero reaction). [Parentheses in original text.] (1949, p. 280).

In other words, when we anticipate and then achieve the anticipated result, we experience a state of emotional balance that is not especially positive or negative. However, if we fall short of the expected result, we feel a negative emotion. If the results are greater than anticipated we experience a more positive emotion. In the same way, when a particular musical result is anticipated and the motion of the music takes us there, we are in emotional balance, a neutral zone that is emotionally neither negative nor positive. If the musical motion leads to a place that is less than anticipated, we experience a negative emotion and we are "let down". Inversely, if the motion of the music leads to a place greater than anticipated, we feel a positive emotion, and we are uplifted.

A 2009 article in *Scientific American,* entitled "Why Music Moves Us" says that what we feel when listening to a piece of music is remarkably similar to what everybody else, listening to the same music, experiences (Schrock, 2009). Two recent studies

show that music can be a common language of emotion generally recognized by people from diverse cultures and ethnicities, even when they have no prior exposure to the type of music used in the study. One study asked if people could identify the intended emotion in music, even when it was written in an unfamiliar tonal system. In this study, thirty Western listeners rated the degree of joy, sadness, anger or peace in twelve Hindustani raga excerpts. Results show that the listeners were sensitive to the intended emotion of the music in three emotions, joy, sadness and anger (Balkwill, 1999). [It seems a shame that peace cannot seem to be translated across cultures as easily as the other emotions.]

Another study investigated the ability of the Mafa, a people, living in a remote area of Cameroon, Africa, to recognize happiness, sadness and fright in Western music. In this study the Mafa participants paired musical examples with pictures of faces exhibiting these emotions. They chose the intended emotion at a rate greater than chance. The reverse test was done with Western subjects, listening to Mafa music, with similar results (Fritz, et al, 2009).

The Psychological Dial is a tool that gives a composer, using the Schillinger system, guidelines as to the direction, angle, and speed of melodic configuration in order to depict specific human feelings musically. Furthermore, as I will argue in this chapter, the Dial can be used to create musical images to induce specific and desirable emotional responses in music therapy settings.

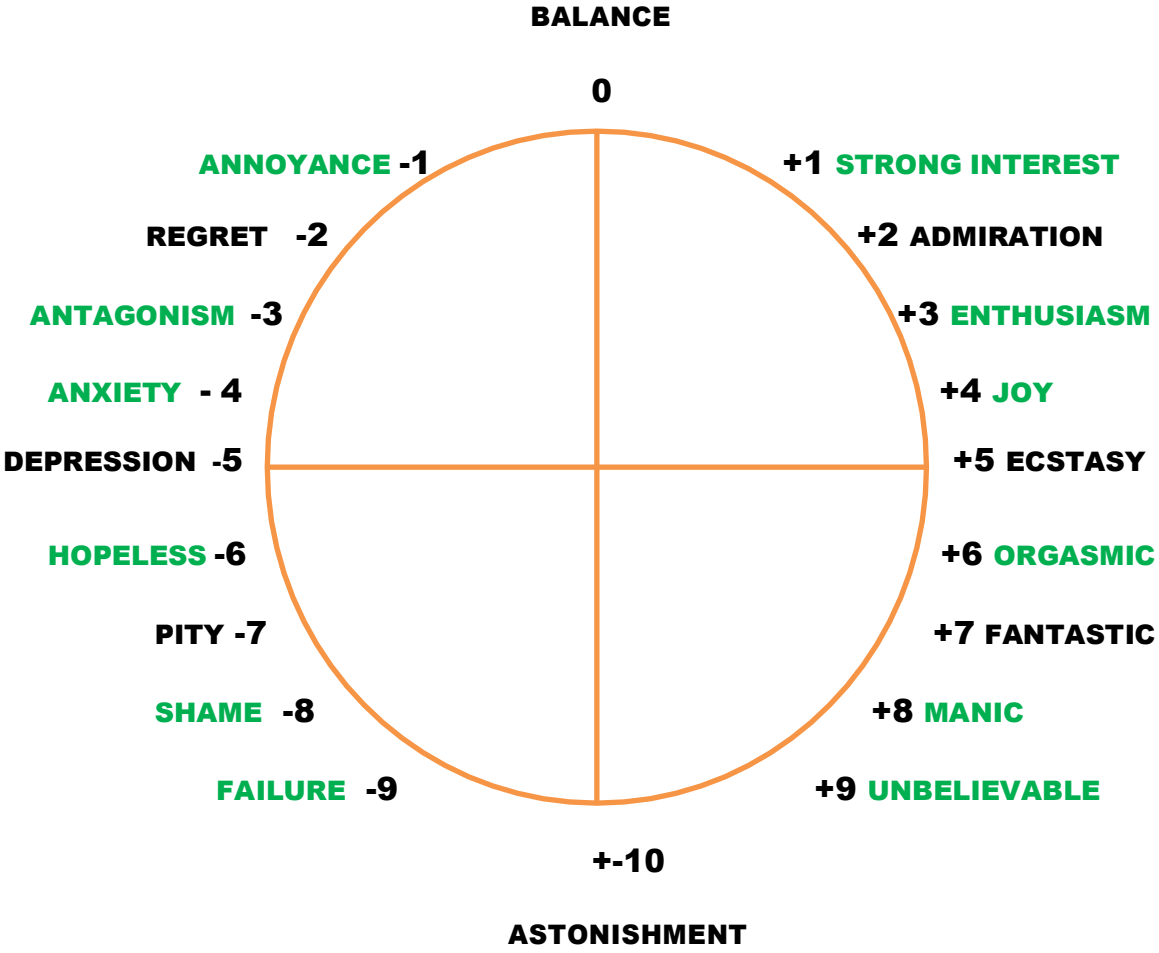
Before moving on to Schillinger's Psychological Dial, seen on page 44, it's important to understand that the dial represents a continuum of emotion from the neutral

balance point at the top of the dial to increasingly intense emotions, both on the negative and positive sides, as one continues around in either direction. The positive and negative numbers show the relative intensity of emotion, “0” being the midpoint between positive and negative intensity and “10” being the ultimate intensity. Moving around the Dial, -5 is more negatively intense than -3, and +5 is more positively intense than +3. The emotions in black are Schillinger’s entries; I have added the emotions in green to fill out a full range of emotions since Schillinger included only a few on his dial. While my entries are subjective, it is my hope that it will help to demonstrate how the emotions grow in intensity as one travels either clockwise or counter-clockwise from the “0”. My entries are interpolated between the emotions Schillinger included and they are intended to indicate where other emotions might be located. For example, the emotion “annoyance” is found on the negative side between “regret” and “balance”, probably closer to the balance point. “Fear” is indicated between “anxiety” and “depression”. On the positive side, “enthusiasm” can be found between “balance” and “ecstasy”. The choice of terms I used to label the Dial is highly subjective in nature, as I’ve already indicated. It is not particularly important what labels are used. As we will see in future chapters, the goal of the therapy I am positing is not to pinpoint a *specific* emotion, but rather to *move* the patient as far as possible in a clockwise positive direction. For example, the goal is to nudge a pre-surgery patient from a negative emotional state of anxiety to a more positive, relaxed state somewhere clockwise of the “0” point on the Dial. However, any positive movement would be beneficial to the patient, and therefore be considered a successful result. On the following page is my version of the Psychological Dial.

Figure 1

SCHILLINGER'S PSYCHOLOGICAL DIAL

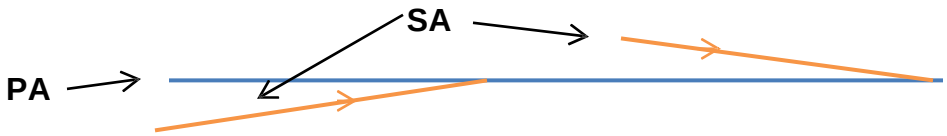
I developed this version to facilitate understanding. Schillinger's original version is found in Appendix E.



There is balance at the "0" point where emotion is neither positive nor negative. Moving in a clock-wise direction from the "0" point, emotions are increasingly positive, while those found moving in a counter-clockwise direction are increasingly negative. Emotions in black are from Schillinger's version of the Dial. I added the emotions in green to fill out the Dial. Please note that this is a very subjective action on my part and the emotions selected are arbitrary entries. The reader may have their own examples to fill in the various positions that may more accurately represent to them the increasing intensity of the emotions, positive and negative. The lower two quadrants of the Dial contain exaggerated versions of the emotions in the upper two quadrants, and for all intents cancel each other out as they reach their ultimate expression at +-10.

Translating the Dial into music

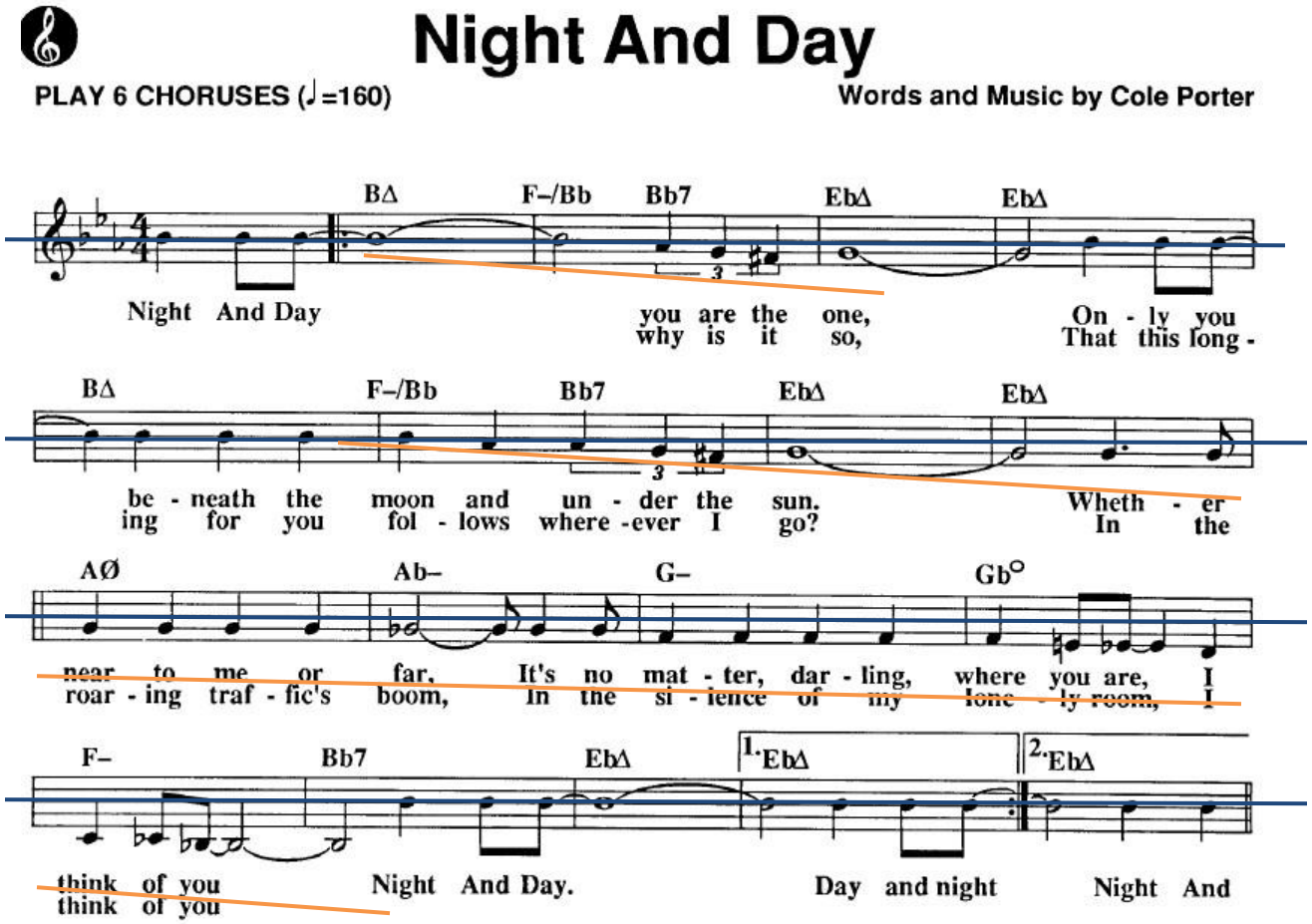
It's important to start by defining a few of the terms used in describing how the settings on the Dial are incorporated into the writing of music. The *primary axis* (PA) is a horizontal line drawn through that note in a musical score that has the most accumulated duration in a particular phrase of music, quite often it is the tonic[1] of the key, but it can be any note in the scale being used. The *secondary axis* (SA), as defined by Schillinger,is a line showing the general angle the melody is taking, melodically moving either toward or away from the primary axis. The following diagram illustrates the relationship Schillinger saw between the primary axis and the secondary axes. The primary axis is in blue and the secondary axes are in orange. The orange arrows show the direction the melody (SA) is moving relative to the PA. Black arrows point to the PA and SAs.



