Participants' Perceptions of a Receptive Raga Music Therapy Experience: An Interpretative Neurophenomenological and Arts-Based Analysis

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A Thesis
in the Department of Graduate Studies
Individualized Program

Presented in Partial Fulfillment
For the Degree of Doctor of Philosophy at
Concordia University.
Montreal, Quebec Canada

July 6, 2025

CONCORDIA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

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Entitled: Participants' Perceptions of a Receptive Raga Music Therapy Experience: An Interpretative Neurophenomenological and Arts-Based Analysis

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Doctor Of Philosophy (Individualized Program – Fine Arts)

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ABSTRACT

For years, Indian musicians, scholars, and music therapists have explored the therapeutic use of raga. Research is emerging on its use in complementary medicine in India, yet little formal research exists on the use of raga in receptive music therapy with clients unfamiliar with this style of music. This mixed methods study used interpretative phenomenological analysis, neurophenomenological analysis (through electroencephalogram brainwave recordings via a Muse 2 headband and Mind Monitor software), and arts-based hermeneutic analysis to investigate the experiences of six participants unfamiliar with raga during a recorded receptive raga music therapy experience. Four group experiential themes emerged from the coding and analysis of interviews: (a) curiosity and interest with Indian classical music and culture, (b) imagery and pre-associations despite musical unfamiliarity, (c) increased immersion as musical movements progressed, and (d) the music allowing a change of consciousness. Both group-level and individual experiential themes were examined while acknowledging the rich nuances within the participants' individual experiences. Brainwave results generally indicated an increase in alpha waves (associated with relaxed, meditative states) or delta waves (linked to deep meditative or sleep-like states), along with a decrease in beta waves (associated with alertness). A comprovisation approach using the qualitative findings and electroencephalogram data for two diverging participants offered a more embodied and comprehensive understanding of the phenomenon. The results were integrated in the discussion. This study contributes to an intercultural and multimodal understanding of raga in receptive music therapy and explores potential applications in guided imagery and music practices.

Keywords: arts-based research, cross-cultural, guided imagery and music, mixed methods research, neurophenomenology, raga, receptive music therapy

DEDICATION

In memory of my loving parents, Dr. James George and Grace Venkatarangam.

ACKNOWLEDGEMENTS

I gratefully acknowledge the participants in the study for their willingness to share their rich experiences, my advisor Dr. Guylaine Vaillancourt for her wonderful guidance, insight an support throughout the many steps of this research, and Dr. Laurel Young, who was the co-supervisor for my research, for all of her support throughout my music therapy education as well as her invaluable insights in this manuscript. I also acknowledge my committee: The late Dr. Christine Beckett for all her vital help and guidance throughout my academic studies, for getting me excited about the intersection of music and psychology and for her help during the stages of the quantitative elements of this research; Dr. Sumathy Sundar for her vital contribution to this area of research and her continued help in this music therapy research with raga; and Prof. Sandeep Bhagwati for his unique, creative, and vital insights throughout the process – including the research development and arts-based component of this research. I would like to thank my external examiners, Dr. Andrea McGraw Hunt, for her invaluable input, including the EEG and neurophenomenological aspects of this research, and Dr. Owen Chapman for his rich insight into the arts-based research component. I would also like to thank the music therapy faculty at Concordia University, including Dr. Laurel Young's PhD candidate at the time, Dr. Deborah Seabrook, for her guidance and encouragement during the construction of this research and Dr. Bing Yi Pan for his help with the EEG analysis process.

I would like to thank my ever-so-patient and caring sitar teachers throughout the years: Uwe Neumann (my first teacher), Ustad Shahid Parvez, and Seema Gulati, as well as the SPK academy for their help in finding the perfect raga for this study; the professors in other faculties who taught and inspired me to develop this research: Dr. Stephen McAdams, Dr. David Pare, Dr. Rosemary Mountain, and Dr. Virginia Penhune for her willingness to consult with me in the early EEG stages.

I would also like to thank the PERFORM Centre at Concordia for their award and help in the recruiting process and the Concordia INDI department for assisting with a research space for the experience.

I also thank my family for their support and encouragement, and finally, my wife Annabelle, for her invaluable help, encouragement, understanding and support – not to mention her tremendous help with our little son Shaan – as I undertook this extremely challenging process.

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Chapter 1. Introduction

Introduction

Music can evoke profound emotional experiences in individuals of various cultures; it could be considered a shared human phenomenon (Chanda & Levitin, 2013). Accordingly, receptive (listening) music therapy experiences can allow individuals in various settings an avenue for meaningful experiences and a means of relating to their own cultural identities (Swamy, 2018; Vaillancourt, 2012). *Raga*, the compositional and improvisational framework for the classical music system of India (Clayton, 2001; Manaranjanie & Dona, 2012) is known for its *rasa*, meaning emotional or spiritual response as well as for the transpersonal connection it can evoke in listeners (Shankar, 1995). This classical system has its own specific melodic motifs (Menuhin & Davis, 1979), microtones, and ornamental slides (Swamy, 2011), as well as ascending and descending structures (Lee & Houde, 2011). Traditionally in Indian healing practices, raga is often used as a receptive or listening practice while accompanied by an *induction* (defined below). For centuries, South Asian artists, healers, and gurus have explored raga for its transformational and healing qualities (Lee & Houde, 2011; Sundar, 2005, 2007). However, the exploration of raga and its therapeutic potential in research settings has, relatively speaking, been more of a recent phenomenon in India, and a phenomenon seldom addressed in the music therapy literature outside of India.

In Indian studies, receptive guided imagery with the raga Ahir Bhairav ($N = 29$) was found to complement electroconvulsive therapy to alleviate anxiety and depression in psychiatric settings (Sundar et al., 2020). In Sundar et al.'s (2020) study, guided imagery involved leading the participants to picture themselves on a journey toward health and recovery and was done while the patient listened to raga music. The music therapist assisted the patient in concentrating on relaxing their body, regulating their breathing, facilitating deep breaths, and visualizing images associated with the goal of achieving good health and recovery (Sundar et al., 2020). This method is not to be confused with the Bonny Method of Guided Imagery and Music (GIM), which is a separate formalized method (see the section on Visualization Inductions in GIM, p. 32). Receptive raga experiences have also been found to increase the self-esteem of adolescents via the School Form of the Self Esteem Inventory when implemented over a 15-day period (M. Sharma & Jagdev, 2012). In another study, receptive raga experiences lowered levels of depression and allow better sleep quality as measured via the Pittsburgh Sleep Quality Index

(PSQI) and Montgomery Asberg Depression Rating Scale (MADRS) compared to the participant group that was receiving psychotropic drugs (Deshmukh et al., 2009). In neurological studies, Geethanjali et al. (2019) found that participants (*N* = 16), after selecting a preferred raga (Dhramavati), indicated an increase in theta wave power in the bifrontal cortical region. These waves can be indicative of positive experiences such as trancelike, rapid eye movement, meditative, and blissful states (Aftanas & Golocheikine, 2001; Kim et al., 2022).

In my own experience as a music therapist, I have observed that group receptive music therapy experiences can provide individuals from diverse backgrounds with moments of intercultural communication, shared emotional responses, and experiences of togetherness. However, it has been recognized that although music is a human phenomenon, it is not always a universal language (Letts, 1996). Many genres of music around the world adhere to distinct music systems that may be experienced differently by people unfamiliar with their unique musical elements, such as tonality, polyphonic structure, gesture, timbre, and instrumentation.

Furthermore, it is becoming evident that music therapists internationally are becoming aware of the need to integrate the music of their clients' identified cultures (Ng, 2017; Swamy, 2018) as well as the need to integrate other non-Western or non-Eurogenetic (Reigle, 2014) music systems into music therapy practice in culturally sensitive ways with uninitiated listeners (Hanks, 1992; Lee & Houde, 2011; Moreno, 1988). It has been acknowledged that Western classical music has a colonial past, where European colonists persuaded local inhabitants of a nation to learn their classical musical systems, inadvertently causing them to abandon the instrumentation of their heritage that did not fit within the European musical system (Kok, 2011, 2023). This cultural colonialism could have had profound effects on many non-Western individuals' senses of identity (Kok, 2011; Swamy, 2011) and imposes an inadvertent power dynamic and subsequent ethical concern when therapists use limited music systems and genres of music with their clients.

Thus, research is warranted to further the understanding of participants' experiences, which may in turn help in the development of an evidence-based protocol for the safe and effective use of receptive raga music therapy experiences with unfamiliar listeners. As using raga also entails a general understanding of this musical system, the first section of the literature review defines raga and its philosophical origins, focusing on raga in intracultural contexts. To fit the scope of this research, *tala,* the unique and mathematically complex Indic rhythmic system is not a focus in this research but remains an area for further study in intercultural therapy contexts.

Key Terms

The following key terms are defined to ensure coherence and consistency throughout this thesis.

Raga

Raga is defined as a sequence of tones with specified melodic motifs (Menuhin & Davis, 1979), microtones, and ornamental slides (Swamy, 2011) that, when sung or played in a primarily improvised manner, express a particular emotion (Moreno, 1988) and create a specified aesthetic experience (Venkatarangam, 2017). These improvisational forms adhere to the established protocols of traditional Hindustani (North Indian classical music) or Carnatic music (South Indian classical music), which are passed on to the performer by a recognized guru or an accredited educational institution of classical Indian music. Raga is the exclusive music system used in Hindustani (the Indian classical music of North India) and Carnatic music (the Indian classical music of South India). Thus, the terms raga and Indian classical music will be used interchangeably in this study unless otherwise specified.

Thaat, Swara, and Shruti

In this music system (with variations between Hindustani or Carnatic music) are the parent modes, or thaats. These thaats consist of specific notes called swaras. Each of these notes has a distinct fine tuning called shruti, which gives a subtle character to each note while generally adhering to a semitone/tonal structure (Clough et al., 2025). Such subtlety could be compared to the difference between the Renaissance just intonation tuning of a harpsichord versus the tempered scale of the Baroque era, but with a different intonation for each note dependent on the mode (thaat). Ragas are then built upon these thaats.

Bhava

Bhava, within the context of Indic classical music (Van Der Meer, 1980) are the gestural, timbral, and tonal/microtonal ornamental expressions both shared between ragas and exclusive to each raga. In a raga performance, the performer internalizes, feels, and projects bhava to the listener (Clayton, 2001, 2005). Bhavas can also be linked to dominant emotions in the performer, such as love, sorrow, and wonder, that are transmitted to the listener in the form of rasa.

Rasa

The objective of any raga, through bhava, is to evoke rasa in the listener. Rasa is the state of mind, emotional experience, mood, or sentiment of the raga. It may also include feelings of rejuvenation, aesthetic experiences, or profound sensory experiences (Clayton, 2001; Manaranjanie & Dona, 2012) in the listener.

Of the nine rasas, the ninth one, *shanta rasa*, is particularly relevant in the context of this thesis. It was established after the other eight by the Indian philosopher and aesthetician scholar Abhinavagupta (10th to 11th century CE). Through various bhavas from the performer linked to knowledge, truth, and calmness, in shanta rasa, one can experience harmony between the mind, body, and the universe, culminating in a transcendental feeling (G. Saxena, 2023).

Alap

The raga movement performed in this study was the alap. This movement, composed of three subsections, most accurately encompasses the mood of the raga (Powers, 1958; Ruckert et al., 2001; Viswanathan, 1977). It is known as alap in North Indian (Hindustani) music and is also known as the alapana in South Indian (Carnatic) music. It has been compared to a highly structured improvised exposition or cadenza in Western classical systems (Venkatarangam, 2021). Alap is played at the beginning of the composition; here, the musician develops the theme of the melody without the accompaniment of the tabla (Indian drum); it can be followed by other movements or serve as its own performance. Within this one movement is a division of three other subsections: the exposition, the jhor or introduction of a rhythmic ostinato, and the jhala, involving a slight increase in tempo. Each movement is played with greater rhythmic intensity. In my experience as a sitar student and observer in group lessons, this movement is often demonstrated to the student through musical modelling, with very little verbal instruction. Alap can vary in length, as the musician will expand motifs through manipulation of tempo, ornamentation, and elaboration (Viswanathan, 1977). The movement could last anywhere from 1 minute to several hours, depending on the atmosphere, the listeners, and the performer's inspiration (Manaranjanie & Dona, 2012).

Culture

In the present study, culture is being defined as a learned construction of intertwining values, norms, beliefs, linguistic (Monk et al., 2008), technological, and artistic practices of one or many social groups that can influence an individual’s psychological processes, schema, sensory perception, and sense of identity (Markus & Kitayama, 2010). An individual can have multiple and intersectional cultural identities and affiliations depending on context, including location and situational factors (Monk et al., 2008). Culture is not static but fluid; it can shape the individual, and the individual in turn can shape culture (Markus & Kitayama, 2010).

Eurogenetic

Eurogenetic is used interchangeably with the more general term Western in referring to musical systems or art musics heavily influenced by European culture or tradition (Reigle, 2014).

Receptive Music Therapy Experience

A receptive music experience is when listeners respond to live performance or recorded music nonverbally and through personal reflection to achieve therapeutic outcomes, including but not limited to emotional, intellectual, or spiritual outcomes (Bruscia, 2014). In my clinical experiences and training, depending on the therapeutic goals, including relaxation, somatic responses, or metacognition, participants may enter meditative or transpersonal states of consciousness.

Induction

Induction is the process before the musical experience where the guide/therapist uses a present and calming voice to suggest a feeling of relaxation or awareness of self, eliciting an overall non-ordinary state of consciousness. Phrases may include "take some time to make yourself comfortable," and "notice the ebbs and flows of your breath." Many methods can be tailored to the particular individual or group (Grocke & Moe, 2015) depending upon therapeutic goals. These inductions share some roots with meditative practice. In this thesis, inductions have been separated into visual inductions and metacognitive inductions.

My Personal Relationship to Raga

My embracing of raga and its therapeutic potential has followed a gradual trajectory. I identify as a first-generation Canadian of South Indian descent. Naturally, growing up in Canada, I was encouraged and immersed in the prevalent discourse of European classical music education. At that time in my life, Indian music was a secondary aspect of a culture I had not fully appreciated as I journeyed to find my own identity.

The first time I encountered a sitar, an Indian yet Persian-influenced stringed instrument often used in raga, was in my friend's (another first-generation Indian's) basement. His grandfather was a sitarist, and the instrument had been kept in storage after his passing. I was well accustomed to plucked stringed instruments at this point, but upon looking at this sitar, I realized that it was unlike any stringed instrument that I had encountered before. I was amazed by the instrument and its unique structure; the family let me borrow it. The sitar has a series of strings underneath it that are rarely plucked but automatically resonate when the other strings are struck. This, coupled with the resonating chamber of the instrument (there is no sound hole), creates a unique sonic filtering effect for the listener. This effect is aided by the instrument's unique flat bridge, which affects the envelopes of the sound partials, making it sound different from other plucked string instruments (Siddiq, 2012). Through trying to teach myself the instrument, I realized that the sitar was of a technology and melodic and rhythmic system that was in a way foreign to me. Although I had taught myself instruments and genres related to Eurogenetic, Afrological, or Eurological (Lewis, 1996) systems in the past, it became apparent that to understand this different and equally complex musical system would require the training and the guidance of a teacher or guru.

Through my extensive study of the Mahair Gharana, (the school or conservatory of playing popularized by the late Pandit Ravi Shankar) and later the Imdadkhani Gharana (the other popular school or conservatory of sitar made known by the late Ustad Vilyat Khan), I discovered that raga was an improvisational art-music unique to itself. Although it has influenced more recent contemporary music genres, raga was unlike various genres of jazz, experimental, ambient music, improvisational rock, Eurological or Afrological (Bhagwati, 2021; Lewis, 1996), contemporary classical music, or 20th century classical music. Rather, this form was intertwined with South Asian philosophy and spirituality (Lee & Houde, 2011) and with an infinite and distinct nuanced complexity and aesthetic intent.

I also observed during my own and others' performances of sitar in the alap (instrumental cadenza) movements with international audiences, that raga at times evoked experiences that one might describe as transcendent or transpersonal. It was not that transcendent or transpersonal experiences were unique to this music for me, but with raga that effect appeared to be an intent, one that seemed to me to have been purposefully refined with time. I reflected upon rasa theory, which is present in Hindu philosophy and related to raga. In rasa theory the primary objective of the arts is to take the listener to another reality, where they experience the inner workings of their consciousness (Bailly, 2007). I noticed that the music was taking me to what I would define as a meditative state, an almost resonant and embodied experience. I wondered if my experience of this music was personal, and if others, particularly those less exposed to this music, might respond to raga in a similar manner.

My sitar training and experience with musical genres positively and powerfully affecting individuals in different ways inspired me to become a music therapist. I was interested to see that rasa has similarities to some goals of contemporary receptive music therapy practice. I also learned that my music therapy training, like my North American music education training, was still rooted in piano and Western music theory rudiments, as evidenced by the music performance skills included as music competencies outlined by the certification body (Canadian Association of Music Therapists, 2016). I soon began personal sessions as part of my training in GIM, an advanced receptive, "music-centered consciousness expanding therapy" (Association for Music and Imagery, 2025, para. 1) that uses Western classical music (Bonny, 1969). I witnessed the profound and transformative nature of this method. Prior to my immersion in this method, I had already been facilitating various types of receptive raga experiences with mindfulness-based inductions using raga on the sitar. I began this practice as a music teacher, facilitating mindfulness groups with my previous training in counselling and mindfulness and some basic knowledge of yoga, and later as a music therapist working in mental health settings. Accordingly, as a music therapist, I wondered if raga could fluidly accommodate the psyche in new ways for some clients, depending upon their therapeutic goals.

Foundational Research

My insights into the effects of raga led me to conduct my own qualitative study as part of my master's requirements in the Department of Creative Arts Therapies at Concordia University, of a receptive raga music therapy experience on sitar in raga Desh with unfamiliar listeners (Venkatarangam, 2021). In that research, groups of three participants listened to a live 15-minute performance played by me on the sitar after I conducted a live induction with them. Following the music experience, participants participated in individual semistructured interviews. The overarching themes that emerged in the data from the semistructured interviews were precontextual thought processes inherent to the experience, emotional and physiological changes throughout the musical movement, and raga as a trusted guide – a space to embrace thoughts. The music initially appeared to evoke participants' memories of times they had heard music similar to this genre (Venkatarangam, 2017, 2021). Participants also reported phenomena during the listening experience that appeared to correspond to the musical elements inherent to the music movements (see key terms , p. 3 for an explanation of the alap movement). For example, there was a moment in the performance where one participant's heart was beating faster; another participant reported that the increasing intensity and elaboration of the movements appeared to bring them from outward thoughts to inward awareness (Venkatarangam, 2017, 2021). Another participant found that the rising intensity allowed him to focus on the music as opposed to his ruminating thoughts before entering the experience (Venkatarangam, 2017, 2021).

Some experiences appeared to be related to the *jhala*, or the climax of a raga. In jhala, the repetitive ostinato and rhythmic elaborations activate further droning resonation from the instrument due to consistent right-hand picking (Royacaudhuri, 2000), working in conjunction with the sympathetic strings. Based on participants' reports, the music also adhered to the iso principle, where the music matches the participant's emotional state while slowly raising or lowering the intensity of the music to allow a desired mood (Davis, 2003). The research affirmed my initial intuition, based on clinical experience, that these musical experiences could be purposefully and sensitively applied in clinical music therapy settings with clients of diverse backgrounds. However, I also had new questions. Although I was able to make informed predictions, I was unable to know what was happening for participants at specific moments of the music. For example, as the interview was conducted post experience, I wondered whether the experiences participants described occurred during a specific musical movement or within a particular area of the guided induction. Also, as the music was a live semi-improvised performance and had not been recorded, I could not play back excerpts to verify. I felt that further research was warranted and with a protocol, stimulus, and measuring tools that could more easily assess what was happening for participants moment-by-moment throughout the meditative and musical experience.

Assumptions

Based upon my clinical experience, my previous research, and the previously summarized literature, I had the following assumptions upon entering this research. I assumed that receptive raga music therapy experiences could have cross-cultural clinical relevance. My assumption was that receptive raga music therapy experiences could bring about the phenomena of music as transformation (Bruscia, 2015), where the primary therapy medium is the music as opposed to relying on other modalities, such as other arts or verbal mediums, for participants and clients in receptive raga music therapy experiences. I also assumed that most participants would experience receptive music therapy sessions involving raga as meaningful. I assumed that participants would respond to the various movements in the raga. I assumed that many music therapists would be open to using raga in their work, even if unfamiliar with the genre, should they be given adequate training in incorporating this music into their methods.

Statement of Purpose

Building on the findings of my foundational study, the purpose of this research was to gain a multimodal understanding of the perceptions and conscious experiences of adult individuals experiencing a recorded receptive raga music therapy experience. Multimodal understanding in this study was to be assessed through EEG tracings of the six participants' brainwaves, their personal experiential themes derived from qualitative interviews, and the embodied understanding I would gain by converting two of the six participants' analysed EEG brainwaves, graphed as a score and mapped with experiential statements from their transcripts, into a comprovisation (Bhagwati, 2013) that I would perform and record. The design was to employ a convergent parallel design (Burns & Masko, 2016), where both quantitative and qualitative data were to be collected simultaneously, given equal weight, analysed separately, and then integrated to deepen insights into their experiences. The purpose of the comprovisation was to illuminate further meaning in the participants' experiences that might have transcended language.

Hypotheses

I hypothesized that (a) receptive raga music therapy experiences would allow individuals to experience meditative states of alertness or attention, where there is an inhibited cortical state in which the brain remains active but internally focused; (b) states of attention would be reflected via electroenchaphalogram (EEG) tracings; this would be the amplitude of beta waves (14 to 32 Hz) known to relate to subjective feelings of alertness (Bardekar, 2018), alpha waves (7 to 14 Hz) attributed to relaxed meditative states, theta waves (3.5 to 7 Hz) to subjectively reflect deep relaxation and blissful states (Aftanas & Golocheikine, 2001), and delta brainwaves connected with deep sleep and a connection with the subconscious (Bardekar, 2018); and (c) brainwave changes will correspond with the changes in submovements within the alap (alap, jhor, jhala) as well as the subjective recounting of participants' experiences.

Research Questions

The research questions established for this study were separated into qualitative, quantitative, hybrid, and arts-based categories.

Qualitative Question

How do participants describe their experiences of a receptive raga music therapy experience in the alap movement on sitar?

Quantitative Questions

(a) What is the effect of raga on the participants' states of attention or alertness as viewed by EEG brain wave power (delta, theta, alpha, beta, and gamma) during the receptive raga music therapy experience in the alap movement?

(b) How do the various movements in the alap movement in the recording correspond with their EEG readings of brainwaves, during and after the receptive raga music therapy experience?

Hybrid Question

In light of qualitative interviews with participants, in what ways does the EEG data contribute to a more rich and nuanced understanding of how receptive raga music therapy experiences in the alap movement affect the participants' states of mind?

Arts-based Creation Questions

(a) In what ways does the arts-based hermeneutic comprovisation of two participants, who have converging and diverging experiences, deepen understanding of the phenomenon under investigation?
(b) What were the instrumentation, creative givens and artistic/technological constraints used in the ABR?

Chapter Outline

In Chapter 1, I introduced the topic of investigation and discussed its relevance. Key terms relevant throughout this thesis were introduced. Then, contextual considerations were discussed, including my personal relationship to the topic, my foundational research, and subsequent rationale for the current research. Assumptions, a statement of purpose, and the research questions were presented. Chapter 2 leverages my lived experience, and the literature related to raga, examining concepts of *nada* and *rasa,* its timbral qualities, and raga's appreciation across both intracultural and intercultural contexts. I explore existing studies on the emotional and neurological effects of raga and its use in music therapy, as well as the role of Daoist and Vipassana meditation in creating mindfulness inductions, concluding with the relevance of these practices in the context of receptive raga music therapy. In Chapter 3, I outline the research methodology, which involves a mixed methods approach combining neurophenomenological, interpretative phenomenological analysis (IPA) and arts-based research. I explain the study's delimitations, participant recruitment, and data collection procedures. Chapter 4 presents the findings of the study, guiding readers through the qualitative findings and quantitative results. The chapter includes interview excerpts and detailed EEG data for each participant, illustrating their neurological responses. It also consists of the arts-based hermeneutic research process. Finally, in Chapter 5, I merge the EEG and qualitative data sets for all 6 participants and relate them to the broader literature. Within this section, I include the arts-based hermeneutic comprovisation process and insights. I finally outline the limitations and implications of the study.