Movement *toward* the PA, either descending from above or ascending from below, is considered negative motion and creates a negative emotional effect. This correlates with Schillinger's theory that when we receive less (in this case *hear* less) than we anticipate, we experience a negative emotion. Meanwhile, movement *away* from the PA, either ascending or descending, is considered positive motion and creates a positive effect. In other words, the outcome of what we experience is greater than what we anticipate. The further away from the balance point on the dial that an emotion is

[1.] The tonic of a musical phrase is the note that describes the key the music is in. For example in the key of C, the tonic would be C. If the music were written in the key of B flat, as in the example below, the tonic would be B flat. The tonic is also the "do" in "do, re mi," etc.

located, the steeper is the corresponding angle of the SA (melodic line), either toward the PA (in negative motion) or away from the PA (in positive motion) as seen in the examples which follow. In the example below, a horizontal blue line drawn through all the B flats (the notes on the middle line of the staff) would be the primary axis (PA). The orange line that continues to below the fourth line of the staff is the secondary axis (SA).



The “0” point on the dial, that Schillinger describes as “balance”, represents very little motion. A melody written at this level would not move, relative to the PA, very far or rapidly in any direction. However, a melody written from the emotional perspective of ecstasy, +5 on the dial, would move fairly rapidly *away* from the PA; while one written

from the emotional perspective of depression, the -5 point, would move just as rapidly *toward* the PA. If duplicating an emotion even further around the Dial such as pity or a sense of the fantastic, the trajectory of the melody would move toward or away from the PA at an even greater angle and/or speed. “Astonishment”, at +-10 could be considered to be either positive or negative, as it represents the ultimate expression of each. It would require the greatest angle and/or speed of the melody line. While the two bottom quadrants of the dial are not relevant to the therapy I am positing, they are extremely interesting. It is possible that music written from this perspective on the dial would be a combination of positive and negative motions that could potentially cancel out one another. However, I would defer any further examination of this phenomenon to others for research and/or philosophizing.

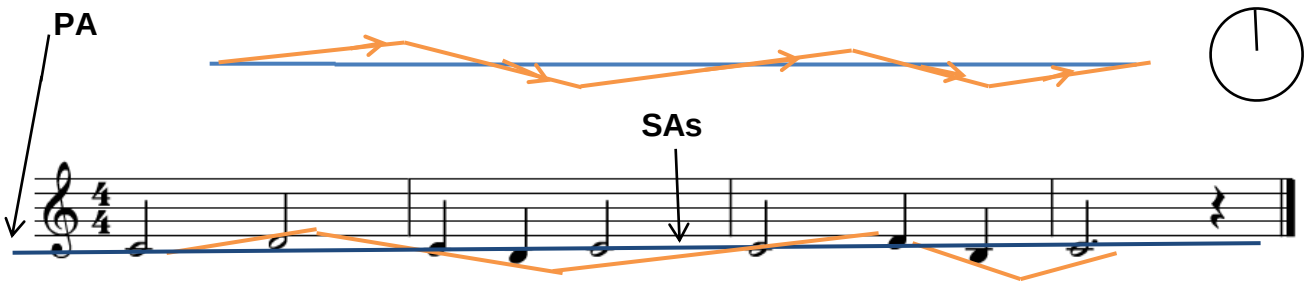
In his book Schillinger presents various scenarios to illustrate the different emotional stations represented on the dial. I have included my own scenarios, most of them actual experiences from a recent trip to Europe, modeled after those in his book, along with diagrams Schillinger uses in his courses showing the appropriate projection of a melody (secondary axis) relative to the *primary axis* of a phrase of music. They correspond to the major points on the dial, both positive and negative. The horizontal line represents the PA, while the line moving either away from or toward the PA represents the SA, or general direction of the melody. Included with each diagram is a miniature Dial marked with a line at the point signifying the approximate emotion the diagrams represent. The diagrams showing the projection of the secondary axis from the primary axis represent an approximate direction and trajectory, either toward or

away from, the PA. Notice again that in the diagrams and accompanying music a primary axis is in blue and the secondary axes are in orange.

The following are the examples of actual and hypothetical experiences from our European trip illustrating how the emotions generated by those experiences would be diagramed using the Dial. The short musical phrase demonstrate how a composer might use that setting in the construction of a melody. They were written for illustrative purposes only, and they do not exemplify the development or length of a musical phrase or phrases needed to establish an intended emotion. One of the questions that this investigation has precipitated is how long a phrase needs to be to elicit a desired emotion. This is one of several questions for future studies.

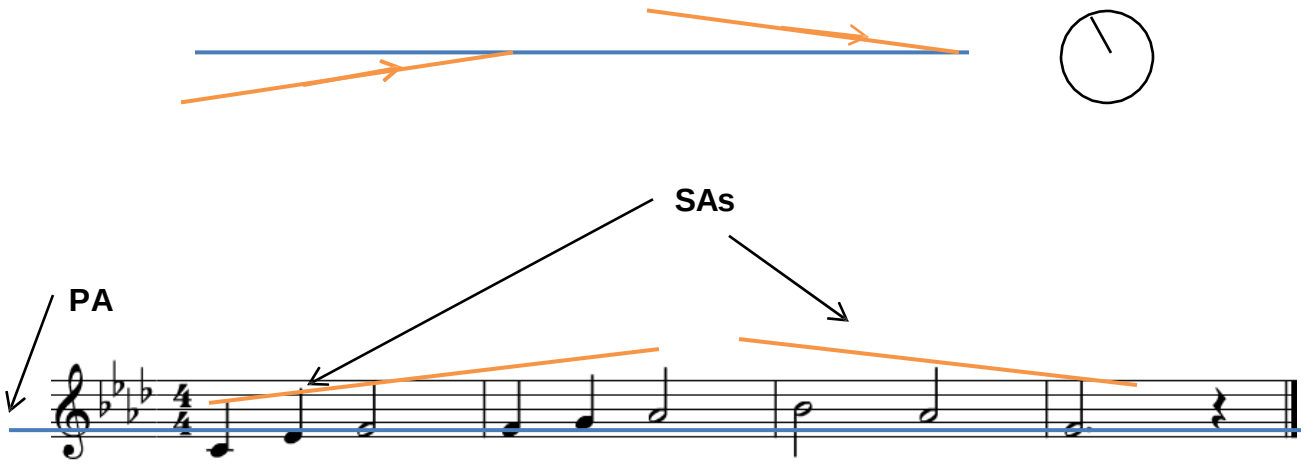
Balanced Emotion

As my wife Nancy and I began to understand the Metro and other rail systems in Europe, we anticipated arriving at our desired destinations and usually did so. This experience would correspond to “satisfaction” at the “0” position on the dial and very little melodic motion would correlate with this experience. A depiction of the relative trajectory of the melody (SA) in orange, from or towards the primary axis (PA) in blue, along with a line drawn at the”0” position on the accompanying dial is represented below. There is very little motion away from or toward the PA.



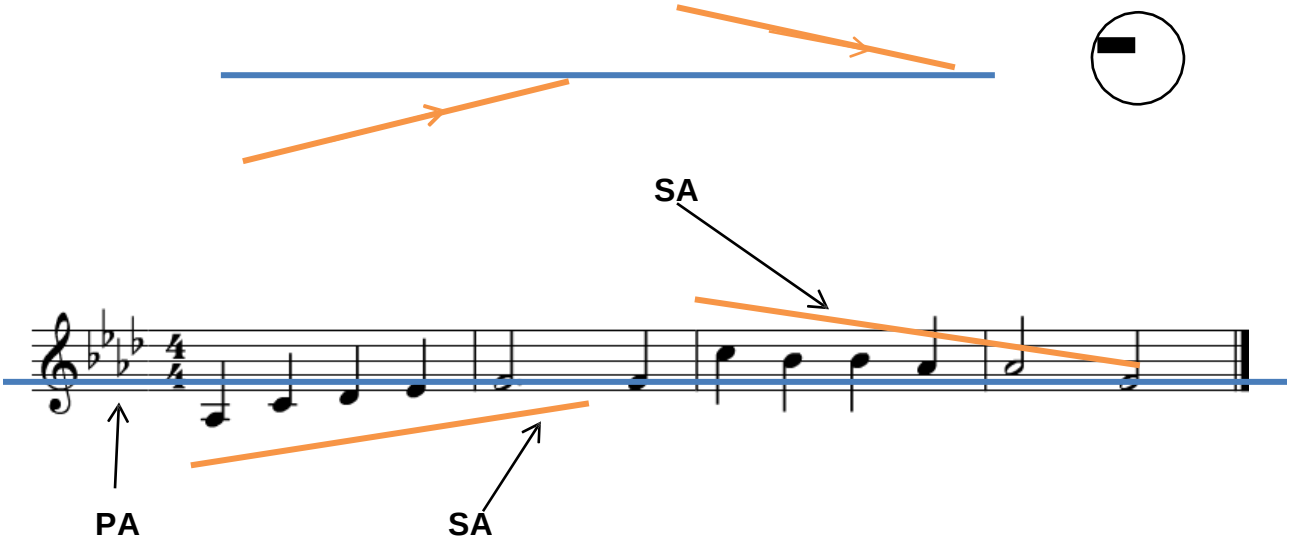
Upper left quadrant of the Dial: negative emotion

However, one day we became confused and missed our stop. We had to walk quite a way to our hotel. This annoyance could be represented as a point slightly counterclockwise from the “0” position on the dial, as shown below. Notice that, in all the next examples, one line moves toward the PA from below and one from above. This illustrates that it doesn’t matter whether the melody originates from above or below, it can be written either way, or with a combination of the two movements, as long as they move toward the Primary Axis. Also, notice the position of the line drawn on the accompanying dial.

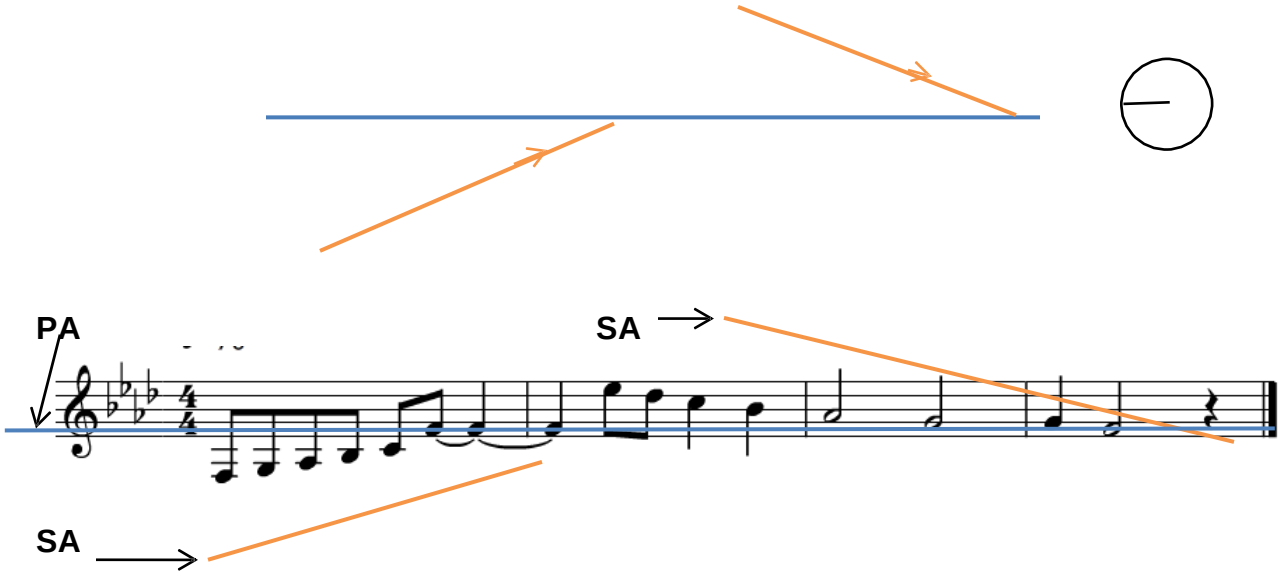


Another time, on a day trip to Montserrat, a monastery high on the side of a mountain, we had received poor directions and got off at the wrong station. We were unhappy because we had carefully followed the directions we had been given at our hotel and still ended up in the wrong place, and we were having difficulty finding someone who could direct us to the correct station. We had to wait 45 minutes for the next train and we were very upset, which probably moved our emotional state even

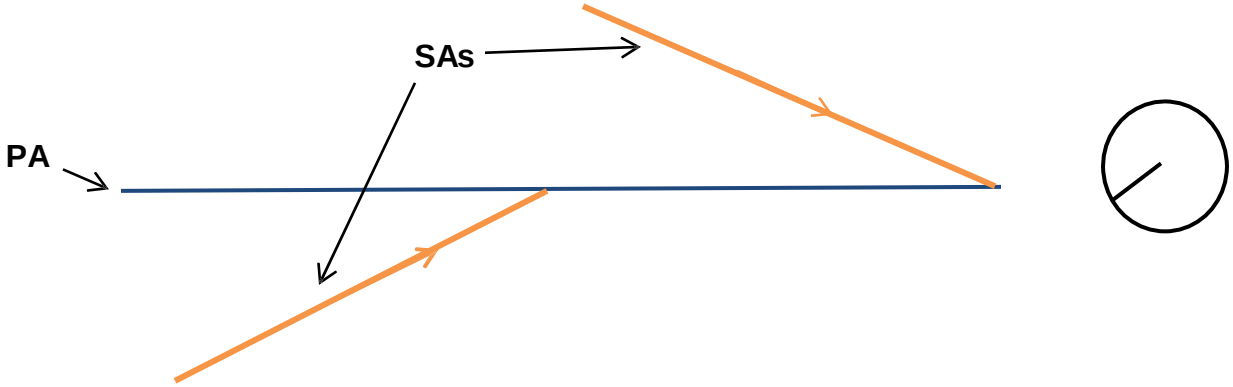
further in a counter-clockwise direction, to somewhere between “regret” at -3 and “depression” at -5.



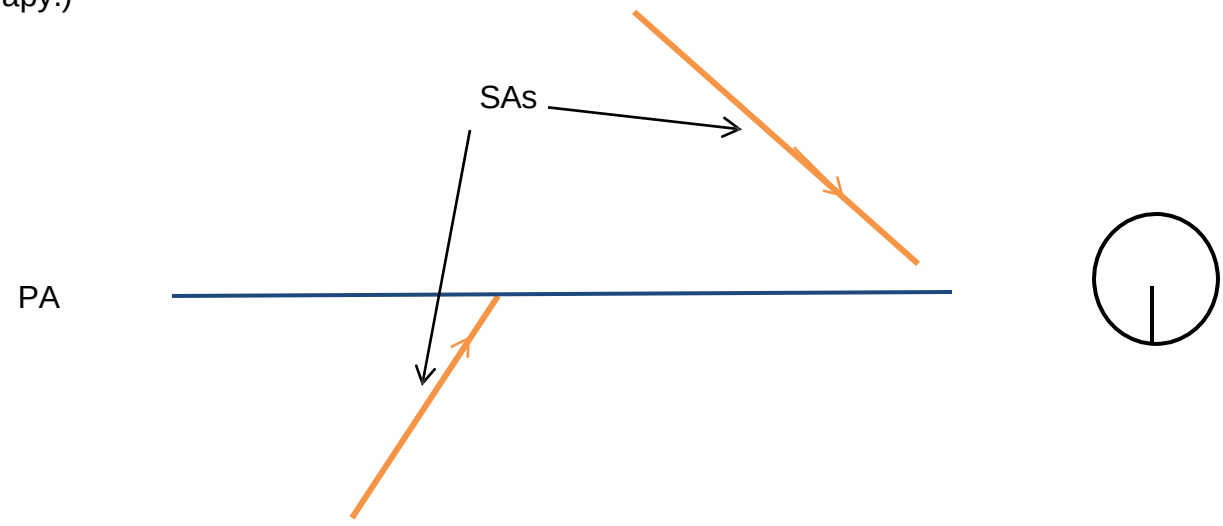
It got worse when we first attempted to use one of our credit cards to purchase rail tickets. The card was refused. The majority of our funds were in that account so it was quite “depressing” (the -5 point on the dial).



In a hypothetical scenario, if we had been away from our hotel, lacked funds to get back and no one we approached for help spoke English, we would have been past the state of “depression”. Because this is past the point I would use in the therapy I am positing, I have not included a musical insert. The diagram for this hypothetical scenario, however, would look like this:

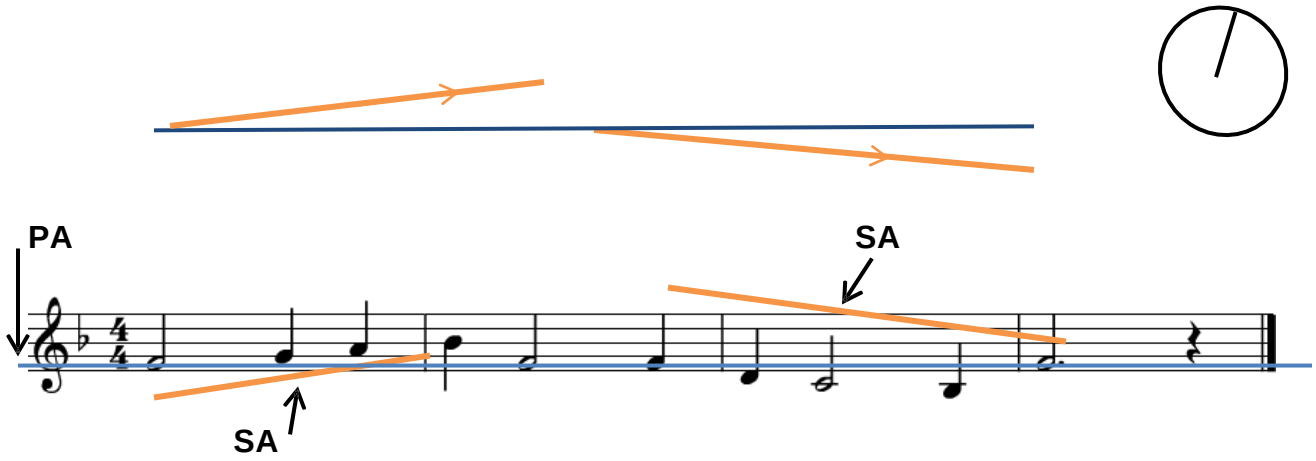


In another hypothetical situation, if pickpockets had stolen our wallets and passports while we were looking for help, we would have been close to complete “apathy” and “inability for any corrective action”, very close to the -10 point on the dial. To depict this emotional tone musically, one might use this trajectory of melodic motion: (Note: Again, no music inserted here as this is beyond what I would use in music for therapy.)

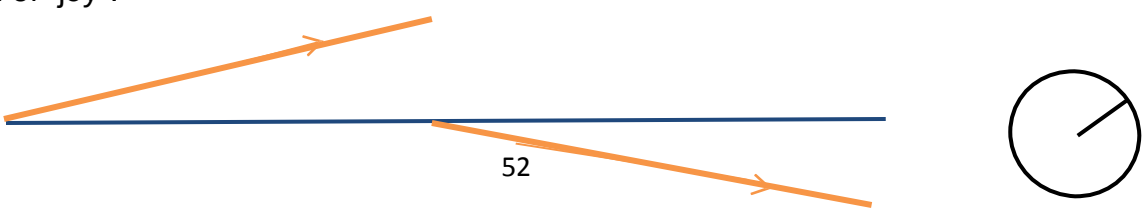


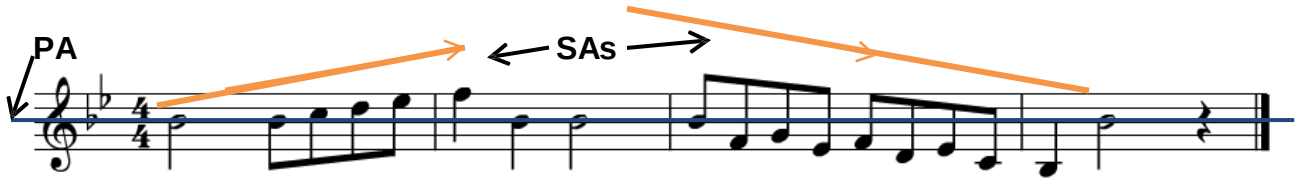
Upper right quadrant: Positive emotion

In actuality, we were at our hotel when the card was refused, so the situation wasn't too bad. We used the Skype connection on my computer to call the bank. They authorized the card for Europe, which they had failed to do on two previous requests, and we purchased our tickets to Paris. Now we were rather pleased with ourselves. This moved us a bit into the positive side of the dial, somewhere between "balance" and "strong interest". Notice that on the positive side of the dial the secondary axis moves away from the primary axis, either in a downward or upward motion or both and that the accompanying dial now has the lines drawn on the positive side.