Chapter 2. Literature Review

This chapter explores in more depth the relevant background information related to raga and how it can be defined. The intracultural nature of raga within India is explored and intertwined throughout this chapter. The current literature in the field, including receptive raga in mental health settings, is also addressed, incorporating empirical research and traditional methods such as Nada Yoga and Raga Chikitsa. The unique timbral qualities of the sitar are discussed within the paradigm of raga. As previously mentioned, tala, the complex Indic rhythmic system that is intertwined with raga, is not a focus of this research as I studied the alap movement, which does not involve fixed meter or percussion. Induction and meditative practices, particularly from South and East Asia, are explored, but early Greek and Egyptian meditative and hypnotic practices have been omitted to fit the scope of this thesis. Receptive practices in music therapy, such as GIM and regulative music therapy (RMT) are surveyed, with a specific emphasis on their various induction processes. Myth archetype, the collective unconsciousness, and transpersonal states are presented from multiple cross-cultural perspectives with a focus on Chinese Daoism and also in reference to Indological spirituality and philosophy. Other raga music therapy interventions with non-South Asian populations are discussed as well as the need for continued multimodal research.

Developing a Culture and Music-Centred Understanding of Raga

India is one of the most culturally rich and diverse places on earth. For centuries, various cultures have imperialized, settled, and immigrated to India (Manaranjanie & Dona, 2012), resulting in a varied and populous landscape, which has 1.4 billion people, approximately 17.5 percent of the world's population (United Nations, n.d.).Yet, in this multicultural mosaic, Indian classical music has maintained a distinct musical system (Neuman, 1990). Unwavered by external influences, it is perhaps the combined spiritual, philosophical, psychological, and profound aesthetic nature of raga (Bailly, 2007; Sundar, 2005) that has enabled it to touch people of various religions, ethnicities, socioeconomic backgrounds, and languages. Schrauf (2009) defined intracultural variation as people who have cultural differences yet belong to a larger shared cultural group. Raga could be seen as an intracultural phenomenon that unifies such a group despite their differences.

In this section, I explore the intracultural yet multicultural nature of raga. I discuss the salient philosophical and timbral concepts related to raga while focusing specifically on how raga is expressed using the sitar in the Hindustani paradigm. This focus is in part from my own experience as a student of Hindustani classical music (whose primary instrument is the sitar) while also addressing Carnatic music as an individual of South Indian (Tamil and Malayali) descent who has attended classical Indian music festivals of that tradition. Second, I explore how raga is appreciated both intra- and cross-culturally.

Raga as Resonance: Concepts of Nada and Rasa

An important concept has resonated throughout India interculturally (Beck, 2006), as found in the Vedas (4000–1000 BCE) and Upanishads (1000–400 BCE; Beck, 2006; Danielou, 1995): from these ancient Indian texts, Indian philosophers and theorists put forth that the laws of harmony, nature, musical modes, and human emotions are all connected. In this Vedic philosophy, *nada* is the elemental sound or vibration that links consciousness and the entire universe in all its materializations (Danielou, 1995; Moffitt Cook, 2025; Sundar, 2005). One's consciousness is transcendentally connected to God or Brahma, which is essentially the initial ohm that created the universe (Beck, 2006).

A complementary philosophy described in the Nāṭya Śāstra (200 BCE–200 CE), an ancient manual of the arts is *rasa* or the essence, flavour, or aesthetic experience (see Key Terms, p. 3 section; Bailly, 2007). Rasa does not only apply to music; it relates to any artistic practice that can produce an aesthetic experience (Bhagwati, 2003). In rasa theory attributed to the Sage Bharata Muni, entertainment is a positive side-effect of art but far from the primary objective (Bailly, 2007). Rather, in rasa, the primary objective of the arts is to take the listener to another reality, where they experience the inner workings of their consciousness. Following such experiences, the listener may have spiritual and moral dilemmas and subsequent personal insights (Bailly, 2007).

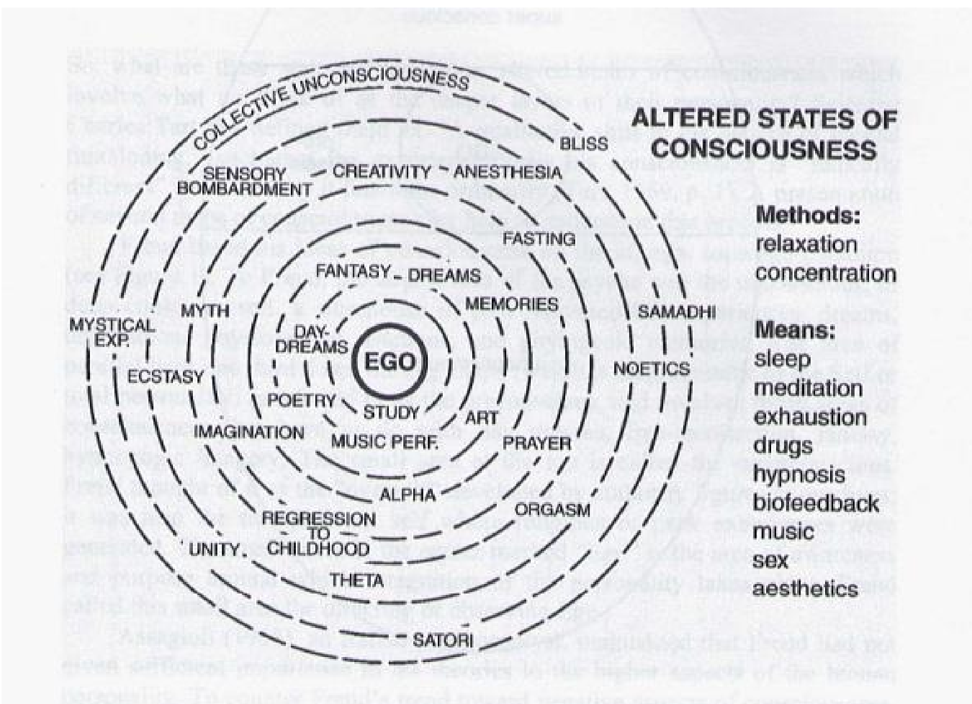
Raga, an extension of nada and often linked to rasa theory, allows a vibrational resonance in the listener (Kaufmann, 1965) that evokes a range of emotions aligning the individual holistically while synchronizing them to the earth's biorhythms (Brummel-Smith, 2012). The ancient Indian relationship with vibration, resonation, and raga's transcendent, and celestial aligning qualities extend to the instruments and timbres used in classical Indian music.

Interestingly, rasa and nada have similarities to some perspectives adopted by pivotal music therapists who have shaped contemporary music therapy practice. Helen Bonny, through her research in GIM, had charted the rings of consciousnesses in what she described as the

Bonny Model of altered states of consciousness (Kenny, 2006). She described music as one avenue to extend beyond the ego self (at the centre of the rings) towards alpha wave states, regression to childhood and imagination; this state is followed by theta wave activity, which are in the outer rings or consciousness where one might experience myth, and finally mystical experience that is far from ego (see Figure 1). In Bonny's model, this process leads to the Jungian collective unconsciousness and the Hindu and Buddhist concept of *samadhi* (Kenny, 2006), which is Sanskrit for the highest reality. Like Bonny, music therapists Carolyn Kenny and Charles Eagle viewed sound vibration as central to and intersecting various disciplines including music therapy, music education, music psychology, and neuroscience (Kenny, 2006).

Figure 1

Bonny's Cut Log Diagram of Consciousness



Note. From Bonny & Tansill, 2002, in L. Summer (Ed.), *Music & consciousness: The evolution of Guided Imagery and* Music (p. 82). Copyright Barcelona Publishers. Reprinted with permission.

Timbral Implications of the Drone, Sitar, Meend, Pitch, and Contour

The Drone. A polyphonic timbral commonality always present in raga is the drone. Indian classical music does not share the Western, or more specifically Eurogenetic, perception or philosophy of harmony and counterpoint. Rather, a drone permeates throughout the composition as a sonic foundation for the melody. This drone, usually on the tonic and dominant, emanates throughout the whole composition. It is sometimes played, depending on the gharana (conservatory) or instrument, by a separate musician on an accompanying stringed instrument such as the tambura (see Figure 1) or an electronic emulation.

The tambura's similar resonating chamber to the sitar allows the accompanying musician to create the drone by plucking 4 strings in a subsequent pattern before each string's spectral envelope has a chance to decay. In the Etawah or Imdadkhani gharana, the sitarist relies on the resonating drone of the sitar itself. The instrument's overtones blend, creating the perception of a constantly suspended note. The drone also creates a musical pedal point where various melodic variations can extend from (Manaranjanie & Dona, 2012; Powers, 1958). In my experience as an international performer and music therapist, the drone itself has had significant impact on the listener. I have witnessed European and American uninitiated listeners remark about how meaningful or meditative the drone was for them. Individuals in my music therapy sessions in Canada have appreciated its constant presence; they remarked that it focused their attention and prepared them for what was soon to unfold in the listening experience.

Figure 2

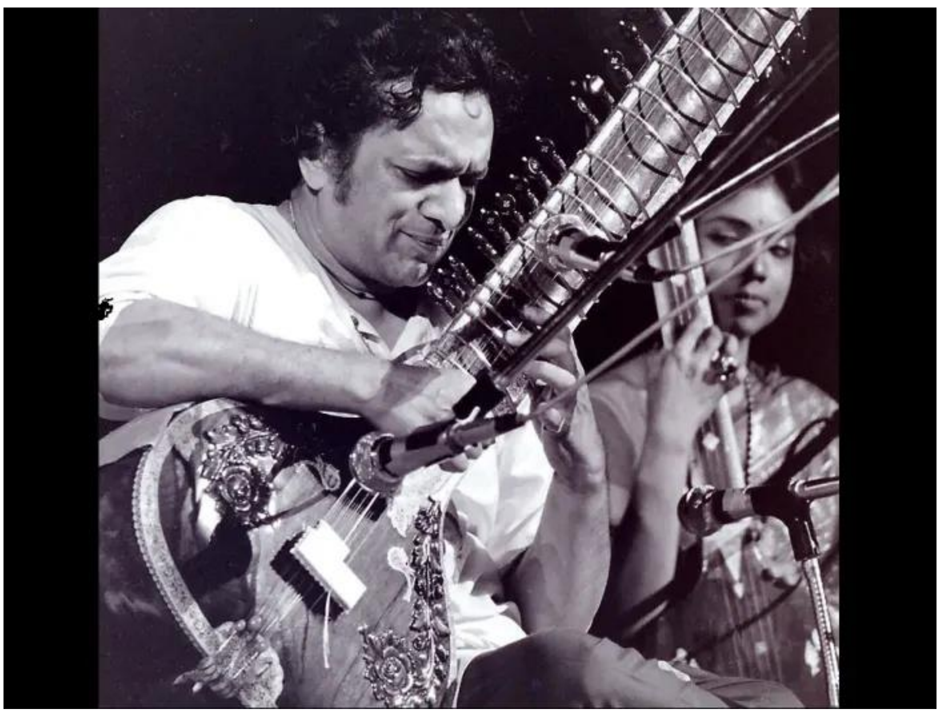
A Close-Up of a Tambura

Note. From T. Maari, 2012. Copyright CC 3.0.

The Sitar. Raga, which was originally inspired by the voice (Rao et al., 2014), is also expressed on a variety of pitch-based instruments. The early concept of instrumental timbre previously generalized timbre to one specific instrument. However, researchers in psychoacoustics have found that there is a variation of timbres emitted from one instrument due to various factors; they view timbre as a set of multidimensional auditory attributes that comprise the temporal and spectral features of sound (Tillmann & McAdams, 2004). How an instrument is played – the volume, register, polyphonic capabilities, and timing of microtonal gestures –greatly affect the timbral and subsequent perceptual qualities evoked by the instrument (S. McAdams, personal communication, August 12, 2019). Even though raga and timbral elements inherent to the musical system can be played on many other instruments, the sitar (see Figure 2) has unique timbral attributes.

Figure 3

Ravi Shankar Playing the Sitar at the Woodstock Festival August, 1969



Note. Photo by Markgoff2972 (https://upload.wikimedia.org/wikipedia/commons/6/60/Ravi_Shankar.jpg). Copyright CC BY SA 4.0

This North Indian plucked string instrument resembling a large mandolin has a series of 8–12 strings underneath the instrument that are particularly tuned to the notes in each raga prior to each performance. These strings are not plucked but rather resonate when the other strings are played. The distinct timbre of the sitar, other classical Indian instruments, and even the voice may be a fundamental part of the distinct aesthetic experience for the listener. The timbral envelopes on the sitar are also very complex in comparison to other plucked instruments; the flat bridge on the instrument disturbs free vibration of the string, creating complex and uncharacteristic overtones (Siddiq, 2012).

The Meend. The use of meend (pitch bends) in Indian music is shared in all ragas and is unique from other genres in that each note blends into the other (Jairazbhoy, 1971) in various and specified ways. On the sitar, the main string is struck with the plectrum (*mizrab*) in many ways through left hand gestures that create a unique nuanced vibrato called gamak (Slawek, 1987). Thus, microtonal nuances become a musical or nonverbal form of communication that could be compared to the prosody of speech. A well-executed raga, when performed with attention to its microtonal, gestural, dynamic, and register requirements on any instrument, (including the voice) can reveal the essence (bhava) and structure of the raga, creating a perceptual and emotional experience (rasa) for the listeners.

Pitch and Contour. Raga as a nonverbal language is passed from teacher to student. The current Carnatic (South Indian) raga system is based upon a 72-mode system mathematically formulated by Venkatamakhi (1633–1673) using various combinations and tuning arrangements (Sundar, 2005) specific to each raga. Although the early heptatonic scale system that evolved to be raga independently and coincidently share similarities to the Eurogenetic diatonic system (Clough et al., 2025), raga does not use the tempered scale system as in European classical music. Rather, each raga is microtonally adjusted according to the specifications of the raga (see the definition of raga in the Key Terms section, p. 3). Ragas are primarily a type of just tuning where the perfect interval is a proper 3:2 ratio (Jairazbhoy, 1971) as opposed to the tempered system which, although first invented in China during the Ming Dynasty by Zhu Zaiyu (Wang, 2021), has been primarily applied in Eurogenetic music.

Indologist Danielou (1995) believed that these perfect intervals, less common in the Eurogenetic system (although not exempt), are an avenue for musical healing to take place. In both the South and North of India (Jairazbhoy, 1971), ragas have evolved from early heptatonic ragas. The current North Indian system is a 10-mode system and share some ragas with the South Indian system. Each raga has a set of rules or musical givens set for the performer (Jairazbhoy, 1971) to allow for the raga composition and its subsequent extemporization to unfold. The teacher normally has the student memorize patterns until the student has internalized the structure of the raga. An advanced student would then be able to play the more nuanced and expressive movement – the alap – somewhat intuitively. In alap movements, studies have found commonalities across ragas regarding the development of motifs (Viswanathan, 1977). These motifs tend to adhere to a pattern and contour where they start in the lower register, move to the upper register, and return to the lower register upon completion (Viswanathan, 1977). One might speculate as to how this contour affects the listener's perceptual and aesthetic experience regardless of the raga that was selected. Typically, with some exceptions in Carnatic music (Raman & Dowling, 2016), the player stays within one mode and tonal centre for the duration of the raga. The gradual variations and development as specified in the genre may give the listener the opportunity to slowly make sense of the music and emotionally respond to it.

Intracultural Appreciation of Raga Across India

Despite the differences between Hindustani (North Indian) classical music and Carnatic (South Indian) classical music and the unique variations from the many gharanas (conservatory), raga is a musical system that continues to be appreciated intraculturally in India. Renowned classical Hindustani sitarists such as Ustad Shahid Parvez Khan (Paul, 2018) and Pandit Ravi (Shankar, 1995) have acknowledged Carnatic music and its influence on their music. Likewise, Hindustani performers have been invited to well-known festivals in the South such as the Chennai Fine Arts Festival in 2014.

During the metered section of the performance by a performer in Hindustani Raga, I have witnessed appreciative South Indian festival goers responding through customary intricate hand gestures representing each section of the taal (rhythmic meter) of the performance. Not unlike the specific gestures of a conductor indicating the beat within the measure, each Indian gesture marks the beat within the long rhythmic cycle. Simultaneously, the performer skillfully and at times mathematically weaves around the beat played by the percussionist while finally ending on and accentuating the *sama* or first beat of the measure (S. K. Saxena, 1979). In this context, the audience is not marking time for the performer but rather indicating that they are following, responding to, and appreciating the music. Performers often adjust their musical selections and playing in real-time according to the response and musical understanding of their audience (S. K. Saxena, 1979). Thus, the music becomes a nonverbal conversation between performer and audience member. Even within India, it is apparent that audiences may have many different levels of understanding and appreciation of this complex classical music system (Neuman, 1990). However, as in other forms of art music, many listeners, expert or novice, appear to experience rasa and therefore be moved by and appreciate the music.

Cross-Cultural Appreciation of Raga

As mentioned previously, to date classical Indian music is one of the few classical music systems that has not been influenced by the Eurogenetic music system and has ventured outside of its borders to find widespread appreciation (Neuman, 1990). This musical system has permeated the vast South Asian diaspora, an area that is one fifth of the world's population and comprises people who identify with various ethnicities, religions (e.g. Sikh, Hindu, Christian, Muslim), social mores, languages, and socioeconomic statuses. One might wonder how raga may be received with multicultural populations outside of the South Asian region. Raga has gained attention from the European and North American classical music community, influencing artists such as violinist Yehudi Menuhin (Menuhin & Davis, 1979) and minimalist composer Phillip Glass (Thomas, 1986). Raga has further influenced pop rock artists like the Beatles, such as the "Within Without You" track on their *Sgt. Pepper's Lonely Hearts Club Band* album (The Beatles, 1967), as well as jazz artists like John Mclaughlin during the Mahavishnu Orchestra (1971–87) and more recent Shakti project (1976–present). Raga has not only casually inspired these artists but also led them to seek the intensive and life-devoting training and philosophical worldview required of this music while incorporating it into their musical creations. George Harrison of The Beatles (Inglis, 2013) and Glass (Thomas, 1986) studied with Pandit Ravi Shankar, and Mclaughlin, in addition to his known study with Pandit Ravi Shankar and Ustad Ali Akbar Khan, also studied with Carnatic Veena player Dr. S. Ramanathan (Tiwari, 2015) for many years.

Often, the creative outputs from the blending of two worldviews take on a life of their own. For example, intercultural composer and researcher Sandeep Bhagwati explores elements of Indian classical music and rasa theory in his own creative works. He has developed an explanation as to what happens during the integration of new musical systems. Bhagwati's work adds to the model of aesthetic perception found in Sanskrit tradition (HKW – Haus der Kulteren der Welt, 2019). In the Sanskrit model, the artist produces a series of signifying sonic gestures or bhava that are then perceived by the listener to create an emotion or rasa. Bhagwati ascertained that when crossing cultures, many creative misunderstandings can happen where bhava might produce a rasa that is not traditionally intended (HKW – Haus der Kulteren der Welt, 2019). He calls this “Pata” music, which allows a new perception of reality for the individual (HKW – Haus der Kulteren der Welt, 2019). Perhaps this new perception of reality with uninitiated listeners may allow a new insight, where listeners look at their lives in a new way and from a different perspective.

On the other hand, one may continue to wonder if humans have a universal or natural predisposition to bhava or the language of emotion inherent to this music. As I stated previously in this chapter, it has been proposed that humans have had a natural and independent discovery of the heptatonic system in both the East and the West (Clough et al., 2025). Gurus of the tradition have a spoken discourse that the initial ragas were first inspired by the songs of birds (U. Neumann, personal communication, August 5, 2010) and linked to the sounds of animals and nature (Sankar Ganesh, 2020). The Gandharvas, celestial beings in Indian mythology associated with Indian musical texts, were divine, imaginative, and musical virtuosos of raga; these demigod-like individuals were said to be the musicians and singers of the gods and those who passed raga to humans (Adhikari, 2022). Moreover, they were often depicted as half animal with bird and humanoid characteristics (Adhikari, 2022). These celestials have been equated with creating, refining or beautifully employing the moveable seven note do system in Indian music, composed of sa, ri, ga, ma, pa, da, ni, and sa (Adhikari, 2022). The microtonal ornaments within each note are often metaphorically linked to birds and other animals. For example, the root note *shadja* (sa) is reflective of a peacock seeing rainy clouds, the subdominant note *madhyama* (ma) is the cry of a heron, and the dominant *panchama* (pa) is the song of the nightingale (Sankar Ganesh, 2020).

French composer Francois Bernard Mâche (2001) viewed musical structures as related to archetypal patterns that are found in nature as well as bird songs. He reflected upon bird songs operating on principles like music, including the development of themes and elaboration within similar syntax while returning to certain themes (Mâche, 2001). Mâche viewed human neural pathways as prewired to be receptive to musical patterns in the environment regardless of familiarity (Mâche, 2001). This predisposition may in part explain how raga can be perceived, quickly made sense of, and subsequently move listeners cross-culturally who have exposure and understanding of the music. In the next section, I look at the scientific study of raga, paying particular attention to the perception of familiar and unfamiliar listeners, as well as intracultural and cross-cultural therapeutic applications.

The Scientific Study of Raga

As this is an interdisciplinary research aiming for a multimodal and multicultural understanding of raga experiences, I incorporate knowledge from various epistemological stances in this review. This section presents empirical findings from the fields of music psychology, auditory cognitive neuroscience, and music therapy on how familiar and unfamiliar listeners may process and experience music systems in general and then more specifically, raga. Sections are organized as follows: Perception and cognition studies with familiar and unfamiliar listeners, emotional perception studies with unfamiliar and familiar listeners of raga, music therapy studies on intra-cultural receptive raga experiences, and music therapy studies on cross-cultural receptive raga experiences.

Perception and Cognition Studies with Familiar and Unfamiliar Listeners

Perception and cognition studies (Curtis & Bharucha, 2009; Kessler et al., 1984; Kopiez et al., 2003) have found that listeners tend to default to their enculturated knowledge in processing music when listening to unfamiliar music. At the same time, they appear to adapt very rapidly and successfully to new systems in music listening experiences (Krumhansl, 2000; Rohrmeier & Widdess, 2017). Kessler et al.'s study (1984) with Balinese music, which features tonal and scale systems that are quite distinct in comparison to the Eurogenetic music system as well as the Indic music system, found that both Balinese listeners (with various exposure to Eurogenetic music) and those categorized as Western listeners at Stanford University used similar strategies to identify whether a probe tone (a suggested note played by the researcher) fit following a musical excerpt. This determination included assessing scale membership, pitch height, and statistical regularity (Kessler et al., 1984). Balinese listeners with no knowledge of Eurogenetic music systems were able to pick up the tonal hierarchy in Eurogenetic scales (Kessler et al., 1984). Ayari and McAdams (2003) found that both unfamiliar Western and familiar Arabic listeners were receptive to similar structural elements that indicated new segments in the maqam (Arabic mode). These elements included pauses in the music and shifts in tonality, indicating changes in the performance. In addition, listeners of both cultures relied on their internal tonal schemata, such as tonal hierarchy and scale membership, when they were more familiar with the scales (Kessler et al., 1984). Studies have found that unfamiliar European and North American listeners are less receptive to modal changes (Ayari & McAdams, 2003) and quarter tone pitch discrimination (Globerson et al., 2016) than familiar Arabic listeners.