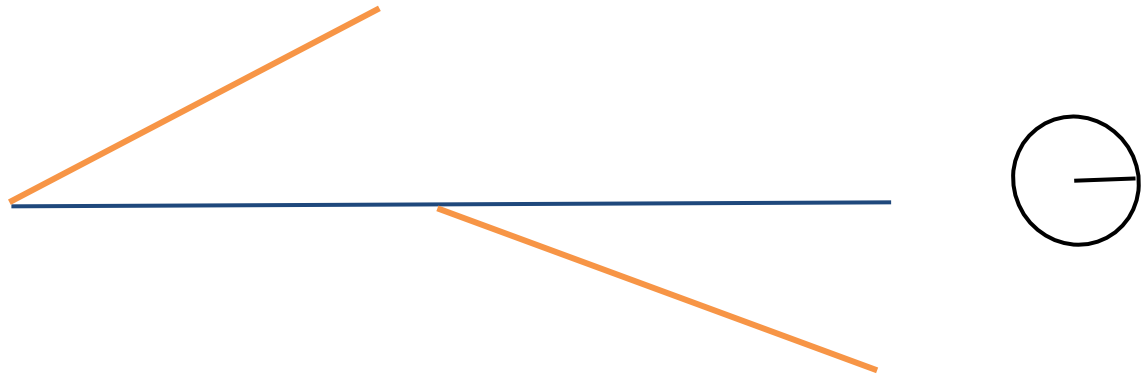


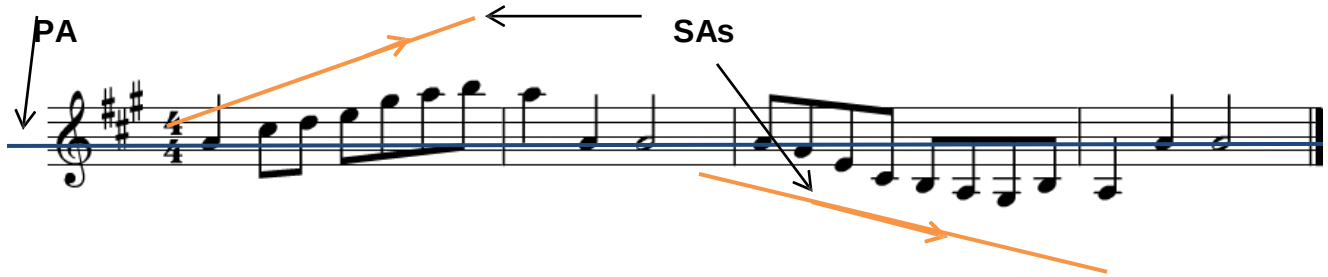
Sadly, no part of the trip moved us all the way to "ecstasy". However, if the train conductor had offered to upgrade us to first class with complimentary wine and snacks, we would have moved further around the dial in a clockwise direction, perhaps to the +4 position of "joy".



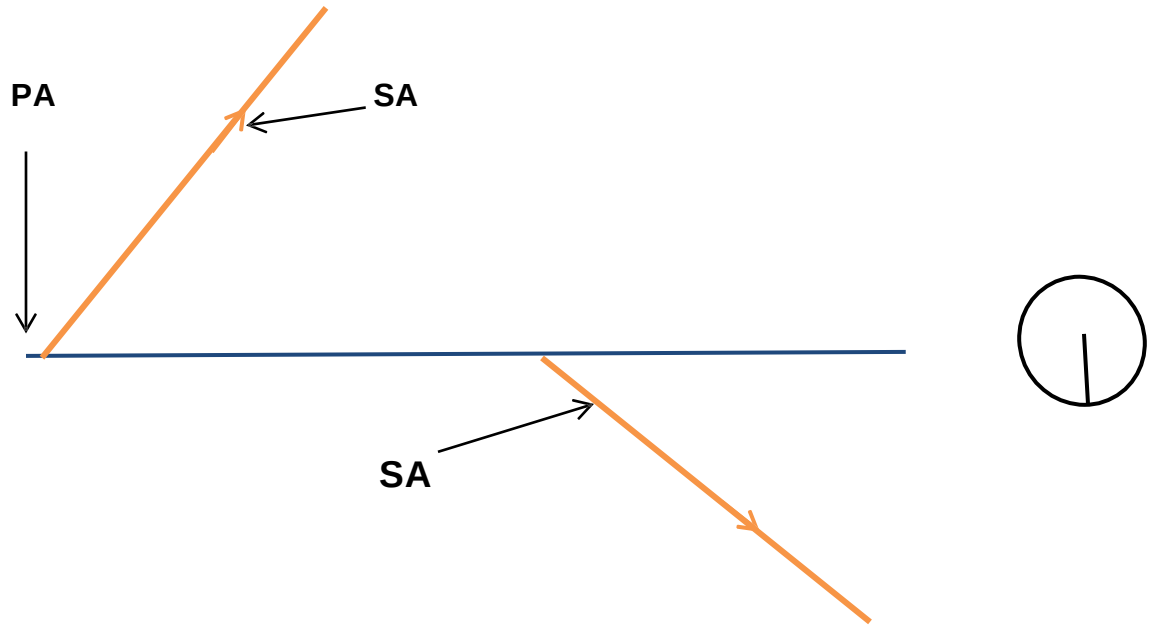


If, upon arriving in Paris, we were greeted by a brass band playing the *La Marseillaise*, and were informed that we were the 10 millionth couple to visit the city, thereby winning a brand new Citroen (delivered duty free), along with a lifetime supply of chocolate, wine and every Edith Piaf recording ever made, we would definitely be over the top! This would put us at the +5 position of “ecstasy”. (This is definitely hypothetical.)





We would have been astonished to learn that we were also given French citizenship and an annual tax-free stipend of €200.000. That would definitely have been close to “astonishment” or “unbelievable” at the +10 side of the dial. For this I would compose music using the following movement of the melody line. (Again, no music inserted here as this also is beyond the range used in my thesis.)



Other components of music: adjuncts to melodic motion

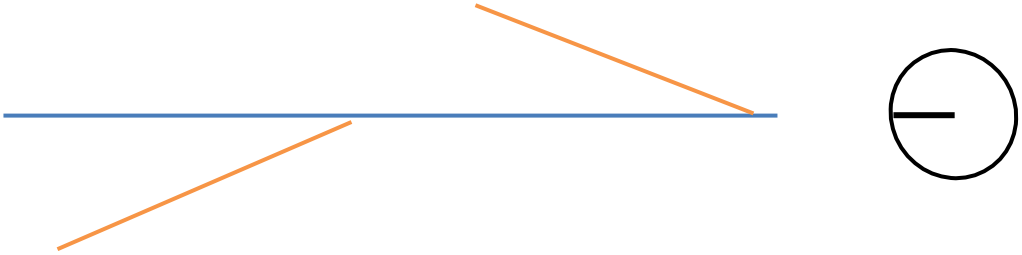
My thesis is primarily concerned with melody, as per Schillinger, and rhythm, as per shamanistic entrainment. Melody and rhythm can be said to be the two main components of music, however there are other components that add “spice” to any music. Schillinger included material on the use of rhythm, harmony, register[2], dynamics[3], and timbre[4] of the instruments to reinforce the emotion elicited from the

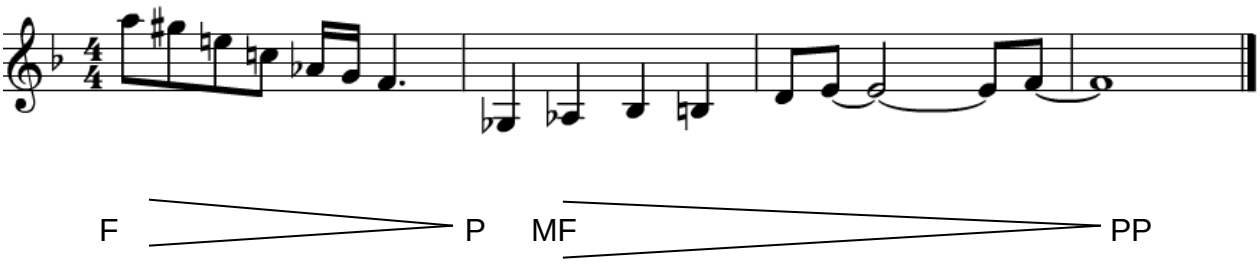
melodic motion of the music. The section of the Schillinger system devoted to the Psychological Dial offers direction on how to use these other components to best support a melody, and elicit the most desirable emotional response from the listener. I have been challenged in finding a way to explain these concepts, in terms that are understandable to a non-musician reader, because Schillinger not only uses musical language, but musical language that is defined differently from that of most musicians. One night however, I woke up having had my second voilà experience regarding this thesis. I realized I could use the same diagrams that I used to illustrate melodic movement to also illustrate these other components. For example, if we were to explore how dynamics, the loudness and softness of music, could be used to support a particular melodic and rhythmic movement, say in balance, we could use the balance setting of the Dial to show very little variation in this component. The music would start at a medium volume and remain there. If, however, we wanted a strong negative use of dynamics, we would have a lot of motion from quite loud to quite soft as per the following diagram, where “F” is Forte or loud, “MF” is Mezzo-forte or moderately loud, “P” is Piano or soft, and “PP” is Pianissimo or very soft.

[2]*Register* is an area of the musical range of an instrument. On a piano keyboard, *register* means the area of the keyboard the music is played on. Typically the left hand plays in the lower register and the right hand plays in the higher register. The middle register can be played with either hand.

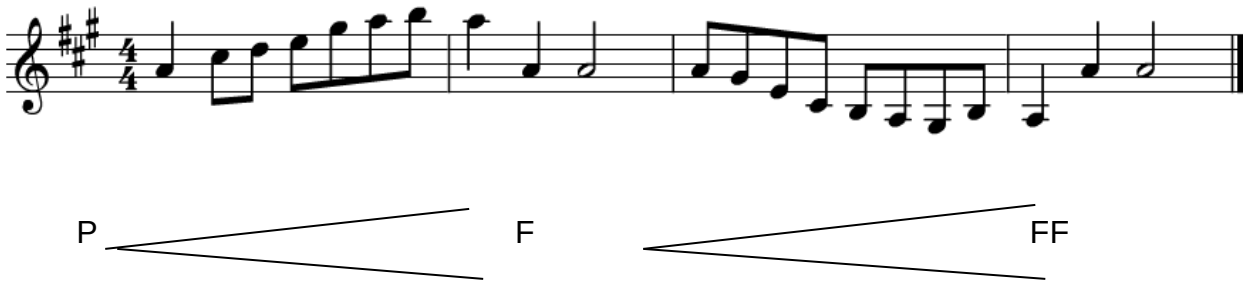
[3] *Dynamics* refers to the loudness or softness of the sound, and how that changes throughout the music.

[4] *Timbre* refers to the quality of a musical sound resulting from tonal qualities rather than pitch or volume. It plays a role in the unique sound of the various musical instruments and helps us to identify them. A violin has a different timbre from a flute, though they may be playing the same pitches.





Conversely, when composing a positive melody one could start the sound relatively softly and increase to loud or very loud at the end of the phrase, as shown in the following diagram. In the music example, “FF” indicates Fortissimo or very loud.



Similarly one can use the same logic in designing every other element of the music. In composing for negative emotional results the more intense the emotion the more intense is the change of a component, e.g., the more intense is the speed of the notes, the greater is the range of the melody, the more tension in the accompanying harmony, the more edge to the tone quality of the instruments used, the lower the

register of the music for negative emotional intent, and the higher the register for positive intent, etc.

However, the lay-reader does not have to understand very much of the complexities of Schillinger in order to see the benefits of the use of his system in conjunction with entrainment as a viable music therapy. Further, a composer needs only to learn parts of the Schillinger material to begin to integrate it into his or her composing style and benefit from the information studied. However, to really understand the total Schillinger system requires several years of consistent study. George Gershwin is said to have spent four years studying with Schillinger, sometimes as often as three times a week, learning what he wanted from the system (Previn, 1947).

Chapter Six

Schillinger in film music

A film is, *should be, more like music than like fiction.*

It should be a progression of moods and feelings

Stanley Kubrick

Recognizing that composing film music was a lucrative and expanding field, a number of Schillinger's students migrated to Hollywood. In this new and competitive environment they soon discovered that using the Schillinger system gave them a definite advantage. The system's mathematical approach to pattern making of musical motifs[1] expedited the creation of music. This was a very useful tool in the atmosphere of pressure and time restraint that was typical of film production. It also was an expedient means of working through writer's block. Most importantly however, these composers realized that using the Dial gave them a yardstick to employ in crafting music that would support and disambiguate the action on the screen. With the Psychological Dial, they had a tool that allowed them to write music that evoked the specific emotional response required for a particular movie scene. The Schillinger system gave them a competitive edge and freed up their creative potential.

In his article, "Schillinger's influence on film music," Charles Previn extols the value of Schillinger's Psychological Dial for composers wishing to match their music to the desired emotional tone of a movie scene. "The Psychological Dial avoids the 'catalogue' approach to the problem. Instead Schillinger presents a set of general laws governing

[1] Motif: A recurring fragment of music or succession of notes.

the relationship of sound and emotional response" (1947).

As an example of how music sets the emotional tone in a film, imagine a movie scene in which two lovers are kissing at the train station. Are they parting forever? Or is one of them simply going into the city for a day of shopping? Or perhaps there is a villain lurking in the shadows waiting to murder one of them. The film score can supply emotional information about these questions even before they arise. If the background music is appropriate and well written, the audience has some idea about what is going on without being told. An ordinary goodbye kiss might be written with very little emotional content, perhaps close to the balance point of the Dial. If it were the lover's final farewell, the music would be almost at the "depression" point on the dial. If there were a killer around the corner, the music would be designed from a point even deeper into the negative lower quadrant of the dial. From the music we would extrapolate important emotional clues as to what was happening, or was about to happen, on the screen.

Film composers who studied the Schillinger System

The list of composers who were also Schillinger students included some of the most prolific and successful writers of music for film and TV. To a large degree their success was based on their ability to elicit specific emotional responses from the film audience that enhanced the emotional impact of the film, as I intend to show later in this chapter. I believe this capacity to move an audience toward a predetermined emotional state, through the use of music written using this system, would be transferable to healing in therapeutic settings.

For over twenty years Franklin Marks wrote music for Disney Movies and TV. My friend and Schillinger historian, Lou Pine, provided me with a copy of a handwritten letter written by Marks in 1975 to a man, identified only as Mr. Renn, in which he discussed his study and use of Schillinger's system.

> It was Glenn Miller who advised me to study with Schillinger in the 30's when I was staff arranger at NBC and found myself going stale writing the same stuff over and over. At the time, Gershwin was writing Porgy and Bess with Schillinger's help… I've never been at a loss for musical ideas, especially fitting music to dramatic action. I consider that subject [the Psychological Dial] the best part of his method (1975).

John Barry, another Schillinger student, has numerous film credits including *Born Free*, *Out of Africa*, *Dances with Wolves* and the music for many of the James Bond movies. In an obituary written shortly after Barry's death in 2010, Robert Mathews wrote:

> But what few of the obit-writers mentioned was Barry's use of a technique for musical composition that attempts to put the ineffable qualities of music on a scientific basis. It was devised during the 1920s by a Russian composer named Joseph Schillinger, who believed that the emotional content of music could be analyzed objectively (p.1).

He went on to say, "Barry himself used Schillinger's method to pen the double Oscar-winning theme to the 1966 film Born Free in just 10 minutes."

Leith Stevens also studied with Schillinger. His work included composing the music for the original 1953 version of *The War of the Worlds* and *The Wild One* as well as teaching film scoring at UCLA between 1960 and 1965. A *Journal of Film Music* article quoted Stevens as saying, “Studying with [Schillinger] was the most exciting part of my life” (Rosar, 2006). These studies took place between 1932 and 1935. However, it is interesting to note that by 1940 Stevens had seemingly forgotten Schillinger and in his later years began to imply that he had developed the system himself, although his notes were virtually identical to Schillinger’s (Ibid). In 1940, a *New York Daily Mirror* article quoted Stevens touting a book he was writing about a “new mathematical system” and bragging that, “This new mathematical theory is so practical that Glenn Miller, Artie Shaw, Mark Winslow, and other famous band leaders are using it.” Of course my research has shown that, by their own words, these bandleaders studied with Schillinger, not Stevens. While teaching at UCLA, Steven never mentioned or credited Schillinger for this “new mathematical system”. It seems that plagiarism was alive and well with Stevens.

This also raises the question of why, after his death, Schillinger became an almost forgotten man, even while his system was successfully used by so many composers. Perhaps the fact that he was a product of the Soviet system had something to do with it. After Senator McCarthy’s witch-hunt in the early 1950s, a number of Hollywood producers, directors and perhaps even composers were “black listed” because they were accused of being socialists. At that time, it may have seemed prudent to distance oneself from anyone like Schillinger who had ties to Russia.

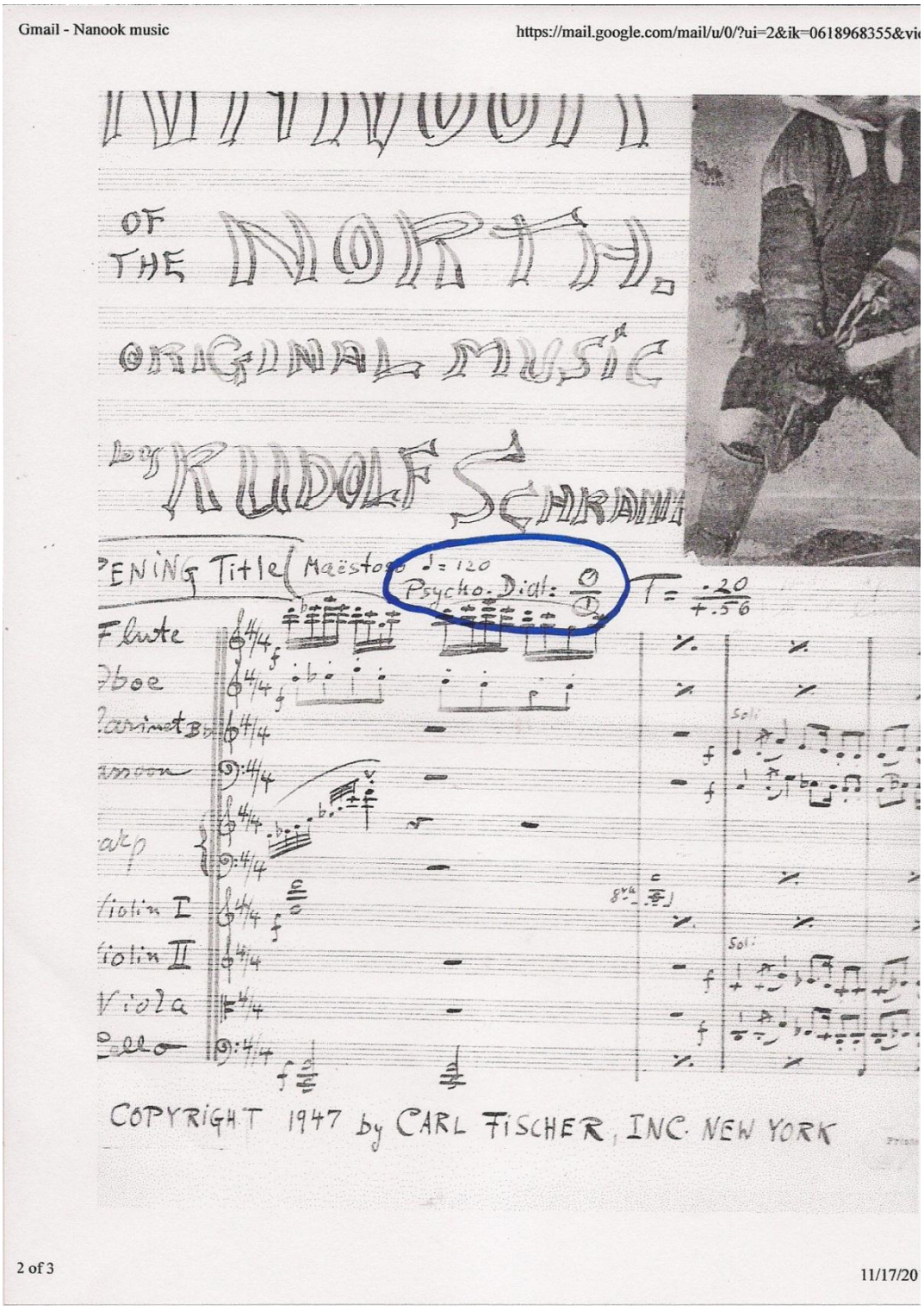
However, this theory is conjecture on my part. Fortunately, there were a number of composers who had already publicly recognized Schillinger's contribution to their work.

There now appears to be a resurgence of interest in the Schillinger system, due in part to a small, but dedicated, group of Schillinger devotees from Australia to Europe among whom I am pleased to count myself. Perhaps a side benefit of this thesis will be to encourage scholars to explore Schillinger and his innovative approach to the arts.

Another Schillinger student, film and TV composer Vic Mizzy, best known for the *Addams Family* theme, was also a practitioner of the Schillinger System. He also taught it at NYU in the 1950s. He used the system to compose music for the movie *Ghost and Mr. Chicken* and wrote music for *Spiderman 2*. Other Hollywood film composers who used Schillinger included Herbert Spender and Edward Powell of Twentieth Century Fox, Leanie Hayton of MGM, and Frank Skinner who was musical director at Universal Studios (Previn, 1947). Lou Pine told me that Minnesota composer Libby Larsen told him that when she was in Hollywood the names most commonly mentioned among film composers were Schoenberg and Schillinger.