Hindustani Indian classical music is a stimulus that shares some similarities with the Eurogenetic tonal system. For instance, it has tone and semitone-based scales (Clough et al., 2025), and when a microtone is used, it always arrives or departs on a tone or semitone. Changing the raga can require microtonal fine-tuning of intervals or shruti. Many ragas are based on the Ionian (major), some on Aeolian (minor) modes, and others on shared Greek modes. In accordance with the previously presented literature, Curtis and Bharuka (2009) found that Western unfamiliar listeners at two New England colleges ($N = 18$) used their enculturated knowledge of the major mode to make inaccurate judgments of correct probe tones of a major raga compared to when those same listeners heard Raga Bhairavi, a Phrygian-based and more unfamiliar raga. This result adds to findings that preconceptions can bias an individual's ability to internalize musical syntax. In general, the literature suggests that cultural preconceptions can both hinder an individual's accurate judgement in an unfamiliar music listening experience and fine-tune judgement in a familiar experience (Kopiez et al., 2003).

In contrast, in a study comparing familiar ($n = 8$) and ($n = 8$) unfamiliar listeners, both groups gave higher rankings to tonic and dominant notes as fitting in the 10 Hindustani ragas under study (Krumhansl, 2000). This result was predictable as both systems use these intervals as fixed tones across scales. A less predictable finding was that both familiar and unfamiliar listeners gave high ratings to the *vadi* or strong tone that is uniquely inherent and emphasized in a specific raga. On the other hand, familiar listeners were more sensitive to tones that should have been omitted in the specific raga. There was only little evidence that unfamiliar listeners were influenced by previous schema when rating probe tones of ragas that shared major or minor parent scales (Krumhansl, 2000). Overall, there were many commonalities between groups, again suggesting shared perceptual mechanisms as well as in-the-moment learning of subtle musical syntax (e.g., vadi tones).

The phenomenon of listeners adapting quickly to different musical systems (Krumhansl, 2000; Rohrmeier & Widdess, 2017) could be defined as incidental learning (Rohrmeier & Widdess, 2017). The individual gains awareness of the structure without an explicit understanding of the rules governing that structure (Rohrmeier & Widdess, 2017). The alap movement (see Key Terms, p. 3) is a highly nuanced protocol with specific requirements for each raga. It is extremely difficult for the rules to be explicitly taught; rather they are often nonverbally and implicitly transferred from teacher to student. One may wonder then if unfamiliar listeners would be able to decipher subtle differences between similar ragas. Rohrmeier and Widdess (2017) explored the jhor sub-movement (see Key Terms, p. 3) in the alap of two different ragas (Tori and Multani) as stimuli with unfamiliar musicians and non-musicians. These ragas share the same mode but have different rules for ascending and descending movement (i.e., certain notes are omitted or played depending on the previous note, resulting in each raga having a distinct melodic motif). The ragas were selected as they do not use Ionian or Aeolian modes to account for the previously described enculturated-based judgements. One group (*n* = 28) heard the first raga, and the second group (*n* = 31) heard the second. Both groups were given a brief explanation of alap and the jhor submovements being used. Following the demonstration and instructions, both groups were played motifs from both ragas and given a rating scale to determine which raga best fit with their initial example and to rate their level of confidence. Both musician and non-musician groups performed above chance after only 10 minutes of exposure to the appropriate raga and felt that they had high confidence in their ratings. Results suggested that familiarization through incidental learning can happen very quickly. The researchers hypothesized that participants' accuracy may increase after additional exposure to the raga (Rohrmeier & Widdess, 2017). As ability to predict music is linked to emotional responses (Rohrmeier & Widdess, 2017), it becomes important to look at how raga can affect emotions in unfamiliar listeners.

Emotional Perception Studies With Unfamiliar and Familiar Listeners of Raga

Juslin et al. (2010) identified 7 mechanisms: brainstem reflex, rhythmic entrainment, evaluative conditioning, contagion, visual imagery, episodic memory, and musical expectancy by which music can induce an emotional response. Of those mechanisms, rhythmic entrainment, emotional contagion (where the listener interprets the emotional expression of the music and mirrors the emotion internally), and visual imagery are not dependent on the listener's familiarity with the music. This section focuses on studies pertaining to unfamiliar and familiar listeners' perceptions of the emotional expression of ragas (emotional contagion) and entrainment.

Bowling et al. (2012) used several modes with various emotional qualities in either Eurogenetic or Carnatic Indian music with native English (*n* = 3) and Tamil speakers (*n* = 3) and found that larger tonal intervals in modes elicited happiness, whereas modes with smaller intervals demonstrated more subdued emotions in both listening groups. Collier and Hubbard (2001) have investigated how scale direction and form can also influence individuals' perceptions of Eurogenetic scales. Balkwill and Thompson (1999) found that both familiar and unfamiliar listeners had similar experiences of the emotional effect (rasa) of the ragas in alap movements as they did when listening to Eurogenetic scales. Balkwill et al. (2004) found that Japanese listeners of raga ($N = 56$) were also able to discern suggested rasa of each raga played on various instruments in alap movements, despite reporting that they had never heard the genre at all. In another cross-cultural study, Chordia and Rae (2007) asked participants ($N = 280$) via online survey to listen to two 5-minute excerpts of two ragas and rate the emotional response that each raga evoked. Participants responded through free-writing and sliding rating scales, and responses varied according to raga but there was agreement across listeners. For example, major/mixolydian scales such as Desh and Khamaj were found to have positive valence such as joy and happiness and Marwa, a hexatonic raga with an omitted fifth tone, was associated with sadness and melancholy (Chordia & Rae, 2007). Another study (Gregory & Varney, 1996) had Western participants from the University of Manchester and participants of Indian cultural background judge through forced choice the mood, title, and seasons for Eurogenetic classical excerpts, new age music, and raga. Despite subtle differences in adjectives, there was general agreement between listeners for the Eurogenetic classical and raga genres.

On the other hand, Wong et al. (2009) found cultural differences in perception where Western unfamiliar listeners of raga ($n = 12$) judged unfamiliar classical Indian music as more tense than a familiar Eurogenetic classical stimulus, whereas Indian ($n = 22$) listeners judged the Western classical music as more tense. Those determined to be Indo-Western listeners ($n = 13$) found no difference in tension. Wong et al.'s study suggested that unfamiliar listeners may initially experience tension in new music – an important consideration when contemplating the use of unfamiliar music in therapeutic settings.

Neurological Studies on Intra-Cultural Receptive Raga Experiences

Raga experiences have also been studied with familiar listeners through EEG research, producing significant findings concerning brainwaves, perception, emotion and meta-cognitive processing of raga. Geethanjali et al. (2019) asked Indian participants (N = 16) to choose between raga Bhairavi and raga Dharmavati to assess participants' brainwave responses to a preferred stimulus; the participants selected raga Dharmavati as a stimulus with positive valence and low arousal, making it the preferred raga for their actual music experience in the study. Following the music experience, participants' readings indicated an increase in theta wave energy in the bifrontal cortical region, indicative of positive experiences including trancelike, rapid-eye-movement, meditative, and blissful states (Aftanas & Golocheikine, 2001; Kim et al., 2022). Beta waveforms in the frontal locations were decreased. U. Gupta and Gupta (2005) looked at non-musician participants' ($N = 80$) EEG waveforms, as well as heart rates and anxiety-measuring scales following an experience of raga Desi-todi on the Indian flute for 30 minutes over 20 days. Participants displayed an increase in alpha wave frequency indicative of relaxed and reflective states during the experience and decreased anxiety via the measuring scale. The researchers found that participants had few psychophysiological responses of reduced stress (U. Gupta & Gupta, 2005).

Hegde et al. (2012) studied the larger overarching movements of a raga including the alap. Through quantitative analysis of participants' responses, they found that valence and emotional arousal were more influenced by the changes in movement than by the actual raga, thus giving evidence that non-culturally specific entraining cues can affect emotion. Hedge et al. also found that fast musical runs and a shorter attack time were more evident of arousal than the specific raga (Hegde et al., 2012). S. Sharma et al. (2021) looked at the gradually increasing changes in tempo and movement toward the higher register that is characteristic of the subsequent movements in the raga. Participants who listened to the excerpts with this musical variability showed decreased anxiety, as reflected in EEG and anxiety-measuring tools in relation to the participants who were given excerpts with slow nonvariable movement, such as new age music or complete silence. In addition, the musical variability group also exhibited controlled mind wandering (mindfulness) through an ability to oscillate between "focus on self" and "focus on music" (S. Sharma et al., 2021).

How the movements in raga can support mindfulness could be further explored to help reduce stress and anxiety, thus fostering wellness in clinical settings. As such, Hedge (2017) advocated that understanding raga listening experiences through neurological measuring tools would give a new understanding of the therapeutic potential of both raga and music therapy. The idea that neuroscience-informed research may help better understand the music therapy listening experiences of participants was corroborated by Hunt (2017b) who conducted a neurophenomenological research with individuals' ($N = 4$) experiences of a GIM intervention with Western classical music, finding that individuals displayed high beta readings reflective of engaged mental states and gamma readings reflective of focused attention. My research aims to contribute to emergent knowledge in this area. Next, I look at current music therapy studies that use raga intra-culturally.

Music Therapy Studies on Intra-Cultural Receptive Raga Experiences

As previously mentioned, raga has been used for its transformational and healing qualities for centuries. However, only recently have these traditional practices been explored within modern music therapy practices. Music therapy scholar Sundar (2007) explored the integration of traditional Indian healing systems, specifically Nadopasan, Ayurveda Yoga, Raga Chikitsa, and Nada Yoga, into modern music therapy practice in India. Nada Yoga is an early form of yoga or mind-body visualization practice related to sound that incorporates heptatonic raga. Raga Chikitsa is a related method that uses focused listening to the inner sound within one's body to facilitate healing and allow an avenue to explore consciousness (Sundar, 2007). An example in Nada Yoga might be the sa, representing the lower chakra, with a middle or subdominant or dominant note representing the body centre, and a higher note might resonate the third eye in the forehead. The music becomes a means of bringing harmony or aligning these centres, which can lead to mind-body wellness. Sundar (2007) incorporated the ancient Raga Chikitsa method with heptatonic ragas while also adapting it to contemporary receptive music therapy practices in India (Sundar, 2007). Her Carnatic raga-based approach broadly incorporates applying musical works with a specific emphasis on swara (note) sequences, ornamentation, and gesture, as well as appropriate rhythms depending upon the needs and goals of the client and their familiarity with Indian classical music. For example, Sundar found that ragas with larger tonal intervals had space for ornamentations and lengthy, slow movements; hence, they could be used for relaxation, while ragas having modes with smaller intervals elicited energy and happy states (Sundar, 2007).

Receptive raga experiences have been shown to boost self-esteem in adolescents when practiced over a 15-day period (M. Sharma & Jagdev, 2012), and in another study, they were found to reduce depression levels and improve sleep quality more effectively than the group receiving psychotropic drugs (Deshmukh et al., 2009). In a clinical study involving patients undergoing electroconvulsive therapy (ECT), Sundar et al. (2020) compared a group receiving ECT alone with a group receiving both ECT and receptive raga music therapy. The group receiving both ECT and raga experienced improvements in cognitive scores, anxiety, and depression compared to the control group that only received ECT (Sundar et al., 2020).

The above examples show how early and time-tested practices with accommodations for contemporary clinical needs have returned to India following post colonization. Further understanding about the use of raga in Indian music therapy practice could give insight into how individuals may experience receptive raga music therapy experiences cross-culturally, which I explore next.

Music Therapy Studies on Cross-Cultural Receptive Raga Experiences

An individual's context, including emotional state, musical preferences, prior experiences and environment, is involved in the aesthetic experience (Ruud, 2013) of both intra- and cross-cultural listeners of raga. Thus, an individual of a certain age and of Canadian origin listening to Pandit Ravi Shankar may find the music reminds them of 60s North America, while another might recall a very different time and place. In a therapeutic setting, this phenomenon may lead to experiences of the past or feelings of nostalgia. Apart from my master's thesis (Venkatarangam, 2017), there has been no research to date looking at the cross-cultural experiences of raga in receptive music therapy settings. However, Swamy (2011, 2018), a music therapist, classical Indian musician, and advanced GIM trainee, has done vital receptive music therapy research with individuals of South Asian ethnicity living in North American contexts. Through her own autobiographical experience as well as her rich narrative research in the field, Swamy found that South Asian individuals living outside of India preferred music that incorporated raga, as it allowed them to explore their cultural and ethnic identities as well as societal factors affecting their lives (Swamy, 2011). Further research could give more insight into how raga in cross-cultural music therapy experiences can affect individuals who may not have an explicit cultural connection with this music. As such, my research seeks to add to the knowledge of how a music that has moved the culturally diverse inhabitants of India might make sense in culturally diverse settings in North America. Next, I make a necessary detour to illuminate the cultural origins of inductions and their use in music therapy practice. I also highlight the practice's relevance within receptive raga music therapy experiences.

The Origins and Use of Inductions in Music Therapy

In GIM (Bonny, 1969), RMT (Schwabe et al., 1987), raga therapy (Sundar et al., 2020), and other receptive music therapy practices, broadly speaking, inductions are used to help participants reach a relaxed state of focus and to help them engage in the music listening experience. One could relate inductions to guided meditation. Although there is no conclusive definition as to what meditation is (Nash & Newberg, 2013), it can be described as a purposeful cognitive method allowing an individual to achieve an intended result, including (but not limited to) concentration, focused attention or awareness, passive observation, becoming devoid of attachment, as well as having imaginative or visualization experiences (Nash & Newberg, 2013). In this section, I discuss two Asian meditation traditions that have similarities with and have potentially influenced inductions used in music therapy, namely Chinese Daoist visualization and Indo-Tibetan Buddhist Vipassana. For each of these meditation traditions, I introduce a related music therapy model that has similar induction methods to the above-mentioned. I then discuss the relevance of these induction types when facilitating receptive raga music therapy experiences. Given the scope of this thesis, I omit early Greek and Egyptian meditative and hypnotic practices.

Daoist Visualization Meditation

Buddhist Vipassana (mindfulness), a focused attention metacognitive-based meditative practice, has become widely embraced by global audiences through practitioners like Kabat-Zinn (2009), but there is relatively less awareness of methods of visualization meditation (Kohn, 2016). Broadly speaking, visualization as a practice is using the imagination to understand and process concepts in a way that brings new meaning to them (Timalsina, 2017). As a result, one can access new avenues in the mind and recognize how imagination intertwines with our perceived reality as a mechanism of self-realization and change (Timalsina, 2017). The Upanishads, composed over many centuries, incorporate visualization-based meditation practices, appearing in many variations throughout the texts (Timalsina, 2017). Starting with the concept of connecting to Ohm in Hindu visualization practices as well as chakras, one may also visualize deities and emotions. Ultimately, through these avenues, one can enter transpersonal states of awareness and, through simultaneous and varied forms of visualization, have experiences that transcend one’s conception of reality (Timalsina, 2017).

Chinese Daoist visualization meditation practices are mentioned in the early Daoist scriptures such as the Taiping Jing (4th century CE) and not unlike Indo-Tibetan Buddhist (metacognitive/Vipassana) meditative practices, have been slightly influenced by other East and South Asian philosophies throughout the centuries (Robson, 2015). These visualization practices have been considered a key form of meditation in the Daoist literature (Robinet & de La Guéronnière, 1993). Meditation is not always explicitly referred to in these scriptures, but many stanzas serve as poetic or divine reflections and also include specific instructions for visualization and meditative practices (Robson, 2015). In traditional Daoist visualization practices, particularly with early practitioners, the meditator is often accompanied by a guide or master, as many of these processes can be quite complex. However, talismans, maps and scriptures may also act as facilitators in the meditation process (Robinet & de La Guéronnière, 1993). In Chinese Daoist visualization meditation, the individual mentally ingests forms of energy, connecting colour qualities to certain body parts to allow health and well-being, and associates these body parts with an external realm, internal cosmos, or greater Dao (Kohn, 2016; Kohn & Sima, 2010). For example, the mind region in the upper forehead (also described as the "cinnabar hut") and the "yellow court," the stomach or abdomen, are vital areas in Daoist scripture. One can begin to see parallels with Indian yogic tradition and early relationships to chakra centres, where referring body parts to colours and qualities are also present. Like the Chinese Daoist yellow court, the yogic/Hindu Manipura around the same area is also yellow in Indian tradition and is related to qualities of will and self-esteem (P. D. Williams, 2008). The Daoist cinnabar hut may be related to the third eye in Hindu and yogic and Buddhist and Vipassana traditions, and in yogic understanding, represents intuition and imagination (P. D. Williams, 2008) and is a vital energy centre. The *Most High Jade* scripture of the Internal View of the Yellow Court (4th Century CE) was a pivotal work as an older scripture in the Chinese Daoist collection whose influence spanned several centuries (Robinet & de La Guéronnière, 1993, p. 55). The yellow court itself, although literally a courtyard, symbolically represents the body in this context (Robson, 2015, p. 1636), and is a recurring metaphor of the body being a literal organism and an envisioned architectural space. The second stanza the *Most High Jade* is as follows:

> Above there are ethereal souls, below is the junction's origin.
> Left serves as lesser yang, the right as greatest yin.
> Behind there is the Secret Door, before is the Gate of Life.
> With the emergent sun and retreating moon exhale, inhale, actualizing them.
> Where the Four Breaths are well blended, the arrayed mansions will be distinct.
> Let the purple haze rise and fall with the clouds of the Three Immaculates.
> Irrigate and spray the Five Flowers, and plant the Numinous root. Let the channeled course of the seven Liquors rush into the span of the hut.

Circulate the purple, embrace the yellow, that they enter the Cinnabar Field.

Make the Shrouded Room bright within, illuminating the Gate of Yang. (Robson, 2015, p. 1640)

This particular stanza demonstrates a great deal of rich imagery and subsequent guidance for visualization meditative practice that retains its influence centuries later.

The first line begins with a description of different body parts: the liver, lungs and spleen, representative of the heavens, and the point below the navel represents the underworld (Robson, 2015, p. 1640). Here, one can see a visualizing or reimagining of the parts of the body to be connected to an external, or in this instance, celestial, realm of existence. In other words, the meditator, through the words in this scripture, can focus on these specific parts of the body, thereby creating a sense of awareness while creating a secondary connection to external symbols. The verse appears to connect the meditator with three realms of existence, the mind, the body and the cosmos.

In line four, the verse describes exhaling with the sun and inhaling with the moon. Here, visual imagery is used upon exhalations and inhalations, where the meditator might be guided to concentrate on focused light emanating throughout various parts of the body (Robson, 2015), which is reminiscent of GIM practice (described later in this chapter). In line five, the verse describes the different breaths or phases that come together, which has been understood as fostering breath or bringing in new chi and expelling the old chi (chi being the vital life force that flows through all living things and the universe), and to become one with the Dao (Archangelis & Lanwing, 2010).

Next, the verse describes a purple smoke that permeates the body and is accompanied by other colours or waves that have their own unique qualities to nurture specific organs (Archangelis & Lanwing, 2010). This wording appears to be a clear reference to mental visualization as a means of facilitating healing. The colour purple is described as having qualities of eternal wisdom and yellow as possessing qualities of peace and focused observation (Archangelis & Lanwing, 2010). The colours are not only nurturing and insight-giving but also related to celestial deities who dwell within the different parts of the body, creating the impression that the internal realm of the body has the capacity for healing while being connected in some manner to the external and celestial realms.

The idea of connecting body parts to areas outside of the external self is reflective of South Asian Kundalini yoga practices, which are believed to be related to practices developed at the time of the Indian Rig Veda (Doniger, 2015). The body is not only a physical energy but also a means to connect to the greater universe, which, in Indian understanding, is connected to the Ohm (the divine sound) or Brahma (Beck, 2006), whereas in Daoism, it is connected to the Dao, or the way. As mentioned, these vital body parts are also present in Ayurvedic, Tantric, and subsequent Buddhist forms of meditation.

Another example of visualization meditation in the Chinese Daoist tradition comes from the *Marvelous Scripture in Purple Characters of the Lord Emperor of the Gold Portal* (Robson, 2015). This particular work involves swallowing a talisman with these words inscripted (p.1725):

> Yellow Right of Purple Tenuity
> Entitled "Grand Mystery,"
> Bring me to the waters of lunar efflorescence,
> To nurture my whitesouls, harmonize my cloud souls.
> This austere practice of the secret prescriptions
> Issues from the Mystic Pass
> Stored in heaven, concealed in the moon,
> The five Numinous Ladies
> Let flu their beams of light in nine paths,
> To illumine my Muddy Pellet (Robson, 2015, p. 1725).

The ingestion of the talisman may be a metaphor for internalizing the contents of the written passage. In this excerpt, the recurring theme from previous scriptures of the "yellow" (formerly described as a symbol of peace) and "purple" (previously having the quality of wisdom) are seen. The importance of the lunar light of the moon was also mentioned in the previous work. Here, the light is concealed in the moon and is unfolded in multiple directions expressed as female deities that finally reach a focal point at the forehead. It is as if this burst of energy gives way to a beam of inner insight. There is mention of balancing specific white souls and cloud souls and having spirits enter parts of the body. Again, the concept of balance or what could be interpreted as becoming one with the Dao, or universal flow of things, appears to be present. The mention of austere prescriptions also alludes to the healing nature of the described experience. What is slightly different in this scripture is the attribution of physical deities

(Komjathy, n.d.), in this case, the Numinous Ladies, entering body parts as opposed to only celestial lights, or palaces. The muddy pellet in the final line is translated as the centre of the nine palaces in an individual's head (Robson, 2015) and thus appears to be a novel introduction to what could in previous scriptures be considered the cinnabar hut. This focal point is where the illumination or enlightenment occurs. The final line has also been interpreted as Nirvana (Robson, 2015), which would possibly give evidence of Buddhist influence of terminology entering the Daoist canon, but arguably not necessarily changing the Daoist meditative practices.

The above Daoist talisman meditation uses the visualization of light and is strikingly like the "Ball of Light" induction used in Jungian schools of psychotherapy and guided imagery therapeutic practices, which are further described in a later section. Kohn (2016), in *Science and the Dao*, described an induction where a white energy gave qualities of righteousness and social responsibility into the lungs, to replace qualities of sadness and melancholy that may manifest there. The strong influence of South and East Asian practice in European contemporary practices can be seen.

Daoist Visualisation Meditation in European and North American Context. It is difficult to fully assess the influence that Daoist practice has had on European and subsequent North American thought. However, many current focused-attention meditation practices in the West have explicitly or implicitly incorporated practices such as visualizing light or colour (Bruscia, 2015), where qualities enter parts of the body with characteristics like calm and clarity. Clinical studies have found that forms of visualization meditation using the imagination to allow mind-body responses (Rossman, 2000) can reduce anxiety and allow a sense of calm in clinically depressed patients (Apóstolo & Kolcaba, 2009). Participants were guided via recordings with muscle relaxation inductions (reminiscent of Jacobsen's induction method) where they were asked to slowly tense and release specific parts of the body and to visualize positive experiences (Apóstolo & Kolcaba, 2009). There is a great deal of research left to explore with visualization practices as well as how this modality might further enhance current forms of non-culturally specific therapeutic practice.

Visualization Inductions in GIM. GIM is primarily a one-on-one modality where a specially trained therapist helps the client to explore their consciousness towards, but not limited to, goals of healing, self-development, and spiritual work. The client spontaneously images to music in a non-ordinary state of consciousness, with the therapist using nondirective, supportive music-based interventions while working to avoid analysis (Bruscia, 2015). GIM sessions use specific programs or playlists featuring specific selections of Western classical music. Sessions unfold in five stages: preliminary discussion, induction, music imaging, return, and postlude discussion (Bruscia, 2015). GIM is a formalized receptive music therapy method, with a large body of research supporting its use with diverse populations.