While it is difficult to know how much influence the Schillinger system had on the work of these composers, it seems from the quotations above that it did influence many of them. At some point in their careers they thought their exposure to the system was very beneficial; not only in using the mathematics of Schillinger to assist in the mechanics of composing to create patterns and symmetry in music, but also the use of the Psychological Dial in structuring the movement and dynamics of their music to elicit the emotions needed in a particular scene.

One definitive example of how a film composer used the dial is shown in the following illustration showing a page of music manuscript hand written by Rudolph Schramm for the movie *Nanook of the North*. Notice the two small dials circled in blue, one with a line at the “0’’ degree point and the other dial set slightly clockwise of that.



Musicians may notice that the oboe is playing the same line as the flute, but in half the time. This is a typical Schillinger technique for developing symmetry of motifs.

This manuscript is one example of the actual use of the Dial in writing film music. A composer would watch the rushes and pencil in a dial indicating approximately where the emotion of that scene should be. He would then begin writing the music, designing it according to what he had marked on the dial. For example, if the scene should provoke a slightly positive emotion, the line would be slightly to the right, of the "0" point, as it is on Schramm's page. A melody written from this perspective would move a bit *away* from the primary axis, either ascending or descending. Conversely, if a slightly sad emotion was to be portrayed, the melody would slightly descend or rise *towards* the primary axis.

Jim Progris taught the Schillinger System at Berklee College of Music in Boston and then went on to teach, using the Schillinger system for composing film music, at several other universities. Most recently he retired from the Frost School of Music at the University of Miami. He is the founder of the Music and Entertainment Industry Education Association and Program Director for the MBEI. (Music Business and Entertainment Industries). He said, in an email to me last year:

> When the techniques covered in Book 1, Theory of Rhythm and Book IV, Theory of Melody [in The Schillinger system of Musical Composition] are employed with the methods proposed in the Psychological Dial, maximum emotional responses can be achieved. It is my opinion that the Psychological Dial with all its implications can serve as a useful tool for quantifying emotional response to a set of contributing circumstances (2010).

It doesn't require a major leap of faith to consider that if music can have a healing effect on the body by positively changing an individual's emotional mindset, and if Schillinger's Psychological Dial is successful in shifting the mindset of movie audiences in a desired direction, then the Dial can be a viable tool to create music that induces a desired emotional mindset in a patient. Coupled with the technique of entrainment, as introduced in Chapter Two, it creates a viable modality for music therapy uses as I am arguing.

In fairness, it should be said that a movie audience is responding to several stimuli at the same time—the acting and action on the screen as well as the music. In a medical setting however, it is not necessary to pinpoint a specific emotion such as admiration, ecstasy, pity or fear, as is done in the movies. It is only necessary to induce movement from a negative to a more positive state to be of benefit to the patient. In terms of the Dial, any emotional movement from the left, negative side toward the top or balanced point should show improvement in patients' self-healing capabilities.

Film composers found Schillinger's Psychological Dial to be a useful in structuring their music to elicit the emotional responses directors were seeking for their films. Therefore, I am positing that his same technique can be used to elicit the emotional responses musical therapists are seeking with their patients.

Chapter Seven

Methodologies for using the Dial for music therapy compositions

All good music resembles something. Good music stirs by its remarkable resemblance to the objects and feelings which motivated it.

Jean Cocteau

One of the many valuable results of a successful thesis is the discovery of new questions to be resolved. An example is the “they’re playing our song” phenomenon (London, 2011) that can occur when using existing music for therapy that the patient may have heard before. In other words, while certain music will create a positive emotion in most people, some individuals may associate it with sad or traumatic events in their life. The “Do-Re-Me” song, from *The Sound of Music,* conjures positive images in many minds. However, someone who associates this song with breaking up with his or her lover might feel otherwise. In an attempt to bypass this problem, some music therapists allow their patient to select the music.

An example of this technique is found in *The Tao of Music* by John Ortiz. He had his patients fill a 90-minute cassette with 10 to 15 minute selections of music. The patients start with music they feel represents their current emotional state. They then select several pieces that fall between their current state and their desired state. The last selection represents their desired state (1997). This is a very individual and subjective action that may work in some cases. However, it does nothing toward developing a duplicable modality that can show positive results in many cases.

This has been a challenge in past music therapy studies that can be minimized, in the future, by using original music. Justin London (2011) of Carleton College says in his paper, *Musical Expression and Musical Meaning in Context,*

> If one uses real musical stimuli, especially well-known repertoire, one will often be faced with associative interference, as one cannot control the context in which subjects have first heard and come to know such repertoire. Therefore in many cases newly composed or otherwise unfamiliar musical stimuli may be preferred, as they circumvent such interference (5)

In other words, original music that has not been heard in any other context has a far greater chance of being heard solely for its emotional content rather than for its association with previous events.

Lou Pine, a knowledgeable Schillinger historian quoted previously, suggested another possible challenge in designing music for therapy. He pointed out that it might be more effective to have the therapy music start at an emotional level close to where the patient actually is psychologically, and slowly move him or her to a more relaxed state. He feels that a “one size fits all” starting point might not work for everyone. While the music would evolve toward the same place, it might be necessary to start at different emotional levels for different patients who could be in depression, fear, anxiety or apathy. A music therapist should be on hand to deliver the appropriate version of the music based on their observation. However, I feel this may be adding unnecessary complication to the system. While different beginnings could be written and used, the purpose of the therapy is simply to move the patient from a negative mind-set to a more

relaxed and positive mind-set. This approach may work very well for most patients. Lou's point may not be quite as relevant as I first feared. It is my belief that a "one size" approach would precipitate the desired positive results in most cases.

Another way of looking at this is in Ferguson's later book, *The Why of Music*, where he says that what music portrays is not physical experience itself but the concern, the emotional attitude, that physical experience arouses (1969). In other words, while one person feels depression because his lover has left him, another feels it because he is bankrupt. They both may experience the same emotion of depression, although the physical experience that precipitated the emotion was different. Another example is the elation that one person feels upon achieving a career goal might also be felt by another when first viewing her newborn. While the triggering experience is different, the emotion is the same. Although the experiences that precipitate the emotions are different for different people, the emotions attached to them are the same, given that the intensity of the experience is perceived to be similar. Future studies could address the different emotional mind-sets of pre-surgery patients and use music that starts at a setting correlated to that mind-set. More about this is found in the next section.

Combining Schillinger and Shamanism

While contemplating this question recently I had another "voilà" moment. I realized that the entrainment part of my methodology changes the *emotions of the mind* through the portal of the *body*. It is a physiological process affecting the emotions. As the frequencies of brain waves are reduced there is a simultaneous reduction of stress; the listener becomes more relaxed. Conversely, the Schillinger component of my thesis

changes the *physiology of the body* through the portal of the *mind*. By affecting the thoughts and emotions of the mind the physiology is also affected. Heart rates, rates of breathing and brain waves are reduced which are symptomatic of a more relaxed state. After all, the goal, especially in a pre-surgery patient, is to bring the patient from an anxious state to a more relaxed state. Therefore, if my modality is successful, it could be a major breakthrough in the science and practice of music therapy.

There are several ways to accomplish the repetitive pulses needed to entrain brain waves. A drumbeat of between 8Hz and 12Hz (8 to 12 beats per second) would be the ideal frequency to entrain brain waves into the alpha range that correlates with a relaxed state. In musical notation this could be shown as 16th or 32nd notes depending on the tempo or speed of the music. Another way to do this would be by an arpeggio[1] of the harmony notes, again using 16th or 32nd notes[2]. However this may be too obtrusive, and the subtle use of a drumbeat in the background might blend better with the rest of the music. While a repetitive drumbeat has been used by itself for thousands of years for healing purposes, as an adjunct it would enrich the effectiveness of the melodic and other musical components of the music based on Schillinger's Psychological Dial. I believe the rhythms should be faster at the beginning of the listening session, perhaps at the upper beta range of 20Hz (beats per second) or more, to better synchronize with the extant emotional state of an anxious listener. Then beat and tempo of the music should gradually be slowed to the 8Hz to 12Hz rate, where it should remain for an

1. *Arpeggio:* This is a musical technique where notes in a chord are played or sung in sequence rather than ringing out simultaneously.

2. *16th* notes are played four to one quarter note beat. *32nd* notes are played eight to one quarter note beat.

extended period of time to stabilize a more relaxed state in the patient. For some purposes the frequency of the percussive beat, and thus the tempo of the music, could be even slower, moving into the theta range, from 3Hz to 8Hz. This may be appropriate for other goals, such as treating insomnia, or autism. This subject might be grist for further studies.

It should not be forgotten that, in addition to melody, there are the other components to music such as harmony, range of pitches, dynamics, etc. These were referred to in Chapter Five. Schillinger delineates a way to design these other components of music to support the Dial actions. I believe these musical components should also start, at least briefly, at a generally negative emotional setting perhaps at the minus 2 or minus 3 point of the Dial, consistent with the setting of the *melodic* movement. This might also better correlate with the extant emotional state of a patient. The music should then gradually take the listener to a slightly positive point clockwise of the "0" degree balance point and maintain that for the longest period of time. Observations by Rilder and Weldin in "Imagery, Improvisation, and Immunity (1996) add to the viability of beginning the music in the negative area. "Entrainment music designed to calm an anxious person would initially evoke tense, chaotic feelings and transition into calming music" (p. 212).

This idea is also supported in *The Tao of Music*, by John Ortiz (1997). He stated, "The principle of entrainment is closely related to the "iso" (isomorphic)[1] principle which

1. *Isomorphic*: Being of identical or similar form, shape, or structure—in this case, referring to the pace of the musical rhythm being synchronized with the patient's mood.

suggests that one's [existing] mood should be matched to the mood of the music and then gradually moved into a desired direction" [by changing the music] (p.318). Chris Brewer confirms this in his paper entitled "Orchestrating learning skills" which Ortiz quotes as follows:

> The *iso* principle is one of the most natural and intuitive techniques for moving [a patient] into a new rhythm. With the *iso* principle, a change in tempo and mood is accomplished by entraining to the present mood [of the patient] and slowly altering the pace in the desired direction. Rather than a quick change…the use of the *iso* principle moved the mood gradually, almost unnoticeably into a different state (p. 319).

Ortiz suggests in his book that patients make a tape or cd of the music they believe is appropriate, starting with ten or fifteen minutes of music that exemplifies the present negative state they want to improve. They then gradually add music moving them toward the desired emotional state. As stated earlier, this process seems to me to be extremely subjective and impossible to codify in order to achieve predictable results with other patients. Ortiz admits this process can be time consuming and tedious. A more generic selection of music which gradually moves a patient from anxiety to relaxation, taking them into the desired state, may be useful and more time efficient (1997).

Ortiz's concept of composing music that invokes similar reactions in most listeners is exactly what my thesis is about. He adds an interesting note when he says, "In effect, entrainment is a process of joining with the feeling portrayed by the music" (p. 319). If this is true, then the concept of entrainment, in a more generic sense, would

apply to the emotions elicited by music composed according to Schillinger, as well as the Shamanistic component of my thesis.

The goal of my thesis

The aim of this therapy is to bring patients into a more positive mindset, relative to the pre-therapy mind-set, in order to give their immune systems the best chance of assisting the healing process. The further a patient moves into a more relaxed emotional state the more positively the immune system should respond, based on the research cited in earlier chapters. Any gain, in a clockwise direction relative to the Dial, or from a more anxious to a less anxious state, should be considered a success and beneficial to the patient.