GIM inductions are used in both group and individual settings and the induction is less individualized in group settings. In individual sessions, GIM practitioners predominantly employ sensory imaginal inductions (Bruscia, 2015), some of which involve visualization. Within this method, music is not involved during the induction. One of these inductions is the "ball of light" (Bruscia, 2015), which has many similarities to previously described Daoist visualization practices. The client is guided to visualize a ball of light gradually entering different areas of the body (Bruscia, 2015). The light may be a certain colour possessing specific qualities such as "calmness" or "clarity." These inductions may be modified in various ways and can involve breath in place of a light. In my own experience with personal sessions, I have noticed that these inductions vary based on the practitioner's clinical and cultural background (e.g., chi gong, yoga, mindfulness, Gestalt, or Jungian orientations). In addition, these inductions are adapted to accommodate the client's context, therapeutic goals, and the implicated sensory modalities through which they create imagery, which can vary among clients.

Vipassana Meditation

> He abides contemplating feelings as feelings, ardent, fully aware and mindful, having put away covetousness and grief for the world. He abides contemplating mind-objects as mind objects, ardent fully aware and mindful, having put away covetousness and grief for the world..., breathing in long, he understands "I breathe in long"; or breathing in short, he understands: "I breathe in short" or breathing out short he understands "I breathe out short." He trains thus; "I shall breathe in experiencing the whole body; he trains thus; "I shall breathe out experiencing the whole body…In this way, he abides contemplating the body as a body internally, or he abides contemplating the body as a body externally, or he abides contemplating the body as a body both internally and externally. Or else he abides contemplating in the body its arising factors, or he abides contemplating in the body its vanishing factors, or he abides contemplating in the body both its arising and vanishing

factors. Or else mindfulness that "there is a body" is simply established in him to the extent necessary for bare knowledge and mindfulness. (Bodhi, 2015, pp .877–878).

Vipassana meditation is a form of meditative practice that has existed throughout the Asian world since Buddha's lifetime 563–483 BCE, starting in India and Nepal (Cousins, 1996) when Buddha is said to have delivered the *Satipatthana Sutta* or *Discourse on the Establishment of Mindfulness* (as quoted above). Vipassana presents itself as both a possible reactive and preventive method of treatment. Traditionally, this ancient metacognitive practice was not only practiced when an individual was experiencing unhelpful beliefs (Sunnhed & Jansson-Fröjmark, 2014) as in cognitive behavioural therapy, but also as part of a daily routine. Vipassana has extended from India/Nepal to areas like Japan, Korea, China, and Tibet.

Mindfulness in a Global Context. More recently, mindfulness practice has been secularized and extended in Western contexts as a form of self-care. John Kabat Zinn, a U.S. medical doctor, initially developed mindful based stress reduction by integrating elements of Buddhist meditation (such as Vipassana) and Indian Hatha yoga practice for Western clinical contexts (Kabat-Zinn, 2003). He later developed mindfulness based cognitive therapy, a clinical intervention that can be integrated with cognitive behavioral methods (Kabat-Zinn, 2003). Although mindfulness practice can often be without the aid of a guide, it is the guided mindfulness meditation that has permeated receptive music therapy practices. Mindfulness is a metacognitive practice that enables practitioners to be aware of their thoughts and to engage with them in the moment, nonjudgmentally . During sessions, and as briefly demonstrated in the passage from the Satipatthana Sutta quoted above, the practitioner is invited to focus on their breath and often various parts of the body (through a process called body scanning) while noticing how these cognitive, emotional, and physical processes manifest themselves (Kabat-Zinn, 2003).

Clinical research in the use of mindfulness-based stress reduction has found significant effects on depression, distress, life quality perception, and anxiety (Goldin & Gross, 2010; McKinney et al., 1997), and it is increasingly viewed as a valid complementary treatment in therapeutic practices. The client can practice variations of this form both in groups and individually, also without needing a guide at home. Moreover, there is a clear cross-cultural aspect to mindfulness experiences, as the method's roots developed within Indian and Tibetan cultural contexts.

Neurocognitive researchers have also begun to observe brain activity when individuals enter non-ordinary states of consciousness. EEG studies have found that different forms of meditation, such as focused attention (where there is a focus on an internal experience or image), involve higher beta wave and gamma wave bands than at baseline levels, whereas mindfulness-based meditation involves top-down alpha changes, which may implicate increased emotional control (Kerr et al., 2013)

Mindfulness Inductions in RMT. RMT is a receptive music therapy modality that uses mindfulness principles during the induction and at times in the guiding (Schwabe et al., 1987). RMT was created in the 1960s and integrates mindfulness and carefully selected Western classical music to enable clients to become attuned to the music and work towards their therapeutic goals (Schwabe et al., 1987). RMT has been used in various clinical settings including mental health and counselling settings (Fujita & Moridaira, 2017). RMT can be done in both group and individual settings. In RMT, the therapist invites the client to have awareness of cognitive, emotional, and physical processes while also being aware of acoustic sensations (Schwabe et al., 1987). While guided, participants listen to specific Western classical music excerpts prepared by the therapist (Schwabe et al., 1987). Participants are invited to place their awareness on the music to enhance their sensory experience as well as any cognitive, physical, and emotional material that may emerge (Schwabe et al., 1987). The purpose is to alleviate tensions in body and mind (Moridaira, 2013). RMT has shown some promise in alleviating psychoemotional issues in individuals living with mental health disorders (Wosch, 2005). In a clinical case report, Moridaira (2013) also adapted RMT with further elements of Zen for college students with anxiety, sleep disorders, and symptoms of obsessive-compulsive disorder, with twice-a-week sessions for 3 months or once-a-week for 6 months. Following a mindfulness induction, where students were guided to notice their breath and their own physical sensations, participants listened to 20 minutes of music followed by 20 to 30 minutes of processing or discussion of the experience. Students reported being able to accept things as they are, use time efficiently, be able to be around people, and not be affected by small things (Moridaira, 2013). Further research is warranted to better understand the potential of this approach (E. T. Williams, 2019).

Relevance of Visualization and Mindfulness Inductions for Receptive Raga Music Therapy Experiences

RMT and GIM both use excerpts of classical Western music. However, the different types of induction (sensory imaginal inductions, such as visual versus mindfulness-inspired metacognitive inductions) used in these methods allow the listener to interact with the same musical excerpts differently. Visualization allows for the engagement of imagination to connect mind-body and spirit, while metacognitive inductions facilitate a mindful awareness of thoughts, and subsequently, emotions, sensations, and mind-body experiences. The raga in the alap provides steady yet directional movements that progressively unfold like a blooming flower. Thus, the visualization induction, followed by the gradual build of the alap movements, could encourage a deepening of the client's imagery experience, which may lead to transpersonal, novel experiences or other transformational or consciousness-expanding experiences associated with the method. The rasa of the selected raga could also be used to inform the choice of visualization inductions prior to the music. For example, ragas that allow shantha rasa (see Key Terms, p. 3) or a state of harmony between mind, body, and universe (G. Saxena, 2023) could be paired with visualization inductions (S. Sundar, personal communication, April 20th, 2025).

On the other hand, with raga in alap, a metacognitive RMT induction might allow the music to meet the listener and allow a sonic space for them to engage with their thoughts. Fundamental to RMT is the belief that musical movement (i.e., changes, in tempo, dynamics, range) should be present yet not excessive (Voigt, 2010). The alap first movement on sitar, with its initial lyrical space and ornamentation, would meet Schwabe's recommendation. Western classical music excerpts that are steady and calming can be used for client relaxation experiences (Voigt, 2010). As the subsequent movements in the alap become more rhythmically fluctuating in tempo, this fluidity might allow the listener to correspond with the music. Raga does not adhere to an ABA musical form (which would involve a clear return to an initial theme) but rather exposes a theme that is slowly built upon. In the absence of returning to a familiar theme to close the experience (as in many RMT experiences), receptive raga music therapy may yield unique effects. Furthermore, RMT privileges symphonic music, as opposed to chamber music, as it has a wide tonal spectrum that can immerse the listener in the experience (Voigt, 2010). The jhala (last) movement of the alap on a single sitar would not have the same intensity as a full orchestra. However, in relation to the previous movements in the alap, the jhala's constant picking, which results in the resonation of the sympathetic strings and the resonant chamber, creates a form of polyphony that may immerse the listener. This phenomenon is supported by my own previous research, where participants found that the increased volume and intensity in later movements helped to immerse them in the experience (Venkatarangam, 2017). Some clients in my clinical work have even reflected that the instrument appeared to sound like multiple instruments. Ultimately, both visualization and mindfulness induction types may provide interesting benefits in the context of receptive raga music therapy experiences, and further research is indicated to explore specific therapeutic affordances of each type or their combination.

Chapter Summary

In this literature review, I articulated a culture and music-centred understanding of raga, reviewed scientific studies on raga, and explored the origins and uses of inductions in music therapy. I explored the role of the drone, the meend, the pitch, the contour, and the performance instrument in contributing to nada and rasa in raga. A review of perception studies involving familiar and unfamiliar listeners revealed that schemata relevant to understanding raga and its emotional intent can be quickly assimilated by unfamiliar listeners, showing promise for its use cross-culturally. Although music therapy research on the receptive use of raga is limited, integration of Indian healing traditions involving raga is generating promising findings. A necessary detour into the origins and use of inductions in receptive music therapy practices highlighted the contribution of two meditation practices to contemporary therapeutic practice; Daoist visualization and Vipassana meditation were found to have strong similarities with models of music therapy inductions, such as those of GIM and RMT. I felt that visualization and mindfulness inductions were deemed to have potential for use in receptive raga music therapy experiences. To date, there has not been any neuroscience-informed research looking at the emotional responses of unfamiliar listeners in receptive raga music therapy experiences, including raga listening experiences that integrate an induction. The present research addresses the gap in the literature by understanding the perceptions of unfamiliar and familiar listeners of Indian classical alap movements in music therapy experiences outside of India. As society continues to look towards new avenues of mental wellness, this research adds to the body of knowledge to better understand the impact of receptive raga music therapy experiences on states of attention, so that, if warranted, music therapists can sensitively incorporate this time-tested genre into clinical therapeutic settings.

Chapter 3. Research Methodology and Design

In Chapter 3, I describe the design of this mixed methods research in detail. I include the rationale for and description of the selected research methodology, steps taken to obtain ethics approval, sampling and recruitment procedures, methods and tools for gathering and analyzing the data, and considerations for protecting the research data.

Research Methodology

Rationale for the Selected Research Methodology

I chose mixed methods research as the study's methodology due to its ability to offer a nuanced and holistic understanding of a particular phenomenon. This quality is significant for raga research because multimodal investigations that combine ethnomusicology, music cognition, music theory, and neuropsychology are warranted (Clayton, 2001). As knowledge of the world is based on experience and is both real and socially constructed, it is also pertinent to develop or adhere to a research methodology that holds ecological validity within music therapy practice.

Mixed Methods

In this mixed methods study, I employed a convergent parallel design (Burns & Masko, 2016), utilizing qualitative, quantitative, and arts-based methods. More specifically, experimental neurophenomenological analysis, IPA, and arts-based hermeneutic research were methodologies that I embedded in this mixed methods research. In this particular design, both qualitative and quantitative results were valued equally. Arts-based methods, also equally valued, were used to further integrate the findings from two participants and to enhance my embodied understanding of the phenomenon.

In addition, the cross-cultural nature of this research, that is, the participants' diversity and unfamiliarity with the music system, added to the complexity of the phenomenon under investigation. To account for this complexity, I used quantitative measurements to compare findings both between and within subjects, while also using the qualitative and arts-based data to provide a deeper understanding of the psychological experiences of participants within their specific cultural identities (Bartholomew & Brown, 2012). At the same time, assessing preconceived constructs cross-culturally and with culturally specific measuring tools has an inherent bias (Bartholomew & Brown, 2012). For example, cross-cultural research can pose complications as to whether the participants have shared definitions of the constructs in question.

I accounted for this issue of validity using a more flexible qualitative component (Bartholomew & Brown, 2012), which was semistructured interviews. Furthermore, the quantitative measuring tool (EEG) monitored participants’ brainwaves. Thus, I interpreted the data by consulting both the neuroscientific literature and making sense of participants' voices or narratives to understand the meaning attributed to this measurement.

The research had elements of both objectivist and interpretivist ontologies. In accordance with the former ontology, the research is ascribed to realism, where phenomena are viewed as objective reality, allowing for the observation and manipulation of variables; these variables, in turn, can have generalizable results (Hiller, 2016). I realized this objectivity through the use a reliable and valid measurement tool for measuring EEG bands (the dependent variable) as well as the use of one recorded performance of Raga Desh (the independent variable). I controlled for as many confounding variables as possible, balancing this aim with the need for a design that holds ecological validity for music therapy applications.

IPA

The research also adhered to the interpretivist ontology; IPA is a qualitative research approach that explores how individuals make sense of their experiences (Smith et al., 2021). It is rooted in an interpretivist ontology, and more specifically constructivism, where phenomena are viewed as meaning-making within subjective reality (Denzin & Lincoln, 1994). Thus, as the researcher, I offered my interpretation of the phenomenon (based upon my values, interests, purposes, and context) of the interpretations of the participants (based on the participants’ values, interests, purpose, and context (Slevitch, 2011). As a researcher with knowledge of both raga and Eurological music systems, I felt my intersectionality was helpful in interpreting participants’ subjective experiences of raga. Furthermore, as a humanistic music therapist, I believed co-constructing (making sense of participants’ making sense) of participants’ experiences could contribute to the relevance of the findings in real-world music therapy settings. In executing this approach, I strongly adhered to elements of IPA (Smith et al., 2021), where in analysing participants’ transcripts, I attempted to attain a holistic immersion of the transcript through re-reading of the transcripts, marking descriptive comments, linguistic notes such as metaphors and pauses, and noting conceptual interpretations, including free association and linking to theory as part of the analysis of the interviews in columns during the analysis transcripts.

Neurophenomenological Analysis

In preliminary research that preceded the present study (see Foundational Research in Chapter 1, p. 7), some participants' descriptions of effects appeared to occur during specific sections of the alap movements. Thus, I needed a means of understanding what was happening neurologically at each moment in conjunction with the participants' subjective experiences, and chose to apply neurophenomenological methods (Varela, 1996). Neurophenomenological research aims to understand participants' phenomenological accounts of an activity such as meditation and integrate this first-person data with neuroscientific measurements like EEG. In this study, this included examining alpha bands that have been associated with relaxed reflective states (U. Gupta & Gupta, 2005) and theta bands associated with trance, rapid-eye-movement, meditative, and blissful states (Aftanas & Golocheikine, 2001; Kim et al., 2022), as well as beta and gamma waves.

Within the types of neurophenomenological analysis, this research best fit under experimental neurophenomenological analysis (Lutz et al. 2025). In this type of neurophenomenological analysis, there is a presence of both *thick* data (first-person data from the semi-structured interviews) and *thin* data (third-person physiological data). Within these two types of data, there are mutual constraints where subjective experiences assist in interpreting physiological (EEG) data, and the physiological (EEG) data, in turn, help interpret the experience iteratively (Lutz et al. 2025).

Arts-Based Hermeneutic Research

Based upon the nature of phenomenological research and Husserl's assertion about the importance of revisiting the phenomenon itself in inquiry (N. Gupta & Zieske, 2024), integrating artistic methods into this neurophenomenological research design was a natural progression to illuminate any meaning that may have transcended language (N. Gupta & Zieske, 2024). In other words, because the phenomenon itself was art, I felt that engaging in an embodied and integrative arts-based method would deepen my understanding of the phenomenon. This study falls under "art as a primary methodology in research" (Viega & Forinash, 2016 , p. 493), where the creative work is also a primary mode of research, not quantitative or qualitative, but rather allowing for a new means of knowing (Rolling, 2013). In line with the interpretivist nature of IPA (Smith et al., 2021), I had the opportunity to musically interpret or make meaning from two of the participants' interpretations of the musical experience by incorporating elements of music composition (creating a semi-improvised score) or *comprovisation* (Bhagwati, 2013) to integrate the EEG and interview data. For the score, I used the graphed EEG data mapped to the temporal movements of the alap, with time-stamped quotations from the participants (where they felt events occurred in the experience) added. I then played each score. In addition to allowing a way to embody the data or to resonate with the findings as a music therapist-researcher (Vaillancourt, 2009), arts-based research also allowed for an accessible and/or alternative means of disseminating the findings (Knowles & Coles, 2008; Vaillancourt, 2009).

Musical Stimulus Delimitation

The raga was delimited to one, Raga Desh. I have researched this raga in the past. The raga was further delimited to the alap movement (which comprises the three submovements of alap, jhor and jhala; see Key Terms, p. 3), as it most purely encompasses the essence of a raga. It was performed by the renowned musician Ustad Vilayat Khan, a master sitarist respected throughout the Hindustani Gharanas and known in South India.

Musical Stimulus Description and Selection Process

The recording was taken from a live performance on February 27, 1958, courtesy of the LESC Centre de recherche en ethnomusicologie (Khan & Ghosh, 1958). The stimulus used in this research, which began with 2 minutes of silence, is accessible here (or copy/paste the following link in your browser) (https://drive.google.com/file/d/1aZuWMULf96Nu8mZXBRSkrbJUsAf5To3y). The recording was faded out prior to the entrance of Pandit Nikhil on tabla, the percussion instrument that, upon entering, signifies the end of the alap movement. My teacher, Ustad Shahid Parvez and his senior disciple of the SPK academy Seema Gulati, helped me with the selection process. The selected rendition of Desh was the shortest raga (under 20 minutes) that could be retrieved and that clearly encompassed all the alap's movements. These criteria were because a longer raga might cause listener fatigue to uninitiated raga listeners and meditators. This raga is one that often resonates with clients when asked during verbal processing in the field. It is known in both North and South Indian music, although it is more associated with the raga Kedaragowla in Carnatic music. The word "Desh" has a connotation of country and reflects a multicultural sentiment within India. The raga has been described as having a rasa varying from romance to personal longing (U. Neumann, personal communication, May 18, 2008) to peace and tranquillity. Being part of the Khamaj thaat, it has tonal elements of the major scale, the flattened seventh of the mixolydian scale, and as in all ragas, it has its own distinct protocol for ascending and descending (see Cross-Cultural Appreciation of Raga for a description of this movable doh system). In this raga, the ascending notes or *aaroh* are sa re, ma pa ni sa, which is the major second (from the root), major 4th, perfect 5th, major 7th, and octave. Therefore, when ascending, it essentially forms a pentatonic scale. When descending, the notes or *avroh* most simply put are sa, ni, dha, pa, ma, ga, re, ga, re, sa. The 7th, or ni, being flattened when descending, therefore becomes mixolydian upon descent. Other basic protocols within this raga include that if singing or playing ga when ascending, one would immediately descend, such as in a motif, sa re ga, re sa ni, sa. There are also specific portamento embellishments or meend between the notes. For example, when singing or playing this, ga, in this instance, one might slide in a portamento manner briefly between the ga, then re, and back to ga. The strong *vadi* note in this scale is re or the second, while the less dominant note in this scale or *samvahdi* is pa or the fifth. The instrumentation of the musical stimuli was delimited to the sitar as it is the Indian classical instrument I have training in and one with unique timbral qualities.

The music was a recording by a master sitarist as opposed to a live performance by me to account for any inconsistencies in my live performance. In addition, it is more practical and therefore ecologically valid that, in actual music therapy or an adapted GIM setting, the music therapist uses a raga recording rather than having a live performer attend the session. On an aside, a live performance would be realistic if the music therapist were an Indian Classical musician. The performing music therapist could respond through bhava to the environment and the client's movements and facial expressions in real-time, as raga is a semi-improvised musical medium. However, usually this is not the case. The recording, unlike a live performance, was also intended to help account for courtesy or social desirability bias, where participants might be hesitant to express feelings of displeasure or discomfort if I were playing the raga. Prior to the interview, participants were encouraged to be as honest as possible in the service of the research.

Induction Stimulus

The participants were not intentionally recruited as practicing meditators or GIM clients but as a diverse group that one might encounter in a music therapy group or individual music therapy session. Therefore, the induction, adapted from Grocke & Wigram (2007), was chosen not to be a deep visual or mindfulness induction, but rather a general focused awareness of body and breath (see Appendix A for the script).

The Quantitative Measurement Tool: Muse 2 Headset

The Muse 2 headband is a portable measuring tool equipped with four sensors for EEG monitoring. It is positioned on specific areas of the scalp and records the frontal temporal regions: TP9 (left temporal parietal), TP10 (right temporal parietal), AF7 (left anterior frontal) and AF8 (right anterior frontal). It has an FPZ electrode, which serves as a ground point (Gomes et al., 2020). This tool was chosen for its accessibility, as it is a relatively affordable and portable device that other music therapists and music therapy students could potentially use in their research, depending on their goals.

Mind Monitor Software

I used the Muse headset with the Mind Monitor (https://mind-monitor.com) software that allowed for recording and exporting raw data. It consists of an IOS app as well as an online software for graphing the data. Mind Monitor was developed as a solution for individuals seeking to use their Muse devices for purposes other than meditation. In my experience, it has been embraced by artists, the maker and DIY community, neuroscience students, and interdisciplinary researchers for its user-friendly nature as well as its creator who answers any questions via email and group forums promptly. In this research, the IOS app was used to monitor the sensors and EEG brainwaves from the Muse 2 headband in real-time. It was connected via Bluetooth and ran on an iPhone 13 Pro. I was able to export the .csv file that I created from Muse 2 and convert it via the software to various graphs, such as all data points and absolute and relative brainwave charts. Based on the nature of the headset that Mind Monitor uses, EEG outcomes were mainly focused on the overall averages of the electrodes as opposed to each individual sensor and therefore location of the activity.

The software lacked preprocessing capabilities to manage artifacts such as jaw clenching interference, eye movement, or other external signals that were not intended to be measured. During the brainwave recording, I was able to observe the sensors and sensor amplification in real-time, confirming that the data were being recorded. If the waves were flatlining at times, or the sensors indicated no connection midway through the experience, these data were not used, nor were the subsequent qualitative interview data, which was the case for two participants.

After recording, the software had proprietary algorithms to indicate when data had been compromised by external artifacts to such an extent that it rendered the data unusable. Due to this, two more participants' EEG and interview data were not used. The software was also able to identify which external artifacts were present via the quantized and averaged brainwave charts. Indicators of artifacts were, j indicating a jaw clench, which can cause a brief interference with the signal; b.f indicating a bad fit, or that the sensors are not in contact with the skin; and g.f indicating a good fit. C simply indicated the device was connected.

Induction with Music Stimulus Recording Process

As with the musical stimulus, I created a fixed stimulus by recording myself giving the induction, as differences in my timing and character of my voice might have affected the participants' experiences, as per Hunt's (2017b) recording procedure. However, in this music experience, the recording did not involve any form of guiding during the experience. This structure was to emulate how I might currently use raga in a receptive music therapy group or individual session and also to understand how the music itself affects the unfamiliar listeners.

The recording was made using a Shure SM57 microphone plugged into a Focusrite Scarlet audio interface, which was then connected to the digital audio workstation Logic Pro X while reading the script. I also recorded the return to awareness as customary in an induction. Next, I took the recording of the stimulus and merged this with the induction and return to awareness. Therefore, the final track had 2 minutes of silence left for the baseline EEG measurements, followed by the induction, then the raga in alap, the return to awareness, and 1 minute of silence. This recording was converted to AIFF format for playback in Apple Music.

Preliminary Testing of the Stimulus and Muse Headset With Mind Monitor

Prior to recruiting live participants, I first tested the experiment on myself to make sure that the headset was functioning correctly (the headband was reading my brainwaves via the sensors connecting with my skin), and to gain fluency in my procedure to make sure the audio recording was in sync with the software and that there was no lag between the audio recording and the EEG brainwave recording. I next had 2 music therapists (one man, one woman) and advanced GIM trainees listen to the stimulus to ensure my voice during the induction and return was balanced with the music stimulus, as well as to see if the Muse headset functionally would be a reliable measuring tool and fit other people's heads aside from my own. As mentioned, the headset comprises a band with four sensors that must touch all areas of the participant's frontal and parietal region, and it requires some adjusting before use to ensure adequate signal quality.