In composing a particular piece of music to precipitate a desired emotional response, a composer would first find the relative direction and speed of the melody using the Dial settings. Then the other musical components referred to in Chapter Five, such as dynamics, harmony, tone quality etc., are designed to complement the melodic movement. While all components of music are important, it is my belief that the melodic movement is the part of the composition with which a composer should start the composition process. Then the other musical components can be added to enhance the effect of the melody. Once the melody and other musical components are set, the repetitive percussive pulse designed to entrain brain wave frequencies is added to the music. This would create the blending of the two techniques I am exploring in this study, *Schillinger and Shamanism*

Chapter Eight

Conclusions and Call for Studies

You compose because you want to somehow summarize in some permanent form your most basic feelings about being alive, to set down... some sort of permanent statement about the way it feels to live now, today.

Aaron Copland

The healing properties of music have been known, if not fully understood, since the dawn of time. Shamanistic rituals employing sound have been used for healing purposes for thousands of years. From the time of the early Greeks, scientists and philosophers have investigated the properties and qualities of sound, searching for ways to correlate mathematics with music and music with specific emotional responses. In recent times music therapy has become increasingly accepted by medical professionals and is now recognized as a viable mind-body adjunct to allopathic medicine. We have seen how it is possible, not only to use rhythm to entrain brain waves, but also to compose music that has the capability to move an individual into a more positive frame of mind. We have also seen how both music and rhythmic entrainment will induce a more relaxed state in a subject that can positively impact the effectiveness of the immune system.

Joseph Schillinger codified a system that can be used to write this kind of healing music that will reliably move individuals into a positive, relaxed, emotional state. His Psychological Dial and his instructions for designing the supportive components of music, such as harmony and tone quality, have been successfully used to arouse

specific emotional responses in film audiences for over fifty years. I believe that it can be used with equal success in a medical setting. Thus it is now time for scientifically controlled studies to be designed to establish the viability of my thesis. I am offering the following questions that imply topics for such studies:

- Does the combination of entrainment and music composed according to the Schillinger system create the desired result in pre-surgery patients of moving them into a more relaxed emotional mind-set?
- Does this musically induced relaxation result in the reduction of healing time for patients, which would also result in a reduction of the costs for treatment?
- What is the optimal time frame for exposure to the music for pre-surgery and post-surgery patients?
- How far in advance of surgery should the therapy be started and for how long after surgery should it continue?
- Can the Schillinger system be imprinted onto different genres of music to make the music more accessable to various patient demographics?

One would hope that there would be a mandate in every social system to strive to improve that society, particularly in such a basic human need as health care. It behooves us all to look for ways to improve our society's conditions wherever possible. Our health care delivery system here In the United States is broken. While we have one of the most technologically advanced systems in the world, it is also by far the most costly. The World Health Organization 2011 statistics show that the United States lagging behind many other countries (many of them offering free health care to their citizens) in many categories of citizen health.

These lackluster results do not justify the cost of the most expensive health care system on the planet. Perhaps it is time we stopped throwing money at these problems and looked for some alternative solutions.

In addition to the obvious benefit of facilitating the speedier recovery of patients, the system I am suggesting has further benefits. It is a simple, inexpensive, easy to use technology that can be safely utilized by existing hospital staff or others with only minimal training. It is extremely cost effective, a definite advantage to whoever is responsible for paying the bill, the patient or an insurance company. Ultimately however it is society that bears these costs, either through direct payment to providers, taxes for Medicare and other government programs, or medical insurance premiums. Due to the health reform legislation of 2010, insurance companies issuing individual health insurance policies are required to pay out at least 80% of every premium dollar for actual claims or refund the excess premium. If the healing process can be accelerated, the cost of that healing will be reduced as will the cost of health insurance. I am suggesting that a music therapy modality based on a combination of the Schillinger system and rhythmic entrainment can play some part in reducing those expenses. The next step is to test, and modify as necessary, this modality to establish its viability.

This thesis began with a quotation from this poem by William Congreve.

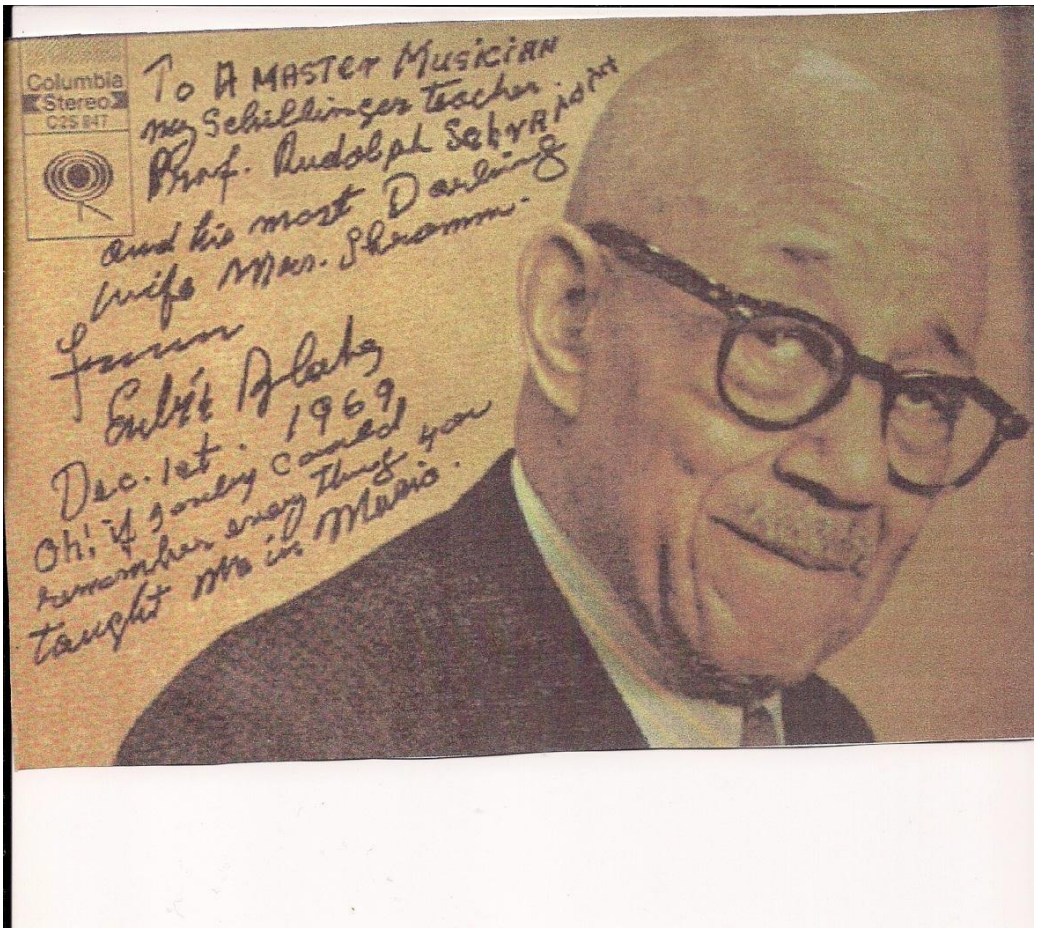
Musick has Charms to sooth the savage Breast
To soften Rocks, or bend a knotted Oak. I've
read, that things inanimate have mov'd, and,
as with living Souls, have been inform'd,
by Magick Numbers and persuasive Sound.

Someone once told me that magic is simply the natural action of laws not yet discovered. Are Congreve's "magick numbers" being expressed in Schillinger's formulas for composing music? Could Congreve's "persuasive sound" be the rhythms discovered by shamans 30,000 years ago? These questions can be answered. Let's do the studies. The rewards may be hard to quantify, but they are potentially immense.

Appendix A

Composite picture of Beethoven and Schillinger sent as a prank by Shostakovich to Schillinger.