Recruitment Procedures

Following ethics approval from the Concordia University Human Research Ethics Committee (see Appendix B for the Ethics Approval Certificate), a digital recruitment poster (see Appendix C) was sent to the Concordia PERFORM Centre Listserv. There were approximately 80 responses, and the first 11 participants to respond were invited to a preliminary phone screening.

Participant Inclusion Criteria

Participants were to be volunteers from the general public. The criteria for participant inclusion were that participants were 18 years or older and had no current mental health issues that required any anti-anxiety or mood-altering medications at the time. Participants were to be proficient in the English language, which was designed to facilitate the data collection and respectful analysis of the semistructured interviews, which rely heavily on in-the-moment communication, use of metaphor, and interpretation. The participants were not to be personal acquaintances or within my social network. For example, former students, friends, family, indirect acquaintances who knew me by name or who were familiar with my work, as well as any music therapy clients, were excluded. My rationale for that criterion was to avoid having participants who may feel pressured or consciously/subconsciously desire to give results that they believe I would like to hear, again creating subject or courtesy bias. They were also to have no recent cases of stroke or neurodegenerative issues to account for the fact that EEG would be used in this research.

The participants were selected on a first-come, first serve basis, based on their responses via the listserv. However, they were delimited to 10, as six to 10 participants is a recommended range for IPA research at the doctoral level with a researcher, like me, who has conducted an IPA in the past (Smith et al., 2021). I responded to their emails and invited each participant to a verbal phone screening. During the verbal phone screening, potential participants were explicitly asked if they were currently taking any medication for mental health issues or had a history of stroke or neurodegenerative issues. They were asked about their familiarity with raga during the prescreening. A brief description of the experiment was provided, along with time for them to ask any questions they might have. A total of 11 volunteers were interviewed since the study was initially meant to include 10 participants, but one individual did not meet the prescreening criteria.

Following the prescreening, the study initially included one person familiar with raga and 9 people unfamiliar with raga and therefore ranging from a spectrum of completely uninitiated to somewhat familiar. There were no classical Indian musicians or people who identified as professional musicians of any genre who participated in the research (see Appendix D for the raga familiarity Likert Scale). Following the experience as mentioned, the participants who successfully had a correct recording of EEG waves, (i.e., limited jaw clamping or noise that interfered with the recording) were the participants who had their data (including interview data) used in the research: six participants altogether. Most were primarily uninitiated listeners, and one had more familiarity with raga as described in the next section. All participants who attended the experience, regardless of whether their data were used, were paid thirty-five dollars for their time.

Brief Contextual and Demographic Background of Participants

This section is a snapshot of the participants based on their responses from the raga familiarity Likert scale, the brief demographic questionnaire (see Appendix E), and their responses during the prescreening interview and the semistructured interview that followed the experience. A variety of cultural and linguistic backgrounds were identified in this sample. Two participants identified as professionals, three as students who were also in the workforce, and one as retired. All participants identified as not active listeners of raga and expressed various tastes in music ranging from Algerian folk music to semi-metallic rock. One participant was an Indian dancer of Indian descent, and although she did not identify as an active listener, she said that she may have come across raga more than rarely. Participants' ages ranged from 19 to 72 years old. Pseudonyms have been used to protect participant anonymity. The first two participants self-identified as men and the rest of the participants identified as women. Four of the six participants implicitly or explicitly mentioned that they had participated in some form of formal meditation in the past, though only one (Scott) appeared to have knowledge of visually and imagery-based meditation. Emma did not adhere to any formal meditation but did use Western classical music to stimulate her creative processes as a writer.

Anton

Anton identified as a 53-year-old White male business consultant who was English speaking. His cultural background or country of origin was not further disclosed. The music that he felt connected to was rock'n roll. Anton indicated a 1 on the Likert scale (where 1 indicated that the person had never heard classical Indian music before and 5 indicated that the person identified as a musician of classical Indian music). He self-reported that he had no knowledge at all of what classical Indian music was and no knowledge of the sitar (the instrument that was used), which was further reflected in his interview. He did mention that he had some knowledge of mindfulness or meditation.

Sofia

Sofia identified as a 19-year-old White woman of Portuguese Canadian descent. Her primary languages were French and English. She was a student and also a social media and graphic design agent. The musical genres she felt deeply connected to were jazz, Western classical music, hip-hop, rap, and pop. In terms of her relationship to classical Indian music she wrote a 2 on the Likert scale indicating that she has briefly encountered it. She mentioned having been to an Indian wedding before and having friends of South Asian descent. Although Sofia did not identify as a meditator, she did mention that her mother was very involved with mindfulness (Vipassana) and that she had tried it many times before, but it was not something that resonated with her at this point in her life.

Geeta

Geeta identified as a 29-year-old woman of South Asian background. Her primary languages were Bengali and Hindi which are languages in Northern India and subcontinental areas. She was a university student with a background in Indian dance, although the specific type of dance was not specified. The music that she felt deeply connected to as she reported on her demographic questionnaire was semi-metallic rock, Western classical music, and jazz. She felt she was at around a 2.5 between rarely and often having encountered Indian classical music and she self-reported that she was not a musician. She explained that she selected 2.5 because she would encounter elements of the music when dancing. She did appear to have some knowledge of meditation as reflected in her interview.

Scott

Scott was a 27-year-old White man whose primary language was English and his profession was as a line cook. He indicated a 2 on the Likert scale as someone who has rarely encountered Indian classical music. He mentioned that he had probably heard the sitar and Indian classical music on the *Sgt. Pepper's Lonely Hearts Club Band* album by the Beatles (1967). The musical genres he felt deeply connected to were hip-hop, heavy metal, and classic rock. In his interview, Scott mentioned that he had experience with mindfulness meditation and also mentioned that he had experience with Reiki, a Japanese alternate healing practice, and in his words, “where the practitioner channels healing energy to the client’s body with the use of crystals.” This remark indicated that he did have experience with a form of visualization practice.

Anna

Anna was 72 years old and identified as a White woman. Her primary languages were English and French, and in her interview she elaborated that her parents were of Ukrainian descent. She was currently retired. The music genres she was deeply connected to were gospel jazz, reggae, Western classical music, opera, Fado (the traditional music of Portugal), Rai (Algerian folk music) and other folk music. She mentioned that she enjoyed exploring and learning various artistic genres from around the world that Montreal had to offer. She marked a 2 on the Likert scale as rarely encountering Indian classical music. In her verbal elaboration, she said that she had encountered raga in documentaries as well as Indian films. She also said that she has heard of the Indian classical sitarist Ravi Shankar. It was not determined if she had a background in meditation or visual induction experiences.

Emma

Emma identified as a 31-year-old White woman. She was a student and a journalist, and her primary languages were English and French. Emma marked 2 on the Likert scale as having occasionally encountered Indian classical music. She indicated that she may have been to friends’ houses that may have had classical Indian music playing and had heard it at restaurants. The musical genres that she felt deeply connected to were classic rock, indie rock, and folk music. When asked if she meditated, Emma said that she practised her own form of meditation, which she described as “letting her mind go blank,” and considered herself a naturally calm person. She did not have an interest in trying meditation apps or any other type of formal meditation.

Data Collection Materials for the Experience

A digital audio recorder was used for the interview process. An iPad was used as a backup recorder. An Apple MacBook Pro was used to play the experience in Apple Music. Participants wore Shure, SE 215 Sound Isolating headphones. I used a Hosa Y Splitter cable and an Audio-technica headset to allow me to hear what the participant was hearing in real-time. Participants also wore a noninvasive portable Muse 2 EEG headband, which went on their scalp.

This headband was connected via Bluetooth to an iPhone 13 Pro that was using the Mind Monitor app to record the raw EEG data.

Additional Covid Protocol

Participants used provided hand sanitizer upon entering the building. During the listening experience and semistructured interview, the participant and I maintained a distance of 2 metres. I wore a disposable facemask, and facemasks were available to the participants upon arrival. The chair, doorknobs, plastic clipboard, pen, earphones, and Muse 2 headset were disinfected with alcohol swabs before and after each participant.

Data Collection Procedures

Setting

After signing the consent form, the individual listening experiences were led by me and took place in a closed room in the Concordia University GM building.

The Listening Experience

Upon entering the room, participants were asked if they had any questions about the consent form that was sent to them prior to the experience. This form (see Appendix F) included details on risks and benefits, data collection procedures, withdrawal, and confidentiality. They were invited to sign the form following a brief review. After signing the consent form, they were then asked to fill out a brief demographic questionnaire (see Appendix E) and were also asked to again fill a self-assessment Likert scale assessing their familiarity with classical Indian music (see Appendix D). Participants were invited to sit comfortably on a chair. A chair was used to simulate how clients might sit during a receptive music therapy session. I then explained to the participants the steps and duration of the experience. They were then fitted with the EEG headband and Shure headphones. A simultaneous soundcheck and brainwave recording check was done to ensure that the headband was fitted correctly and properly recording brainwaves and that the volume levels of the music were adequate for the participant.

The recorded raga music therapy experience consisted of a 2-minute breathing relaxation induction (see Appendix A), followed by 2 minutes of baseline silence, and then a 15-minute recorded classical Indian music excerpt on the sitar, followed by a return, and finally 1 minute of silence. In the induction, participants were invited to either close their eyes or softly gaze towards the floor, as that was an option I would often allow in a music therapy session for individuals who may have difficulty closing their eyes due to factors in the client's past. In my observation of participants, all appeared to have their eyes closed. Eyes open versus closed could impact the occipital region and affect alpha waves. Following the excerpt, participants were given the opportunity to free-write any words, thoughts, or images that emerged for them during the experience. Simultaneously, EEG waveforms (delta, theta, alpha, & beta) during baseline, the induction, and the various movements of each raga were recorded in Mind Monitor. I would simultaneously and very precisely click the play button in Apple Music for the stimulus (starting with the 2 minutes of recorded silence) while clicking the record button in Mind Monitor. I also asked that participants indicate by pointing upward or downward if the volume needed to be adjusted at any point during the experience.

The Semistructured Interview

The participants took part in the approximately 30-minute semistructured interview (see Appendix G for Interview Guide) following the listening experience. After the listening experience, the participants were offered refreshments and a short break. At this time, I engaged in a process called bracketing (Smith et al., 2021) where I conducted a free-write of everything that I knew about raga, as well as my own perceptions and assumptions and previous research findings prior to conducting the interview. For each interview, I would revisit this free-write and add to it when relevant. This process allowed me to be aware of my assumptions and biases prior to conducting the interviews and analysis; I could, therefore, strive to put them aside (when necessary) and become aware when I may inadvertently be using them to guide my own interpretation. It is imperative to avoid leading participants or imposing words upon them during the interview process. Nevertheless, it is essential for the interviewer to revisit certain elements or request that the participant elaborate on aspects they may perceive as more pertinent during the interview, particularly when an existing theme is emerging across multiple interviews Smith et al., 2009).

Music Playback Process. During the interview, I reopened the musical selection on my laptop so that it could be easily accessed. I asked general questions, as outlined in the interview guide (Appendix G). If it organically emerged that there was a specific moment when a phenomenon occurred for a participant, or if they explicitly mentioned a part of the music, I would ask if it would be okay to locate this in the music recording. Sometimes, participants would say it was just a general feeling or experience throughout, and in such cases, the music search was not conducted, and the focus was on making sense of the experience. If the participant referred to specific musical moments in the music, we would attempt to determine where this was happening for them in a co-constructed manner. If they said, in the beginning, I would play two or three examples in the beginning area, until they felt that I had found the correct location in the music. If they felt it was not there, we would expand the search to other sections. Often, it would take several attempts, and participants were generally very interested in pinpointing the exact location in the recording. When the location was determined, I would take a moment to timestamp this location, let the participant know what I was doing, and we would return to the interview. As in a clinical setting, efforts were made to maintain a beginner's mind and not lead the participant in any way, such as assuming I knew what music section they were referring to or even assuming that the musical changes had any effect or meaning in the participants' experiences at all.

Protection of Data

All hardcopy data were stored in a locked file cabinet and on a password-protected laptop and phone. Other than consent forms, data were deidentified. Any personal information sent to participants was sent as password protected files and also deidentified.

Data Analysis Procedures

Qualitative Data

For qualitative data analysis, I adhered to IPA. This method of analysis seeks to be flexible, allowing it to adapt to various types of data and research aims (Smith et al., 2021). Although there are typical data analysis steps involved in IPA, such as reading and rereading the transcripts, annotating the texts, noting experiential statements, and connecting personal experiential themes, the researcher is invited to iteratively move through and between the different stages of analysis in a way that suits both the data at hand and their own way of making sense of the data. In this study, I used the recordings of the six interviews to generate an initial transcription via Microsoft Word's transcription software. I revised all the transcriptions for accuracy and inputted them into NVivo qualitative data analysis software. I started with the most elaborate and detailed interview. I went through each transcript with the following steps, one at time. I read and reread the transcript while listening to the actual recording. Then through using the annotation function in NVivo, I added my descriptive comments. Next, I added comments pertaining to the participant's use of language and metaphors. This step was followed by my own more conceptual comments. Data were then put into categories called experiential statements

(Smith et al., 2021) using the coding feature in NVivo and they were then clustered into personal experiential themes. Next, these themes were cross-referenced with the raw data, that is, examples from the transcription using NVivo. To adhere to the idiographic nature of IPA (Smith et al., 2021) the process was repeated for each participant.

All of the personal experiential themes were organized into group experiential themes (Smith et al., 2021) in NVivo. Some of these themes may have reflected diverging or converging experiences of the participants. Some experiential themes may not have been relevant to all six participants. To stay within the iterative process, the original data were again revisited to ensure that my interpretation adhered to the participants' accounts of their lived experiences. Following this, the transcription examples were transformed into six participant narratives that highlighted thematic experiences of the phenomenon. Participants were then given the opportunity to review their narrative and to edit, elaborate, and clarify as needed to ensure the authenticity of each participant's experience through a process called member-checking (Guba, 1981). Participants were given 3 weeks after receiving their narratives via email to respond with feedback. Of the six participants who received their narratives, one responded with feedback concerning changes or clarification.

Still striving to respect the idiographic nature of each participant's lived experience in IPA while also maintaining IPA's commitment to group experiential themes, I selected experiential statements and transformed them into a written account that explored the group experiential themes. Within these group experiential themes, each participant's personal experiential themes were supported by statements highlighting the converging and diverging elements of their experiences. This approach has been suggested as a logical way to present the data in IPA (Smith et al., 2009).

Quantitative Data

Brainwaves were identified and analyzed for each participant using the Mind Monitor app. Through observing the power spectral density of the frequency bands, I inferred how the variation in these frequency bands intersected with a particular emotional state or states of mind. The measuring tool was also examined by Dr. Bing Yi Pan, who was then a visiting scholar and faculty member in the Concordia Music Therapy Department, a music therapist, and physicist, to ensure that the EEG tool was accurately recording participants' brainwaves. The various segments of the experience (baseline 2 minutes of silence, induction, three raga movements, return, and 1 minute of silence) were mapped onto the brainwave data of every participant using vertical lines to mark specific timestamps on the X axis. These were also graphed using the Mind Monitor app as absolute (with all data points) as well as absolute with average minutes (quantized; see Figures 3 to 8). The latter had fewer scattered data points and consequently had data from the beginning and end slightly truncated, as the app only includes 60-second bins. For some of the graphs, relative brainwaves were used if they showed clearer changes in waves for the participant during the various sections of the experience. For example, for some participants, there may have been a minimal increase in alpha waves. Still, when compared to the drop in the other waves, this increase could still signify a predominant presence of alpha and therefore indicate meditative relaxation. In such cases, relative brainwaves were used in addition to the graph of absolute values with all data points. The brainwaves of the participants were then examined in relation to different segments of the experience by observing when each averaged wave was significantly rising or falling during various points in the listening experience. If no obvious visual change in wave power was observed, it was not deemed significant enough to be considered relevant. I then summarised in writing the results of each person's brainwave changes during the experience.

The Arts-Based Hermeneutic Analysis: Musicking About the Results

To further attune with the qualitative and quantitative data, I employed a semi-improvised interpretation of selected findings to engage with the arts-based research questions. To do this process, I selected the data of two research participants and interpreted them musically in Raga Desh, mapping each participant's EEG data with their corresponding interview. The first interpretation featured Geeta's experience and involved a comprovisation (Bhagwati, 2013) on guitar and electronics of a score that I created integrating her EEG data with her subjective reflection of the experience. I followed that interpretation with another comprovisation based on Emma's experience, using the same approach but on sitar and electronics. A detailed explanation of the comprovisation process is presented in chapter 4, as the creation process is in and of itself a manifestation of the arts-based hermeneutic analysis.

Integration of Findings

In this mixed methods design, the findings were integrated by reviewing each participant's data sets, examining their experiences and emerging themes, and drawing connections between the two through an iterative process involving qualitative and quantitative data. Next, reflections from the arts-based process were reviewed and linked to the EEG and qualitative data sets, again through an iterative process. The three types of data were combined in the discussion chapter, considering how they relate to existing literature on the topic. As previously described within experimental neurophenomenology, qualitative and quantitative data mutually constrain each other. Subjective experiences help interpret physiological (EEG) data, while EEG data, in turn, assist in interpreting experiences iteratively (Lutz et al. 2025). The arts-based process further allowed me, as the researcher, to attune more deeply to two of the participants' lived experiences, leading to additional insights illuminated through the research process.

Chapter 4. Research Findings

This chapter begins with the presentation and analysis of both qualitative, quantitative, and arts-based data, in that order. It is divided into three sections, each focusing on a different research method. First, I display the qualitative results from Interpretative Phenomenological Analysis (IPA) of interview data from all six participants, identifying four group experiential themes. Next, I share the quantitative findings from EEG data collected during participants' experiences. Then, I describe the arts-based results from a comprovisation process involving two participants, including a detailed account of this creative process. This process functions as data and an essential component of arts-based hermeneutic analysis, providing insights through aesthetic expression. Chapter 5 will present an integrated analysis that combines qualitative, quantitative, and arts-based findings while connecting to the literature.

Qualitative Findings

After conducting an interpretative phenomenological analysis of interviews with the six participants about their experiences with raga listening, four experiential themes emerged from the qualitative data: (a) curiosity and interest in Indian music and culture, (b) imagery and pre-associations despite musical unfamiliarity, (c) increased immersion as musical movements progressed, and (d) the music allowing a change of consciousness. The group experiential themes are explored below with careful attention to thoughtfully incorporating each participant's voice by integrating their personal experiences within each group experiential theme, thereby respecting the idiographic nature of IPA (Smith et al., 2021). It should be noted that it will be indicated when not all participants have experienced the group experiential themes.

Table 1

Group and Personal Experiential Themes

Group experiential themes	Personal experiential themes
1. Curiosity and interest with Indian classical music and culture.	1a. A curiosity with the music. 1b. A sense of curiosity in the culture.
2. Imagery and pre-associations despite musical unfamiliarity.	2a. Pre-associations regardless of familiarity. 2b. Deeper, less associative imagery including tactile and gustatory sensations.
3. Increased immersion as musical movements progressed.	3a. Amplified sensory experience as music progressed. 3b. Increased interest as music progressed.

4. The music allowing a change of consciousness.	4a. Contradictory feelings within the relaxation. 4b. Falling into a sleep-like yet awake state. 4c. A symbiosis between raga and the meditative experience.

1. A Curiosity and Interest in Classical Indian Music and Culture

This theme revealed that following the experience, the participants expressed a curiosity and interest in Indian classical music and/or Indian culture.

1a. A Curiosity with the Music

When asked how the music made him feel, Anton, a participant who had never heard this type of music, paused in his first statement as if he was wondering where the music could take him or make him feel when describing what was next. He continued to express his heightened anticipation as the music progressed.

> **Anton:** More like curiosity…to see what's the next, how [pause] high I can get. What would be next and next. Also, I'm not very used to this kind of music so for me it was like curiosity. It's interesting, it's interesting.

One aspect of the music that also resonated for Anton was the timbre of the instrument (solo sitar).

> **Anton:** Yeah, for me yeah, I'm not used to these kinds of sounds. It was definitely not a piano, there's no drums, right? I mean it's not like a bass or a guitar or like a violin or something. I know those sound[s] ... it's different.

Both Anton, a completely uninitiated listener, and Geeta, a relatively much more experienced listener and with cultural ties to the music, reflected upon a concert experience and how this aspect created an interest in hearing more of this music.

> **Geeta:** Yeah, I mean it did kind of feel like I'm sitting in a live concert where somebody's playing because in an auditorium you have everything closed and it's all dark and you enjoy the experience… so definitely I mean I would like to do it.
>
> **Anton:** I like this sound, yeah, actually for example, if you tell me yeah, it's a concert; it's a guy, famous guy, who knows, yeah, it would be interesting to go to see it.

Emma and Sophia also described their curiosity to learn more about the music.

Emma: Yeah, I don't usually gravitate towards guided meditations. I think I'm pretty good at entering that state myself, but it makes me curious about listening to more of this music.

Sofia: Yeah, I think it's interesting to learn about it and to listen to it cause it's not something I'm super familiar with so yeah, exploring would be really cool.

1b. A Sense of Curiosity in the Culture

For Sofia this interest also led to wanting to further explore other aspects of Indian culture.

Sofia: I'm definitely interested in learning more about the music and its cultural background, I thought about that.

Exploring more Indian culture presented in Anna's account as well; in Anna's case she already had an interest to learn more prior to the experience, and the experience appeared to be an affirmation.

Anna: Well, you know there are common themes we hear and read about, I mean you'll have to pardon me ... I had no clue, you know "in India, oh poor India, they are starving to death and in the West it's ad nausea" so I ask someone who is very well informed and he said "no, no." I said, "why do we always hear this other stuff. "So that's what the West wants you to hear, and no," he said, "India is at the forefront of so many things," and I started reading articles, and it's true! There's so much more to India.

In the way Anna presented her account, there was a sense of frustration and slight chagrin of feeling misled. She touched upon hegemony, or a one-sided narrative, as to how the Western discourse had presented India to her. It was only after meetings with someone who was knowledgeable about India that this perception had been changed and her curiosity sparked.

2. Imagery and Pre-Associations Despite Musical Unfamiliarity

This group experiential theme described how five participants recounted imagery and pre-associations despite their predominant unfamiliarity with the music. For the participants, the experience appeared to begin with more associative imagery and progressed into deeper and less-associative imagery.

The first experiential theme involves the groups' pre-associations.

2a. Pre-associations Regardless of Familiarity

> **Emma:** It was very much ah [pause] like the music was giving me the ideas that I was having. It wasn't fading into the background as just another part of my 30 years of experience listening to classical music. Yeah, it was certainly a new experience.

Emma explained further how she associated with being in an Indian restaurant, and how associations were stronger for her because she did not know the music.

> **Emma:** Well just being there and eating the food and stuff. I'm a writer so I feel that my usual experience with music is to come up with my own thoughts about it and get lost. Like I said, in daydreams and things.

At the same time Emma expressed that her imagery would have been less associative had it been a music she was more familiar with.

> **Emma:** But with this music in particular my mind went to memories instead and I was given real associations as opposed to just inventing things on the fly to go along with the music.

For Scott the experience appeared to remind him of times when he had heard the sitar (not necessarily Indian classical music) in the past.

> **Scott:** Yeah, it was making me think of the Sgt. Pepper's album by The Beatles (1967).
>
> **Scott:** Yeah, yeah, yeah. I don't know about insights, it was really just associations with being back home when listening to music and doing this myself … practicing the meditation.

For Scott, the music and experience also reminded him of when he meditated at home. Anna, like Scott, thought of times when she might have heard the instrument or elements of the music in another context. In this case, the association was within the context of another artistic medium.

> **Anna**: I'm also a movie buff, so soundtracks and things like that. I saw a movie. I think it was at Phantasia (Montreal based International Independent Film Festival) last year—an Indian film it was a sci-fi. Yeah, it was something that was not normally done in India.

Sophia's associations were around times when she may have heard this music and being reminded of her friends of South Asian descent.

> **Sophia:** I think it's just like thinking about traditional wear like saris and stuff like that. Also, I have a couple of Indian friends and that will be the colours that they wear, and I

associated the music with that. Yeah, it gave me a lot of like traditional wedding imagery even though I know they are not the only colours.

2b. Deeper, Less Associative Imagery including Tactile and Gustatory Sensations

The next experiential theme involved deeper imagery, gustatory, and tactile sensations that presented for the participants. Emma and Scott had what appeared to be somatic imagery in the experience.

> **Scott**: I noticed the thoughts were completely gone at one point and I started to notice sensations in my fingers and in my stomach. It was like a tingle but a lightness also…
>
> **Emma:** Yeah, like heat mirages, but I think that stopped actually when I closed my eyes. When my eyes were open, I was sort of having that experience, but less so when I closed my eyes after.

Geeta felt some experience in her body, alongside the visual experience.

> **Geeta:** Because I had my eyes closed so I could feel it throughout my body but then I mean imagination was more.

Emma also had gustatory sensations in her experience.

> **Emma:** Yeah [long pause] being, being in a hot place [pause] sugar pastries, molasses.

Emma was then asked whether those were tastes that she was having or memories of them.

> **Emma**: Certainly taste and memories. Yeah, and the cold metal cups I use frequently in restaurants. A very clear feeling.

She then further clarified what she felt.

> **Emma:** Yeah, the water drinking water, but I don't think, I didn't come here thirsty, so you know.

The participants also had imagery or visualizations that at time transcended pre-associations. Geeta had waves of thoughts of her personal life but something transcending pre-associations at the same time.

> **Geeta:** Yeah, I mean I could follow through, like maybe I closed my eyes so I could imagine a story running behind the music— so I could follow through the highs and the lows it was nice.

Geeta further explained her story when invited to elaborate.

> It kind of began with the imaginative story and then kind of sank into my personal thoughts or environment that I am in right now. I mean in general like as in in my life or

something and then again a little bit of the imaginative. Not necessarily that it was the first story that kind of I felt but something which was not exactly happening in my personal life kind of thing. But it slowly like transcended to that.

Geeta elaborated on her story.

> **Geeta**: I don't remember, I'm not sure, (laughs) it is something like a kid is playing outside or something. Something like that but right now I'm not sure (laughs).

Scott also shared his initial imagery.

> **Scott: (**5:57) This is where things are green. Yeah, it's very shadowy. Kind of like a forest. It's nothing special, just like the basic experience of when I close my eyes and start to float away.

Anna also initially experienced imagery that was not only based on pre-association.

> **Anna:** I saw a movie going in my head, seeing someone walking along just as it's getting dark. A long narrow street, the river flowing nearby.

She initially attributed this imagery to pre-association with a Bollywood movie, but later clarified that it too had evolved.

> **Anna:** Just somebody walking, a woman, it's always a woman. [Pause] covered head to foot in black, all robed in black with a veil and everything. No, it didn't really relate to the movie, but somehow the idea popped into my head. Just somebody walking, it was very serene, very quiet, just walking, I guess, home.

Although Anna did not clarify, one might interpret her imagery as her psyche creating a version of herself on her journey. Anna clarified what happened for her later in the music (at approx. 13 minutes). She then stated she could not remember the dream.

> **Anna:** I never remember my dreams [laughs]. I dozed off, a bit of a dream, very small and then I woke up.

Sofia had more abstract or vivid imagery that she attributed to pre-association.

> **Sofia**: I like saw lot of bright colours. I think that's just because of my like predetermined associations with the music and its culture and what I know about its culture. I was seeing like a lot of yellow, orange, purple, pink, bright lively colours. Mostly when the music was more upbeat.

Like Sofia, Scott also saw more colours and mentioned violet, a colour between pink and purple which is further explained in the next theme.

Scott: I was getting flooded with like violet hues and wave-like patterns.

Scott's previous statement (which he describes as occurring at 14:27 seconds of the music) also explained how, similar to Sofia, the colours became more prominent as the music grew more intense or as Sofia described it, more lively. This allows a transition into the final theme.

3. Increased Immersion as Musical Movements Progressed

In the previous theme both Scott and Sofia describe how their imagery became more vivid and immersive as the movements (which build in intensity over time) progressed. This presented in all the other participants' accounts as well.

3a. Amplified Sensory Experience as Music Progressed

Scott: Then especially during the fast parts of the music as it began to speed up, I think I got even more immersed in it at one point, I was getting flooded with like violet hues and wave-like patterns.

3b. Increased Interest as Music Progressed

Sofia (15:18): I don't know, if lively is the best word. Lively. I used to dance a lot. So I like music a lot because I associate it with dancing, and I liked it when it was more lively. Yeah, and I paid more attention to the music.

The music also appeared to reduce her mind from wandering.

Sofia: In the beginning, my mind was wandering, but then at the end, it brought me back in, it caught my attention…The ending really struck with me; the other parts were just kind of calm probably nothing really struck me about them. My mind wanders very easily and towards the end, I was brought back in when the music had started [playing more lively].

For Sophia, the increase was more attentional, while for Geeta, it was more emotional.

Geeta: Like it was kind of a roller coaster ride, kind of thing. Like when there was lower notes or something it felt like there's a stability and like a stagnant thing and then there were higher frequencies or I don't know how to say that, but when it was, there was this rush of emotions running through my mind.

In conversation with her, I then attempted to determine where she experienced this starting at 17:46.

Geeta: This was more we've reached somewhere. I'm flowing through a story and then changing, like changing into a different story. There's more beats

I then tried a different section.

> **Geeta:** This is the more toward the emotional (17: 50).

Anton also reflected on this area.

> **Anton**: (17:41) Cause the beginning it's I think that there's just a few chords involved then probably more instruments are getting in ... more playing is involved, but as the music increases in rhythm. I was like ok, its going, its going , its going.

Anton felt that it appeared to be more instruments playing, despite it just being the one instrument. He seemed to feel that something was happening. It appears to be increased attention; however, the way he says, "its going, its going," indicates his excitement, and thus his attentional and emotional increase. In both Sofia's and Anton's accounts, they both identified with the beginning of the jhala. For Emma, around the same moment, she felt that she was able to lose herself in the music.

> **Emma**: Uhum, there were, well, there was one moment in particular when the music got faster and more intense, I suppose, and it got easier for me to get lost in it, in those moments, as opposed to other moments. Oh we're getting to, yeah (15:04)…Yeah that sort of thing. There aren't any breaks between. (15:04) ...there were more sitars [pausing] or I guess there were? Yes, we're really sort of getting to the crescendo.

Anton found 17:41 of the jhala to be the moment that resonated for him, which, like for Emma and Geeta, was the movement and moment (after the 17-minute mark) that was memorable for them. Both Emma and Anton described a perception of more instruments playing despite it being only the sitar.

> **Anton**: For me the stronger the stronger it is the more I like it (17:41). See here, the rhythm starts increasing and right and here, I think there are more instruments or chords involved? More playing.

Around that time the sitarist is exposing and fretting an ostinato on the 5th or pa note in the upper register in a staccato quality while alternating between the chickari, upper octave top strings, then still slowly soaring around the motifs of Desh while not playing any fast runs. Thus, there is a sense of minimalism within the fast picking. One can hear the resonation emerging in the instrument at this point and it appears to be facilitating what they are experiencing.

4. The Music Allowing a Change of Consciousness

In this group experiential theme, the participants described how music ultimately allowed a new state of awareness but not without other unique or contradictory feelings.

4a. Contradictory Feelings Within the Relaxation

Emma had some initial frustration with the novelty of the music and then she found herself to be relaxed.

> **Emma:** It was definitely relaxing. I would say my normal reaction to instrumental music is to just get lost in a narrative and in my daydreams and imagination and that sort of thing, but with this music, I wasn't able to land on any particular thought for very long. Maybe because I don't have any associations with it— lived associations necessarily. You know, with classical music that I grew up with, that's much easier. Like Beethoven and things like that from my parents. I felt a little bit frustrated by that, I guess, because I knew that I was going to be doing this later, so I was like, "Where are the thoughts that I'm going to dissect or think about or share?" I wouldn't call that an overwhelming feeling. I was just waiting for that to happen.

Emma described her overall feeling of relaxation.

> **Emma:** Yeah, I mean I feel it could be a mixture of the lighting and sitting down, but I certainly feel more relaxed now than I did coming in.

At the same time she felt her relaxation was linked to feelings of energy.

> **Emma:** Yeah it's a bit contradictory but also energetic [laughs] I suppose.

When I attempted with her to find the area where she first felt this feeling (that is further explored in another theme), she begins to make sense of her feeling.

> **Emma:** (17:21) This certainly... I would say, yeah, the music is more energetic but I, myself, am calmer because I feel like this is the part for me that reacts to music.

At the same time, Emma explained that although she listens to music for emotional association, she did not expect or set out to become relaxed when listening to the music the way she did.

> **Emma:** Certainly yeah, I'm a writer so it's very useful for me actually to have music on if I'm trying to find a particular genre or emotional association with the scene, but if I was trying to relax and be part of myself then I would not have music on.

The element of contradictory feelings yet relaxation resonated in both Anton's (a completely unfamiliar listener) and Geeta's (the most familiar listener in the group) accounts. The two described the contrasting characteristics in the music and timbre that could be described as tense while still appearing to allow an air of peacefulness and relaxation.

> **Anton:** The sound, at a point, becomes pretty sharp. At the beginning it gives you a kind of a relaxation feeling.
>
> **Geeta:** The high notes were actually giving turbulence of like I was flowing through the music (17:50). It felt like that [turbulent] other than that it felt [pause] peaceful I would say.

Both Anton and Geeta began their statements describing the tenseness or unrelaxed sensation in the timbre and/or the music at certain moments. Anton felt the music was relaxed in the beginning so one could speculate that the "sharpness" was later in the music. For Geeta, the turbulence was around 17:50 seconds, which is close to the area where Emma felt the energetic feeling. Similarly, Anton, Geeta, and Emma expressed a general feeling of relaxation, peace, and lack of intrusiveness despite contradictory moments.

> **Anton**: So, like a background and more probably relaxation after hard day. Background, it's like you know just being there coming from everywhere.

Anton described this as a background music where there was no specific focal point.

> **Anton:** The music going in the room and it's not you playing it or somebody playing at the piano. The music is everywhere. It's like, like a Dolby system, like a sound system. Yeah, you don't know, here there wherever...

Anna also described the nonintrusive nature of the music.

> **Anna:** It's very restful nothing nerve jangling.

Anna gave a brief but rich metaphor of nerves being jangled. One can imagine a cacophonous sound that might be startling or jarring that in her account was not present for her in the music. Sophia described an enjoyment and similarly a neutrality to the music despite the variations.

> **Sofia:** I really enjoyed it, I enjoyed the variety. So some of it was slower. Some of it was more lively…I didn't fall in love with it, and I also didn't hate it; it was very neutral for me.

In Sofia's case, she described the music as having variability and being agreeable. At the same time, it was not a music that jumped out at her so to speak; it "was very neutral."

4b. Falling Into a Sleep-like Yet Awake State

In the next experiential theme, Scott and Anna described a deeply relaxed state that could be interpreted as a sleep-like yet awake state.

> **Scott:** I described this sort of falling sensation that I noticed happening and then even my neck came forward. I don't know if you saw me at that point. I wasn't sleeping [laughs] it was just like complete relaxation right… So I think like falling was the best description of it towards the end.

Scott described an almost sleep-like state while being awake, where he appeared to be falling. When prompted he identified that this happened at around 17:30 seconds. Anna, on the other hand, felt she dozed off while having some awareness of the music at approximately 13 minutes.

> **Anna**: Well, I don't sleep very well too so that’s another story. I didn't sleep very much last night and I had an intense workout this morning. So, I know it's not the same thing as 20 years old. I can’t go like 24 hours without sleep, it’s not the same anymore [laughs]. Yeah I dozed off but I could still hear everything.

Once could interpret the “non-nerve jangling” nature of the music allowed Anna to have the momentary rest her body needed.

4c. A Symbiosis Between Raga and the Meditative Experience

The next personal experiential theme was a symbiosis between raga and the meditative experience.

> **Geeta**: I kind of feel like with the initial meditation session, when you say relax your body and close your eyes? That kind of made me feel like okay and maybe I’m in a closed concert listening to this.

For Geeta, the induction or guided meditation helped to immerse her in the musical experience and made it feel like a live concert. For Scott, the music itself had an element where it might facilitate a mindfulness practice.

> **Scott**: It was a more difficult task obviously in terms of clearing your thoughts but it's very interesting with the music itself cause it's basically like a mindfulness practice where to dissociate and really become focused on the music itself is much easier, just to clear everything.

Sofia also could envision the potential of this music as part of a meditative practice if she had been invited to lie down, as opposed to sitting in a chair.

Sofia: So, I think that like the music at the beginning probably would have been best for meditation because it didn't catch my attention as much and I'd be able to focus on my breathing but because of the chair, I probably wasn't doing that, I think it would be nice to listen to like the slower parts of this type of music to meditate and do yoga.

Interpretation of the EEG Waves

In this section, I interpret the EEG waves of the six participants based on the indexing of the waves with the various sections of the experience for each of the participants.

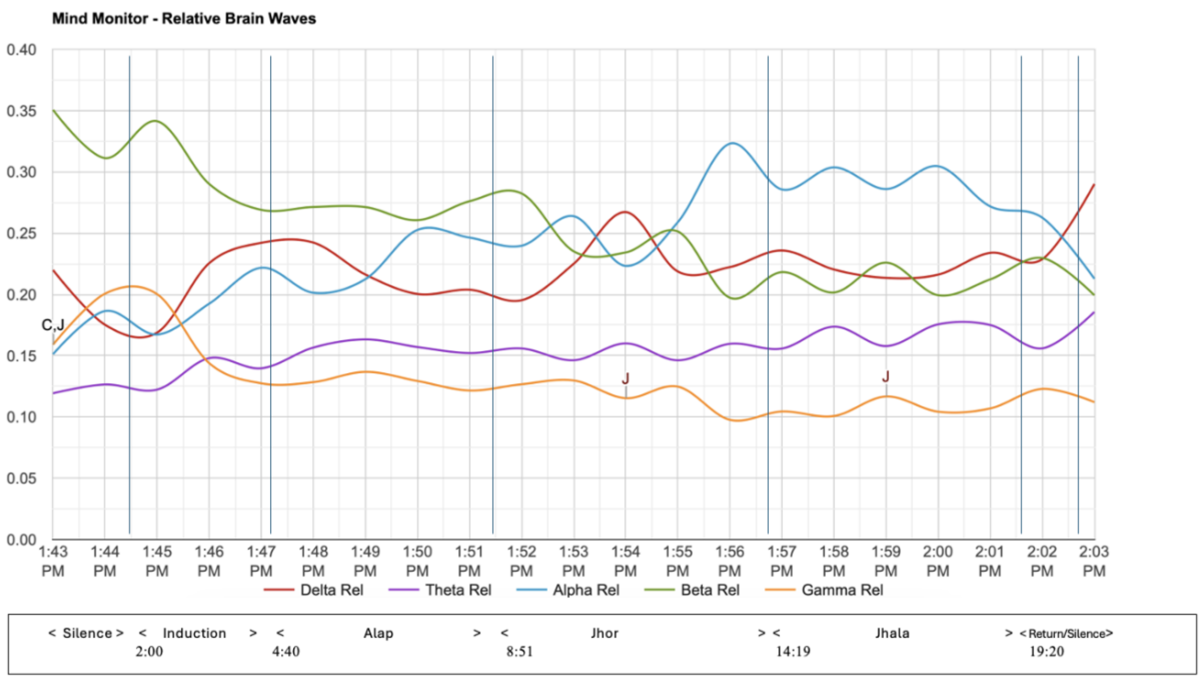
Anton's EEG Waves

From the beginning of the induction (see Figure 4), looking at his relative power (see Methodology for a description and rationale of relative versus absolute power), Anton's beta levels slowly curved downwards from the induction and continued with every movement of the musical experience. Lower beta waves can be indicative of increased mindfulness and present moment awareness of one's current sensory experience (Knyazev, 2007) as opposed to being part of one's default mode network. At the end of the jhor movement, starting at 13:30, where the music became faster, the syncopation changed, and the instrument increased in resonance, there was another large dip in beta, again indicative of a more relaxed state. At around 17:41, or towards the end of the jhala, or faster movement, with increased and sharper picking of the upper strings (chickari) and an exposition of the higher register, the alpha waves dipped as they returned to around the baseline.

Throughout the experience, both gamma and beta wave power appeared to be in sync, which could be indicative of heightened emotional engagement (DeLosAngeles et al., 2016). Decreases in beta and gamma also correspond with being in deeper meditative states (DeLosAngeles et al., 2016). Alpha can be known to increase in certain meditative states (Andreassi, 2007; Frohlich et al., 2021) and in this case went up consistently from baseline, towards the end of the jhor which was transitioning to the jhala. At that moment in the music there was faster picking and characteristic excitement of the resonant chamber on the sitar, but it was softer and with the Ustad incorporating melodic runs. The alpha waves dipped and peaked at 13:30 with the beta as mentioned earlier in contrary motion. See Appendix H for Anton's EEG: All data points.

Figure 4

Anton's EEG: Average Minutes (Relative Brainwaves)

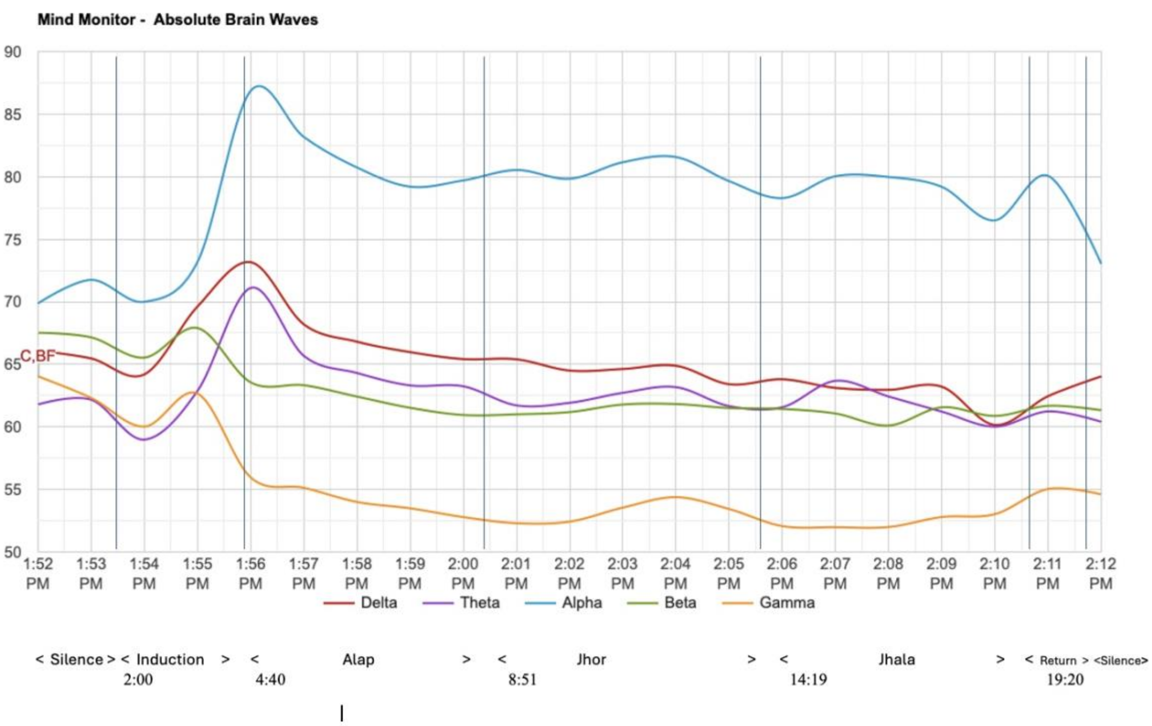


Sofia's EEG waves

Sofia's absolute EEG brainwave power (see Figure 5) showed that during the induction, there was a significant spike in her alpha, theta, and delta levels, which slightly decreased during the music but remained well above the baseline throughout the experience. The greatest change was in her alpha levels at that moment, which are indicative of meditative relaxed states (Andreassi, 2007; Frohlich et al., 2021). Her delta and theta, indicative of relaxation and meditative states, also curved upward. Likewise, her gamma waves, indicative of problem solving (Kumar & Bhuvaneswari, 2012) and beta waves indicative of alert states (Bardekar, 2018) and anxiety, inversely dropped during the experience. At 15:18 seconds of the experience, was the beginning of the jhala, as previously stated, the movement with an increase in tempo and intensity in the music. This was the moment where there was a slight upward curve in alpha waves. It was also evident that Sofia's EEG levels (other than gamma and beta) began to curve back to the baseline levels following the experience. See Appendix I for Sofia's EEG: All data points.

Figure 5

Sofia's EEG: Average Minutes (Absolute Brain Waves)



Geeta's EEG waves

In Geeta's relative brainwave power (see Figure 6), one can see midway through the induction an increase in alpha wave, indicative of relaxed, meditative states (Andreassi, 2007; Frohlich et al., 2021). Alpha levels began to decline during the alap and jhor but remained well above baseline throughout the music experience. A little before and at around 17:50 in the jhala was another significant increase in alpha levels.

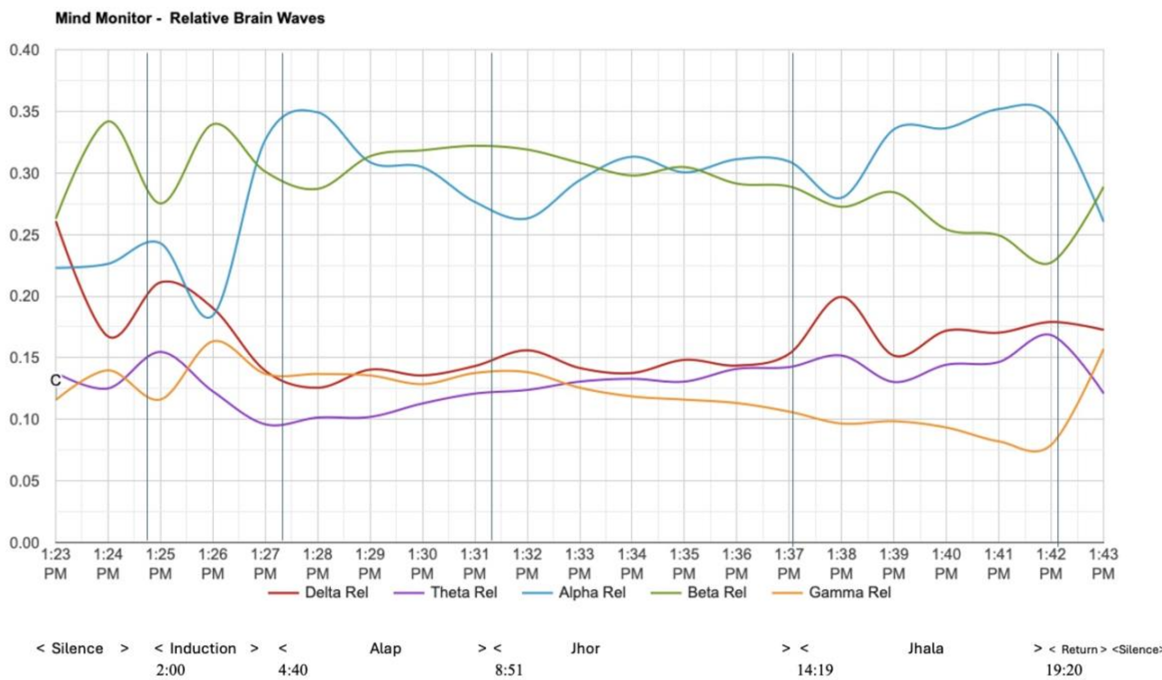
As alpha increased at around 17:00, Geeta's beta levels, which can be subjectively indicative of anxiety (Bardekar, 2018) and external attention (DeLosAngeles et al., 2016) decreased inversely at this moment. Geeta's gamma levels, indicative of concentration and hyper alertness (Kumar & Bhuvaneswari, 2012), slowly decreased throughout the experience and appeared in phase with her beta waves.