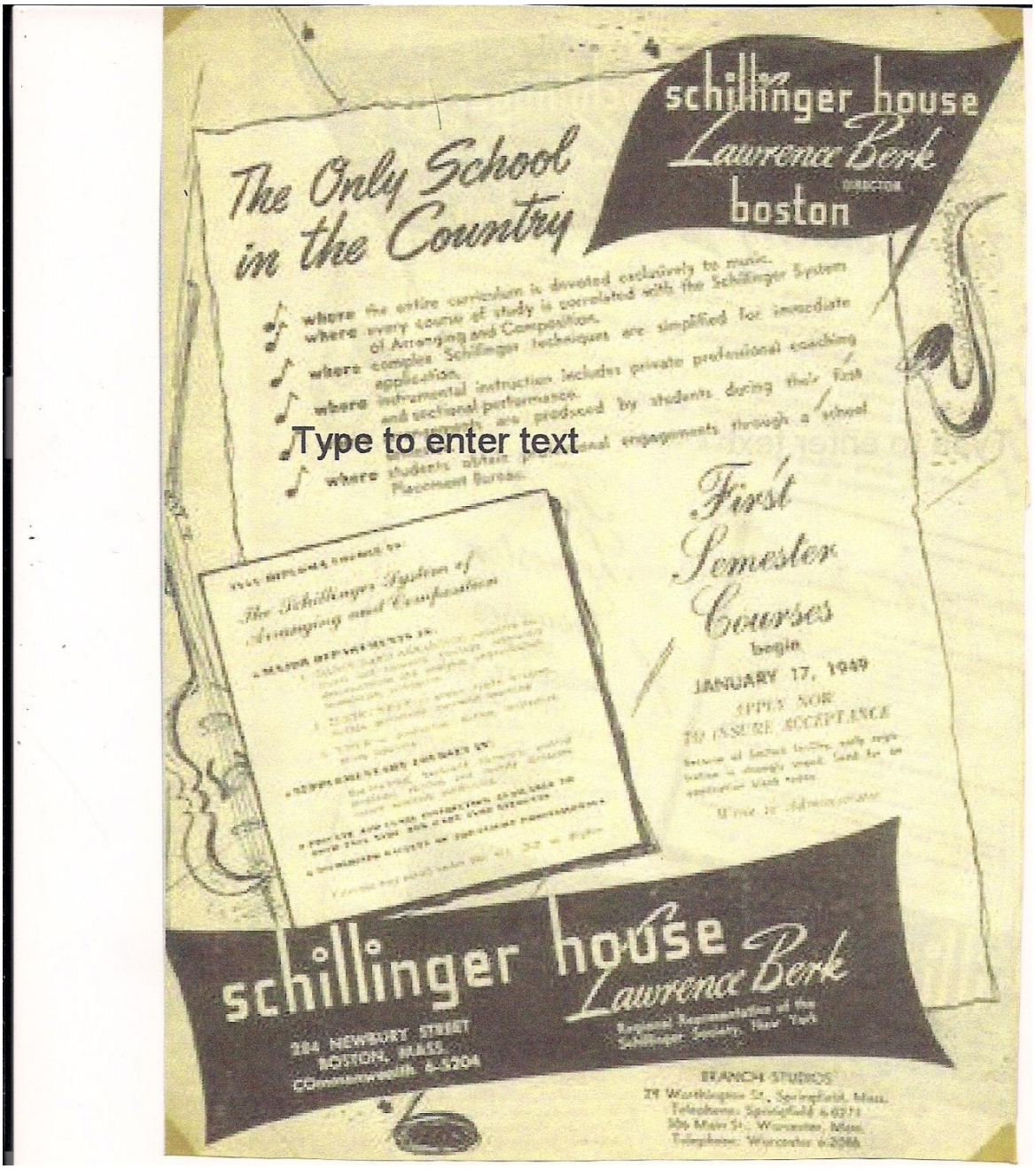
Appendix B



Jazz Pianist Eubie Blake sent this LP of his music to

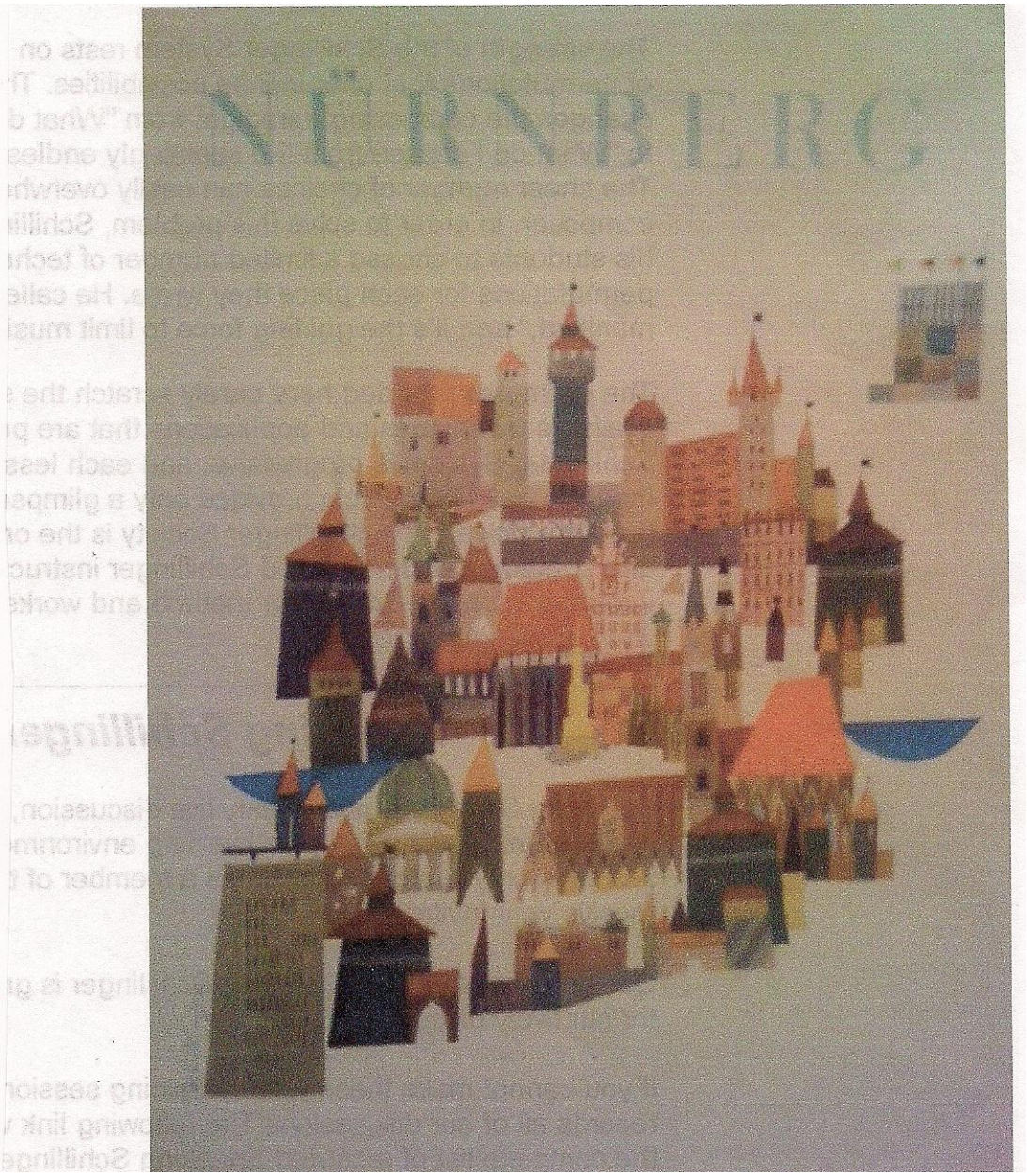
Rudolph Schramm, his Schillinger teacher.

Appendix C



The Schillinger House, started by Lawrence Berk in 1949, became the Berklee College of Music after Schillinger's widow Frances obtained a court injunction prohibiting Berk from using the Schillinger name. Berk created the new name, Berklee, by adding the name of his son Lee to the end of his name. Berk and other teachers continued teaching the Schillinger system for a number of years under the new name. Berklee continues today to be a leading institution in all phases of music and its production.

Appendix D



The Schillinger Society has recently come into possession of this print signed by Joseph Schillinger. It is typical of the cubist style of painting that Schillinger is known to have favored. An art dealer originally bought this piece at an estate sale. Although best known as a teacher of his system to compose music, he also delved into other art forms.

Appendix E

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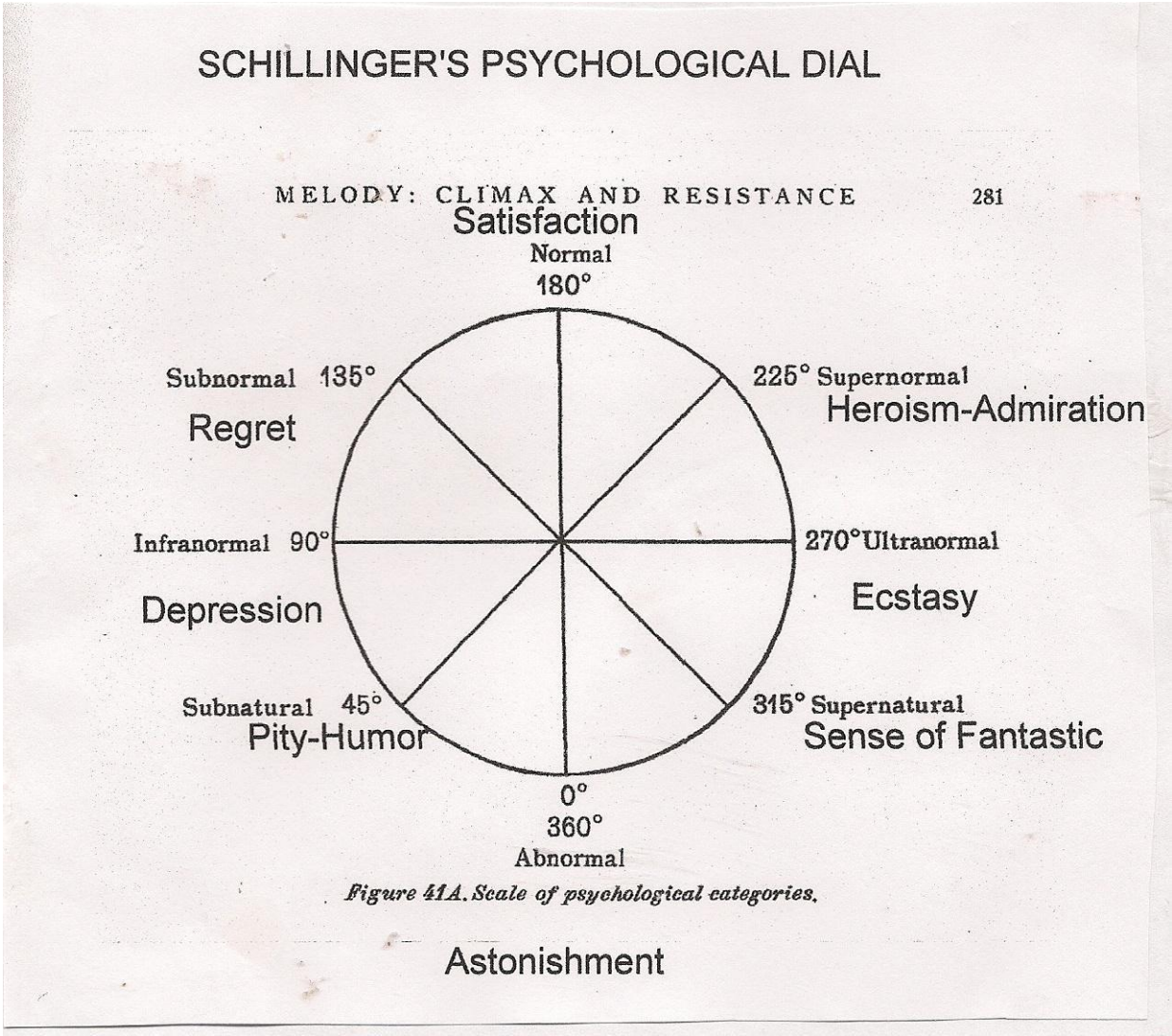

This is the psychological Dial as it is found in Schillinger's books. In Chapter Five, I took the liberty of relabeling the Dial to make it easier to be understand.

Appendix F

How the Dial relates to other musical components enhancing emotional effects of melodic motion

Here are examples how Schillinger used other musical components, such as harmony, dynamics, etc., to re-enforce the desired melodic movement signified by the Dial. For a position of "balance" at the "0" or balance point (180 degree point on Schillinger's version of the Dial), the rhythmic durations (not the entrainment component of the rhythm) would range from very long to moderately long. Scales would have a limited number of pitches and melodic form would fairly stationary. Harmony would be uncomplicated with little movement. Attacks would be smooth and legato with light staccato. Appropriate instruments would be non-vibrato violins, flute, high French horn, sub-tone clarinet and double bass on open strings and harmonics[1]. Dynamics would be uniform and low or medium. The middle register would be the most appropriate for the melody (SSMC, pp.1433-32).

Now let's say the desired emotion is set just to the right of center toward the more positive side of the Dial. We know from the above examples that the movement of the melody should be slightly away from the Primary Axis. To reinforce that Dial setting the rhythm should be uniform with groups of longer duration followed by groups of shorter

1. Harmonics are notes higher in pitch to the actual note being sounded. All musical instruments create harmonics. The differing combinations of harmonics are what give instruments their unique characteristic sound.

duration and the simplest form of syncopation. The pitch scales would have fairly uniform intervals with smaller intervals above shorter ones, i.e., C-E-G-B-D-F#-A-C#-E-G#-B… The harmony should be balanced and consonant with one raised function like an augmented fifth. Schillinger goes on to describe characteristics for every other component of the music that would be appropriate for this setting, including tension and release, contrapuntal forms, best registers and instruments to use. As the emotion becomes more intense, corresponding to a setting on the Dial further in a clockwise direction, so also are the settings of the above components. As these additional elements can reinforce or negate the effects of the melodic motion, it is important to include them in any composition.

Appendix G

Examples of Greek modes and the emotions they were thought to induce in the listener*

Dorian Mode: For strengthening of youth and inciting them to warfare and bravery.

Lydian Mode: For the merging of lovers.

Phrygian Mode: For inspiration

***As found in Washington,1967.**

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