It is interesting to observe that throughout the experience, her beta and alpha brainwave levels remain significantly higher than the other brainwaves most of the time, only shifting in opposite directions around 15:19 seconds, which corresponds with the jhala movement. I might speculate that, despite being in a relaxed, attentive, and meditative state, she also maintained focused engagement for most of the experience or perhaps experienced a relaxed nervousness or anticipation.

Furthermore, a reduction in both gamma and beta waves can indicate heightened emotional engagement (DeLosAngeles et al., 2016). As gamma waves are indicative of problem solving, and beta waves indicative of awareness and external attention, it appeared Geeta was becoming more immersed in the experience through time. See Appendix J for Geeta's EEG: All data points.

Figure 6

Geeta's EEG: Average Minutes (Relative Brain Waves)

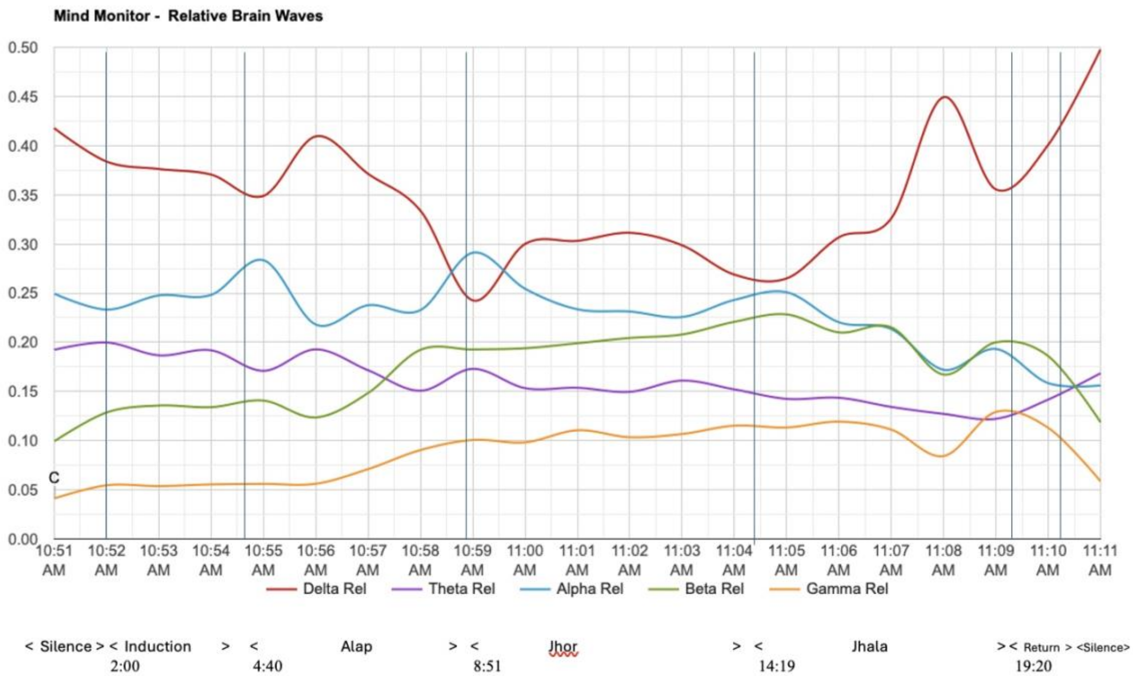


Scott's EEG waves

Scott said he had practiced mindfulness and Reiki. His alpha power levels did not increase during the experience (see Figure 7). His delta levels, which are indicative of sleep and also of deeply relaxed states for experienced meditators (Frohlich et al., 2021), appeared to drop during the experience, but at 14:27 seconds his delta waves appeared to incline while his other brainwaves declined. This concurred with the beginning of the jhala movement, the movement with the most right-hand picking and higher tempo. However, at 17:30 seconds, the music continued to build in intensity, and a clear increase in his delta levels began, with an inverse dip in all his other brainwaves, with the exception of theta, which is indicative of deep relaxation and inner peace (Andreassi, 2007; Kim et al., 2022). See Appendix K for Scott's EEG: All data points.

Figure 7

Scott's EEG: Average Minutes (Relative Brain Waves)

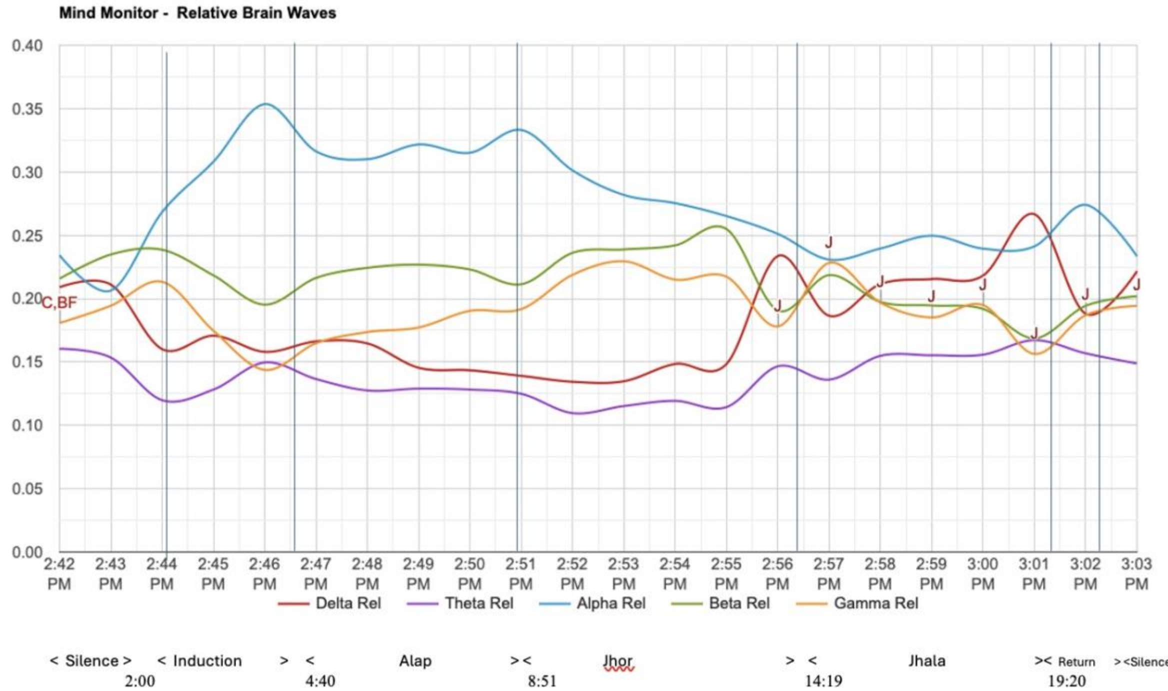


Anna's EEG Waves

Anna's alpha waves, indicative of focused relaxation (Andreassi, 2007; Frohlich et al., 2021), rose significantly during the induction, and although they slightly declined during the initial alap, they stayed significantly above baseline (see Figure 8). During the jhor, alpha levels declined, while beta levels indicative of more alert states (Bardekar, 2018) inclined. Towards the end of the jhala (18:20), there was a noticeable increase in Anna's delta waves, which indicate sleep-like states and deeper levels of consciousness (Frohlich et al., 2021), while her gamma, indicative of focus and concentration (Kumar & Bhuvaneswari, 2012), inversely declined. The indication of j or jaw clenching that appeared in jhala movement rendered some of this data less accurate along these points but within Mind Monitor's threshold for useable data. See Appendix L for Anna's EEG: All data points.

Figure 8

Anna's EEG: Average Minutes (Relative Brain Waves)

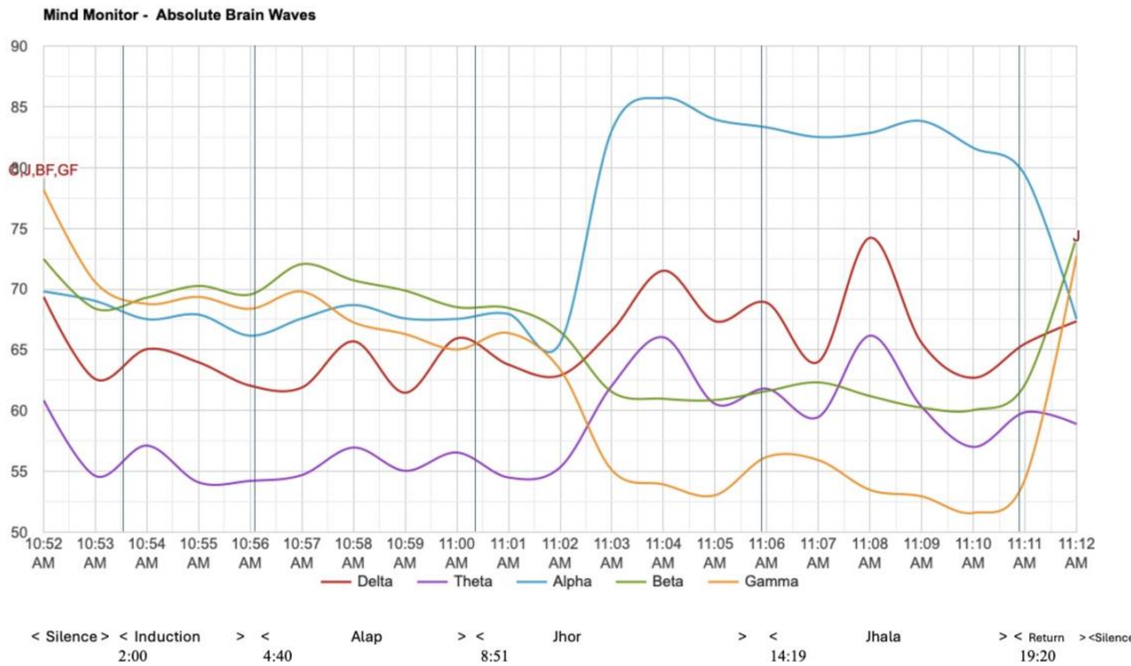


Emma's EEG Waves

Upon observing Emma's brainwaves (see Figure 9), one can see that her alpha waves, which are generally indicative of relaxation and meditative calm while in a wakeful state (Andreassi, 2007; Frohlich et al., 2021), spiked close to 11:00 minutes, which is during the time where the jhor movement became more energetic or intense through increased amplitude and percussive plucking of the instrument. At 17:21, where intensity was further expressed in the music through increased speed, volume, and percussive picking, Emma's alpha waves remained consistently high, and there was also a spike in Emma's delta and theta waves. Delta waves are associated with the deepest levels of relaxation and sleep (Frohlich et al., 2021), and theta waves are also associated with relaxation (Andreassi, 2007) and certain meditative states (Kim et al., 2022). See Appendix M for Emma's EEG: All data points.

Figure 9

Emma's EEG: Average Minutes (Absolute Brain Waves)



The previous section presented the quantitative analysis of EEG readings for the six participants. It displayed the various brainwave readings when mapped to the musical movements, as well as what these readings subjectively corresponded to based on the literature. Next, I review the arts-based hermeneutic analysis process and creative outputs. In Arts-Based Research (ABR), creation functions both as a process and an outcome. The steps and reflections illuminated through this creative approach are outlined in detail.

The Arts-Based Hermeneutic Analysis Process and Creative Outputs

I employed an arts-based, semi-improvised creative methodology to further attune with the participants' experience of the phenomenon as depicted in the qualitative and quantitative findings. I selected the data of two research participants and interpreted them musically in Raga Desh, mapping each participant's EEG data with their corresponding interview. The first interpretation featured Geeta's experience and involved a comprovisation (Bhagwati, 2013) on guitar and electronics of a score that I created integrating her EEG data with her subjective reflection of the experience (see Figure 10). The video link can be found here, or please paste link in browser (https://drive.google.com/file/d/181K-mlaxTo97fc5K1EV-2xfYa2BzJSBv). I followed that interpretation with another comprovisation based on Emma's experience, using the same approach but on sitar and electronics. The video link can be found here or please paste link in browser (https://drive.google.com/file/d/1yEyNddU7Szb0pWt9JrSxRGn8f_j64vON).

Rationale

I wondered if EEG and semi-structured interviews could be combined to better help me make sense of the participants' experiences with contrasting cultural relationships to music in an embodied manner. How might I observe any contrasting elements and unique nuances between the participants' verbal descriptions and what was occurring in their EEG data? I felt that conducting a semi-improvised composition or comprovisation was warranted. Comprovisation reflects the fluid continuum of composition and improvisation (Bhagwati, 2013). It explores the inherent traditions of semi-improvised music and emphasizes that no music is entirely improvised, as musical givens and traditional gestures operate like a computer program executing in real time. In comprovisation, there can be relational polyphony, or a web of interacting agents, performers, scores, systems, or technologies, each interdependent on the other (Bhagwati, 2013). I felt that the dualistic yet symbiotic relationship between raga and my modular synthesizer, which I would use to perform the improvisation alongside both the sitar and the guitar in Raga Desh in conjunction with the participants' data, acted as the interacting agents. Most of the modules and pedals had either an analogue or organic, lifelike quality, characterized by the tactile process of twisting knobs, patching voltages, or touching sensors as opposed to only inputting values. The oscillators showed subtle imperfections that enhanced their lifelike feel and were wired as generative systems that continued to surprise me even after wiring, further adding to their lifelike nature. This, combined with my playing and the participants' experiential statements and brainwaves, allowed me to gain a more holistic understanding of their experiences. I could also compare the similarities and differences between the two participants' accounts while respecting the idiographic approach of the study.

Bracketing, Reflexivity and Ethical Considerations

To maintain reflexivity and be aware of biases, I re-engaged in bracketing through revisiting my free-write before engaging in the arts-based process (see chapter 3 for more information on bracketing). I was conscious that as I was making sense of the participants' making sense of their experiences. My own interpretations and findings to theory and literature also influenced this process (Smith, Flowers, & Larkin, 2009). It is also important to clarify that, as part of the initial consent form (see Appendix F), participants were informed that their data might be used for arts-based interpretation.

Participant Delimitation and Selection Process

Out of the six participants in this research, the arts-based component was delimited to two to respect and accommodate the idiographic nature of the study while remaining within the study's scope. To begin the process of integrating the interview findings and EEG data, I chose to focus on the experience of one more familiar listener, Geeta, who indirectly heard elements of raga in her creative process as an Indian dancer, and on the experience of an unfamiliar listener, Emma, who used Eurogenetic classical music as a catalyst in her creative process as a writer. These two participants appeared to have emotive experiences that sometimes converged and diverged in both their EEG data and interviews, while also having very different cultural relationships with raga.

Procedure

Score Creation. The two individuals were chosen to have their EEG data and narratives transformed into two separate visual musical scores using the Decibel Score Creator software (see Figures 12 and 13). All the following steps were completed one at a time for each participant; first with Geeta, then with Emma. In this process, I analysed the raw EEG data for each participant, which had previously been mapped to different sections of the experience (silence, induction, alap, jhor, jhala, return, and silence), then reviewed the participants' raw transcripts again to identify poignant experiential statements, most of which had already emerged as personal experiential themes in the qualitative analysis. This was also a way of iteratively reviewing the two participants' statements to ensure they were both reflected in the themes. Some of these experiential statements had been timestamped during the interview to indicate the area in the music where the participants felt that particular experiences occurred. Such timestamped statements were added to the corresponding location on the score, and the timestamp was also marked on the score. Experiential statements without timestamps were placed where I interpreted that they might have happened in the listening experience. Those statements lacked a timestamp on the score. Next, I reviewed my previous analysis of the participants' brainwaves. I added dynamic markings based on what the brainwave indicated both subjectively and objectively, such as the direction and the implied emotion or mood associated with the brainwave type.

I then converted them to be read in the ScoreCreator. This would later enable me to identify my position in the score in real time when performing with the Decibel ScorePlayer, which provides a way of reading graphic score notation and, in this context, when played back, would allow the listener to see my interpretation of the score in real time. Although the complete experience was 21:14 seconds, including silences and induction, each comprovisation was made to last 15 minutes to allow myself time to read the score while organically improvising with the various elements, and to keep the performances closer to the length of the actual music stimulus. I was able to allot this duration in the Score Creator and synchronize the score to the playhead used in the Decibel ScorePlayer. I then converted the file to a .dsz format to be played on the Decibel ScorePlayer.

The Performances.

Performance Materials. The scores were displayed on a screen projected from an iPad running the Decibel ScorePlayer. I recorded the performances on an iPhone 13 Pro. The instruments, guitar and effects pedals for the first performance and sitar for the second, ran into the modular synth. I routed the audio from the modular synth's stereo output into a MacBook Pro via an audio interface; the MacBook was running Logic Pro. No additional effects, panning, editing, or mixing were added after the performances, except for some mastering of the final tracks in Logic Pro and the Landr Mastering Plugin. I then synced the audio with the video using iMovie. Further instrumentation and routing will be detailed below.

General Performance Decisions. I decided to musically interpret the participants' direct quotations (experiential statements from their interviews) while simultaneously interpreting their brainwaves, which were aligned with those quotations and mapped to the movements of the experience. While both elements were treated as distinct musical interpretations, they were presented together in parallel. For example, if there was a sudden peak in alpha waves, I represented this by manipulating the timbre of the drone to a louder and more randomly percussive sound. I also responded to alpha brainwave peaks through dynamics such as playing my guitar or sitar louder, pitch, moving up the neck, or combining all three parameters.

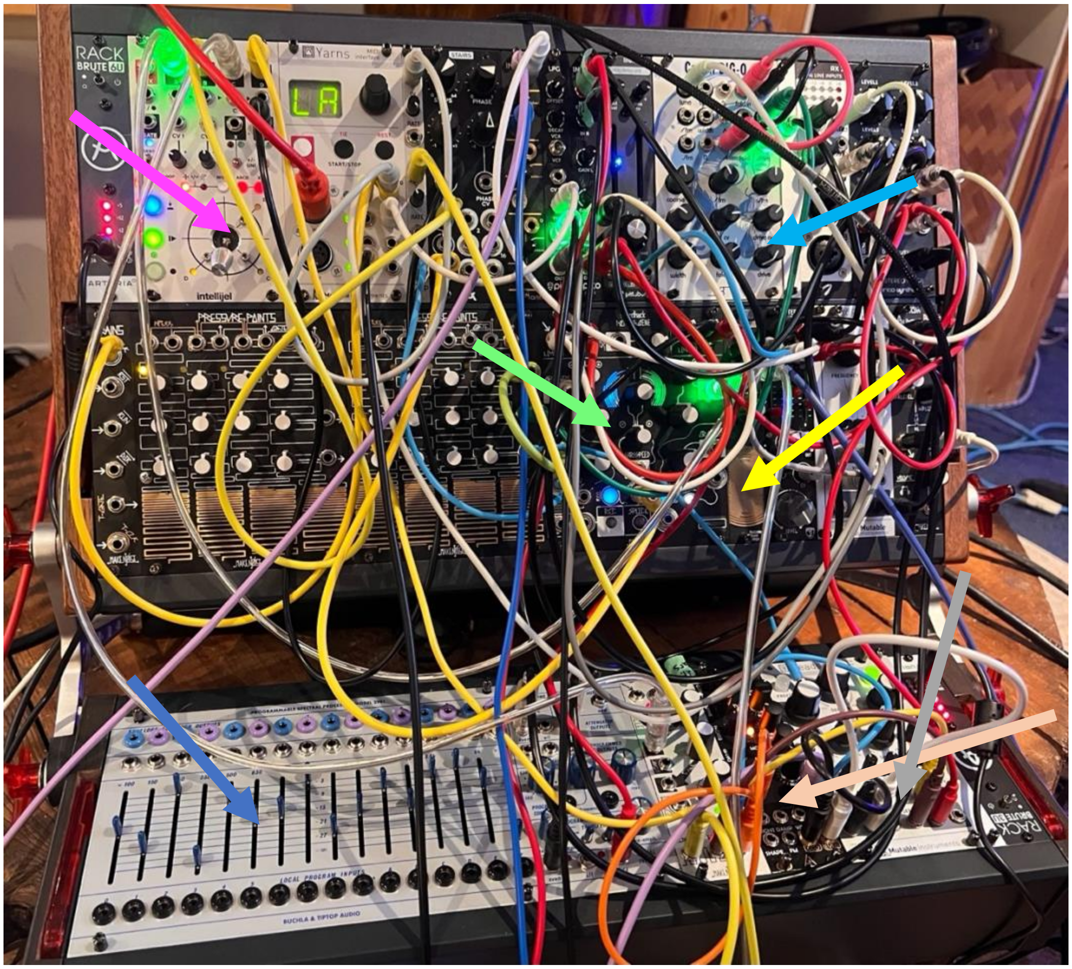
Primarily, with the sitar and guitar, I followed the protocol of raga Desh. I explored various ways to interpret the participant's experiences, or rasa, while remaining true to the protocol or bhava. There were no fixed rules regarding which elements could take priority during improvisation or the extent to which each parameter would be manipulated. However, I would give it precedence if a brainwave, like alpha, was dominant in amplitude and in contrary motion with other waves, especially if it coincided with an experiential statement. The relatively stable waves, I interpreted as drones.

For the experiential statements, these would often be prioritized musically since there were fewer of them compared to the continuous brainwaves. I was not explicitly trying to mimic their statements, but rather to spontaneously interpret them musically in a way that conveyed how they might have felt, sometimes incorporating my own projection within the interpretation. For example, when Emma referred to cliché sounds, I spontaneously interpreted and created the elephant-like sound, which also resembled her description in the interview of a tin cup. This was a mixture of what she had experienced as cliché and what I thought she might experience as cliché, along with the happenstance of the sound that emerged when playing an unpredictable instrument (the modular synth). To introduce more spontaneous interaction into the improvisations, my sitar signal modulated parameters on various modules via envelope followers and audio-rate modulation, so any changes in my playing (dynamics, attack) affected the modular sounds. Therefore, my gestures, whether instrumental or via the joystick, acted like those of a conductor, influencing the modular synthesizer. Simultaneously, the synthesizer maintained a generative aspect of its own. Generative music, a term popularized by musician and composer Brian Eno, refers to music that, at least in some aspects, exists outside of the artist's control and cannot be replicated (Gradim & Pestana, 2021). In preparing the patches, I aimed to introduce random variability and tried to minimize the time spent on wiring.

Establishing Final Versions. Like wiring the patches, the performances were designed to maintain a strong sense of spontaneity and free association in interpreting the experiences, which I believed would be lost in an overly polished performance. That said, I would often stop and restart if I completely veered off the score, if the instrument levels were off, or if I accidentally played a blatantly wrong note in Raga Desh during the melodic runs. Once I reached the end, it meant that I had adequately interpreted the participants' experiences while remaining true to the spirit of Raga Desh. That was the performance to be used.

Figure 10

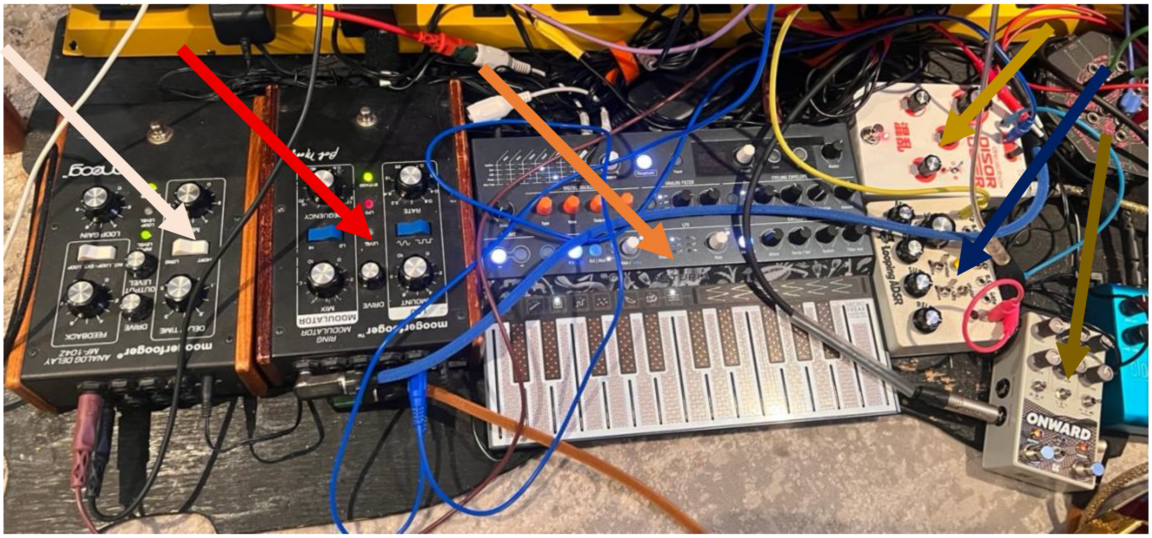
Modular Synthesizer Setup



Note. The Intellijel Planar 2 marked by a magenta arrow, After Later Audio nRings (a Mutable Instruments Rings clone) with a salmon arrow, Captain Big-O with a blue arrow, Mutable Instruments Ears with a yellow arrow, the Tip Top Buchla Performance Mixer with a dark blue arrow, Mutable Instruments Beads with a grey arrow, and Morphagene with a green arrow.

Figure 11

Modular Synthesizer and Pedal Board Setup



Note. A red arrow indicates the Moog MF-102, Arturia MicroFreak with a tangerine arrow, Dreadbox Disorder with a beige arrow, Hungry Robot Looping ADSR marked by a black arrow, MF-104z with a carnation arrow, and Chase Bliss Onward with a brown arrow.

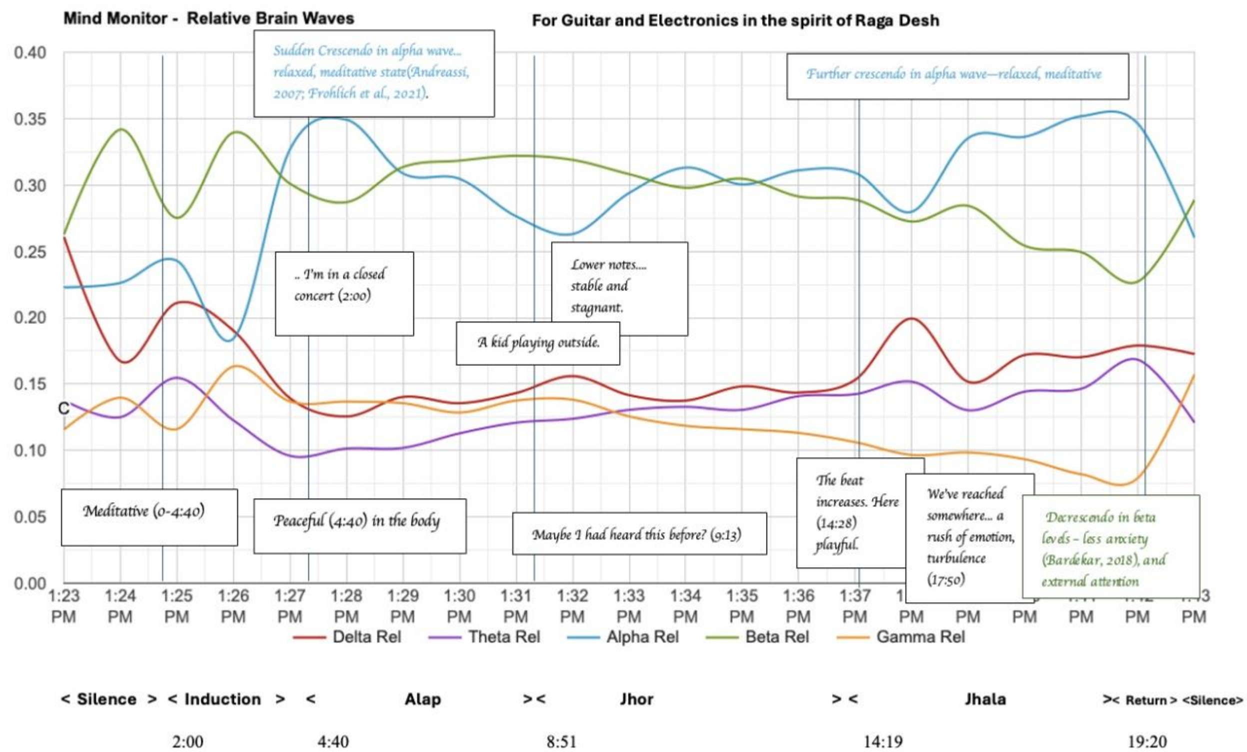
Next, I will guide the reader through my decisions regarding the experiences and how I expressed them musically for each interpretation. The performance was semi-improvised, meaning I adhered to a score while staying within the musical conventions of Raga Desh (see Music Stimulus Description and Selection Process) for the traditional instruments (guitar for Geeta and sitar for Emma) I played. Additionally, all the samples and sequences I created live, excerpt for the wavetable timbre (see below for a description of wavetable synthesis), which I had created in advance for the keyboard patch in Geeta's experience.

Geeta's Experience Musical Score and Performance

For this comprovisation, I used a semi-hollow body guitar, modular synthesis, and guitar effects pedals.

Figure 12

Geeta's Experience Musical Score



Instrumentation and Preparation Specific to Geeta's Experience. Part of the decision to use modular synthesis in this ABR was that although it is an electronic instrument, it has a very symbiotic nature as any action can affect the rest of the system in various, generative and at times unpredictable ways. As mentioned, most of the modules and pedals are either analog or have an organic or lifelike quality. I reflected upon how raga in its very essence has been inspired by nature, birds, and animals (Sankar Ganesh, 2020), as previously discussed (See Cross-Cultural Differences of Raga). As Geeta, compared to the others, was clearly the most familiar with raga, her experience was demonstrated by my play on a Gibson 135 semi-hollow body electric guitar, an instrument that symbolized familiarity. At the same time, the actual raga stimulus and the way it was presented had elements of unfamiliarity to her. Likewise, in this interpretation, the guitar was processed through sound design effects and integrated in multiple ways with a modular synthesizer. For example, the guitar was delayed, or given the perception of echo, and granularization was added through the Chase Bliss Audio Onward pedal (granularization involves merging tiny pieces of the original sampled signal), which could respond to the dynamics of the guitar playing and layer grains on top of one another in real-time. This was then processed through a Strymon Cloudburst reverb pedal (reverberation generally gives the appearance of playing in a larger acoustic space), which would also granularize the guitar signal and create a more homogeneous alternate timbre.

The Drone. I felt that the drone was a vital part of Geeta's experience, both as a sonic foundation for a raga and her mention of low and supporting notes. Since I was playing a guitar that was not particularly resonant or as capable of sustaining a natural drone, I created one with the modular electronics. I adjusted the frequency of the carrier output on the Moog MF-102 with two low-frequency oscillators, which produced voltages that modulated parameters in a wave-like yet random way. These were controlled via the Intellijel Planar II joystick (see Figure 10, indicated with a magenta arrow), allowing real-time, gesture-based control voltage (CV). The ability to record gestures in real time allowed me to shape the evolving texture of the drone in an expressive and responsive manner.

This modulated signal was routed into the After Later Audio/Mutable Instruments Rings resonator (see Figure 10, indicated with a grey arrow), a physical modelling analog resonator capable of producing resonances similar to the sound produced when objects such as strings or metal bars are struck. This process created a sympathetic drone when the guitar was played, evoking the behaviour of sympathetic strings on a sitar that vibrate in response to played notes. The output was further processed through Mutable Instruments Beads, a granular delay module with built-in attenuators and randomizers to subtly vary delay parameters (see Figure 10, indicated with a salmon arrow), adding texture and dimension to the drone.

The MF-102's ring modulator also contributed to this texture by multiplying two signals (the input and the carrier oscillator) to generate a new signal that contains the sum and difference of the original frequencies (Emmerson, 1977). These frequencies were input into the Rings module's audio jack, amplifying the drone's resonant qualities and adding a distinct analog character to this physical modelling module. The Planar II was instrumental not only in shaping the CV in real time but also in recording and replaying gesture-based contours inspired by the various undulations of Geeta's brainwaves. I could further manipulate these contours by adjusting parameters on the MF-102 as the brainwave activity changed. This setup required careful preparation and practice to balance amplitude and resonance, ensuring the drone supported rather than overwhelmed the other elements of the recording.

A further drone that had a more stable pulse was created later in the work through creating a custom wavetable synthesis patch on the Arturia MicroFreak (see Figure 11); the wavetable patch was created prior to the performance by inputting a previous recording of myself playing raga Desh on sitar into the wavetable engine (Mathews & Pierce, 1989) via the Arturia MIDI Editor, which was then converted into a timbre that could be manipulated by cycling through a selection of the recorded waveforms. This process illustrated the nonlinear and interpretative nature of participants recalling the experience through the interview process. It was also another way of integrating my own interpretation of this raga (now as a timbre) to make sense of the phenomenon. I was surprised to find that the timbre had a life of its own but had captured the qualities of sound partials over a flat bridge and sounded like a sitar. I felt it might convey a calming quality as present in Geeta's experience.

I then ran the MicroFreak synthesizer through a Moog MF-104z Analog Delay (see Figure 11) to emulate the phenomenon of memory recall. The notes selected on the guitar were within Raga Desh; however, there were a few moments that were later marked to intentionally explore or stretch the classic motifs in interpreting Geeta's experience. This interpretation was of the whole experience (silence, induction, movements, and return/silence) and therefore, each section of the experience where brainwaves were present was treated as a movement. I was adhering to composer John Cage's concept that actual silence cannot exist (Fetterman, 2012), and in this case was applying this concept to what appeared to be going on in Geeta's psyche during silence.

The recording was the improvisation where I felt the synthesizer, effects, and my guitar were working together. Although it contained a correct blend of unpredictability, it still allowed me to focus on the score by feeling the participant's experience and the ebb and flow of brainwaves flowing through me simultaneously. I could also interact with the changes and randomness of the modular synths.

The Interpretation. This section is my real-time interpretation of the score, what I was experiencing as well as what I was interpreting and how it was expressed via the instrumentation.

Silence. During the initial baseline silence, although Geeta described it all as meditative, there was a constant fluctuation of beta waves. There may have been stirrings of inward awareness, mixed with anticipation of the music for Geeta and distractions, as expected in silence. This phenomenon was interpreted by me running two merged oscillators that were running into the Rings resonator that was simultaneously being granularly manipulated by Beads. At 49 seconds, I begin the alap on guitar to reflect her meditative feeling during the meditation.

Induction. At about 2:10, I begin to raise the frequency to represent the rise in Geeta's alpha waves; it appears to bring her a relaxed state, which she described as peaceful. I also reintroduce the alap on guitar at around 2:55. Here, I add a shimmery reverb from the Strymon Cloudburst that brings in a peaceful string-like quality, doubling the guitar's melody line. I am feeling the peacefulness.

Alap. At around 4:38, I reintroduce a classic theme of Desh, resolving to interpret the peace Geeta is now feeling. At 5:20 I attempt to create the sound of birds to signify Geeta's experience of "a kid playing outside" (Geeta); the idea of a bird was also how I approach the high notes of the raga on the guitar. I am experiencing through her experience the chirps of seagulls and the freedom of being a child, and what a child might hear while playing outside. I am also again contemplating how the ragas are believed to be created by bird-like beings (Adhikari, 2022). This was achieved by increasing the resonance and cutoff of the Dreadbox Disorder (see Figure 11, beige arrow) and looping the Hungry Robot Looping ADSR (see Figure 11, black arrow), which acts as a looping modulation source. Here, I struggle to create the bird sounds; the filter is not resonating or chirping as I had expected when I prepared the patch. Yet, I continue to engage with it. It sounds otherworldly, perhaps this is what celestial bird-like animals sound like, or perhaps what a seagull might sound like to a child playing outside.

Jhor. Here I am responding to Geeta's quote about lower notes stable and stagnant; I add to the Desh motif but an octave lower and reintroduce the main motif again to represent her reflection of "maybe hearing this before" (Geeta). I also note that Desh can connote feelings of nostalgia (Venkatarangam, 2021). I am both feeling and trying to interpret her slight increase in relaxed meditative states as per her alpha waves (Bardekar, 2018). There is less movement in the waves here, and I try to bring an element of sustain in how I am playing. At 8:14, I add a drone from Microfreak's sitar wavetable synthesis patch and some sustained granular shimmering from the Chase Bliss Onward guitar granular pitch-shift delay pedal as I also try to interpret her further immersion in the music and represent the introduction of pulse during the jhor movement. I can feel the modular synth respond, as if it is immersing me in the music, but not in a way that I predicted. Perhaps this is how Geeta's immersion unfolded, subtly and peacefully.

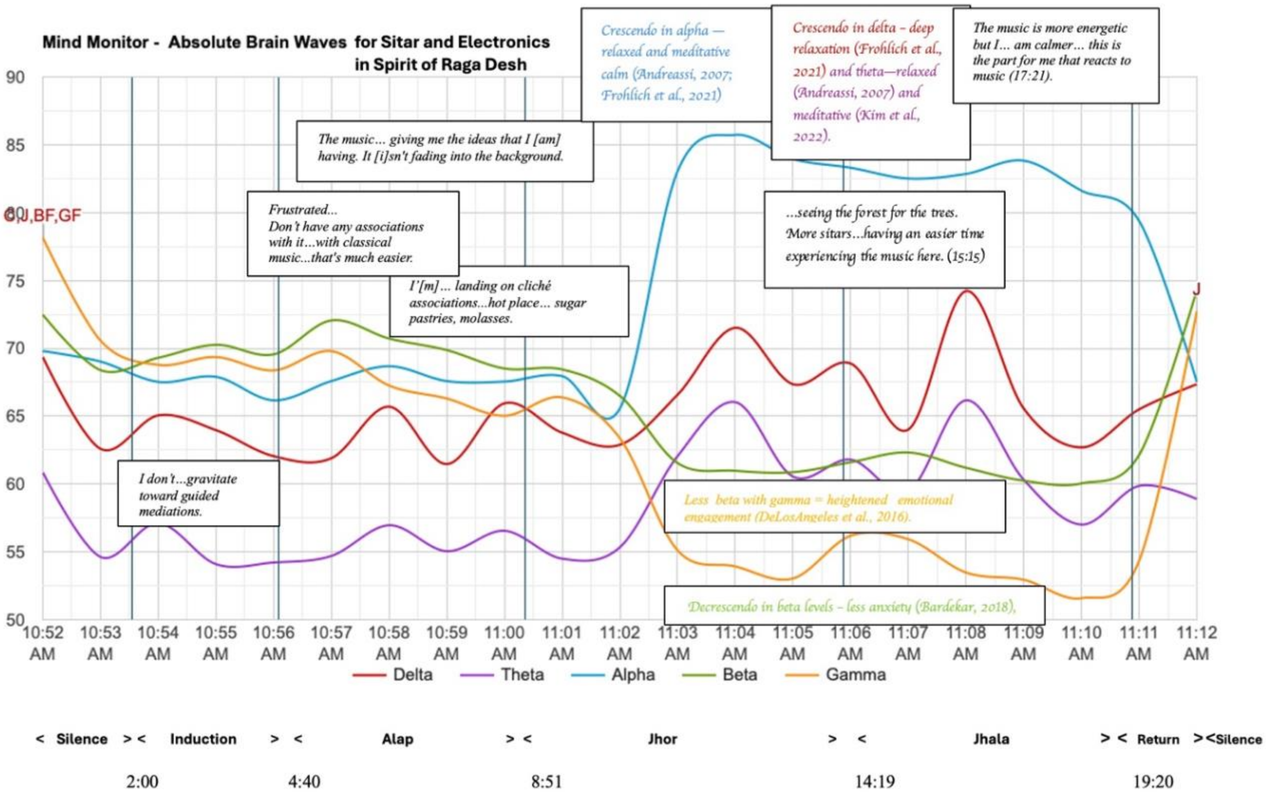
Jhala. At 9:46 I begin to increase the tempo; I am personally beginning to feel the build in intensity and seeing Geeta's comment about a rush of emotion or turbulence at around 11:00. Alpha waves are going up, as I play in the octave, my chase bliss pedal responds to my intensity and pitch. I am interpreting Geeta's statement "we've reached somewhere, a rush of emotion, turbulence, but this is peaceful" (12:05). I am both interpreting and feeling her description and brain wave reflection of a plateau. I also reflect upon idea of nada (see Raga as Resonance: Concepts of Rasa and Nada), which, as mentioned, is the fundamental sound or vibration that links consciousness and the entire universe in all its materializations (Danielou, 1995; Moffitt Cook, 2025; Sundar, 2005). At 12:20 I am playing a European/North American psychedelic rock type motive within Desh. I feel my cultural intersection as an interpreter of her experience, wondering if I am representing this properly. I am feeling the plateau at around 13:25 and responding to the increase in alpha.

Return/Silence. I am experiencing Geeta's feeling as I am seeing her waves of everything returning to baseline. I musically interpret this in the moment by creating a tape effect to represent the tape or in this case waves rewinding back to where they were before the experience, while still maintaining the sound of birds.

Emma's Experience, Musical Score and Performance (Sitar, Modular Synthesizer, PO 33 KO)

Figure 13

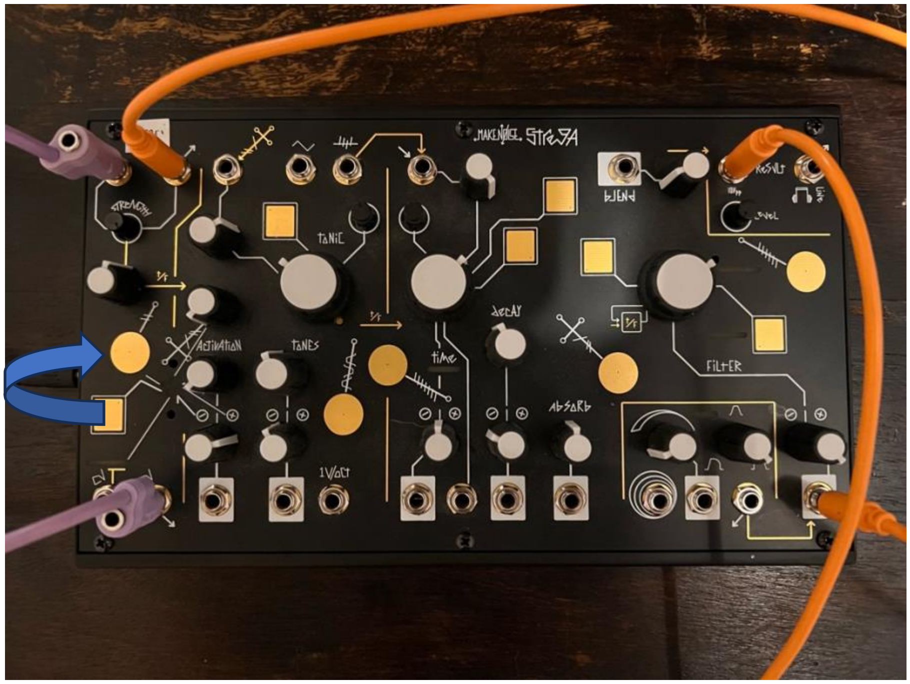
Emma's Experience Musical Score



Instrumentation and Preparation Specific to Emma's Experience. For this comprovisation, I used the sitar as it was the instrument that introduced an element of unfamiliarity for Emma. I again processed the instrument through a modular synthesizer; the patching had been left from my previous interpretation of Geeta's experience. However, since the sitar is amplified through a contact microphone rather than at line level all of the pedals were bypassed. Instead, the sitar was connected to a Joranalogue Receive 2 input to boost the signal. Simultaneously it ran into a Mutable Instruments Ears input that also boosts the signal and has an envelope follower and internal contact mic (when disconnected). From the Ears output, I routed the duplicated sitar signal into the Make Noise Strega (see Figure 14).

Figure 14

Make Noise Strega Wiring



Note. The arrows signifying how to excite the activation circuit with fingers.

The Make Noise Strega is an instrument developed in collaboration with electronic composer Alessandro Cortini, functioning as both a synthesizer and an effects device. It includes a PT2399 Karaoke Chip that produces a lo-fi digital delay and reverb, with random modulation from an internal oscillator and multiple filters. Touch plates on the device allow for additional connectivity and control voltage manipulation. This semi-modular device features markings designed to be intentionally ambiguous, encouraging experimentation. At times, I disconnected my sitar, causing Ears to act as a contact mic that captured scraping or tapping gestures on or near the module, which could then be sent into the Strega. I manipulated the random voltage generator with two fingers on the square and circle touchplates on the Strega (see Figure 14), affecting the activation and interference circuits. The Strega responded differently depending on the sound source, demonstrating its sensitivity to touch, tone, and dynamics. The sitar was connected through the modular system so that when I played the jhala, both the modular and the sitar resonated together. To further represent the fact that Emma's experience was being recalled from memory in a nonlinear manner in the interview, the sitar was run through the Mutable Instruments Beads, delay/granular processor. As previously mentioned, granular synthesis is a process invented by composer Iannis Xenakis (Roads, 1988), which, very broadly speaking, records parts of the incoming audio and replays the splices, which, when small enough, are known as grains. The sitar's audio output was routed into the Make Noise Morphagene audio input, a digital reel-to-reel live tape style sampler and splicer that can be spun in reverse, pitch-shifted, and slowed down (see Figure 10, green arrow). The sitar, spliced even at the granular level, can be played back in real time. These parameters can also be manipulated with CV, where the various settings would be affected by the intensity of my playing due to an envelope and audio outputs running into the CV inputs. In this recording, Strega's external output was wired to the Morphagene's Morph input, so the sitar's responses modulated the randomized pitch and panning across various recording segments.

The Morphagene's audio outputs were connected to the audio inputs of the Tip Top Buchla 296 T Programmable Spectral Processor performance mixer, a recreation of Don Buchla's original design (see Figure 11, midnight blue arrow). I added and removed various frequency bands of the sampled signal, creating unique timbres that represent the distinct sound of the sitar while also drawing inspiration from how EEG uses bandpass filtering when recording brainwaves. With various devices interacting and manipulating each other, I often did not know how the Morphagene sample would sound after being processed by the Buchla Spectral processor when I sampled my sitar. In this recording, what emerged was not what I had anticipated. I had adjusted the level of my Morphagene because, in a previous recording attempt, the sampled sitar was too soft. I had overadjusted, and the sitar distorted, but it was a happy accident, because when filtered through the Buchla, it sounded like the buzzing of numerous violins.

The second 1 V 1 drone was created using the Arturia Microfreak's touch keyboard (see Figure 11, white arrow) as a controller, which was wired via MIDI to the MIDI input of Mutable Instruments Yarns. Yarns is a MIDI to CV converter that can utilize the notation of specific raga parent scales. MIDI is a digital protocol that evolved after CV, allowing electronic devices to communicate. Khamaj uses a flattened seventh. Furthermore, as possible with this module, I fine-tuned it to the specific shruti of Khamaj (see Raga, Thaat, Swara, and Shruti; see Music Stimulus Delimitations) to give this improvisation a more authentic micro-tuning. The oscillator used to receive this fine tuning was a Cre8 Audio Captain Big O (see Figure 10, blue arrow) which also has a wave-folder (where waves fold in against themselves) that allows a buzzy sitar-like timbre; it somewhat emulates what might happen when a string or tambura resonates against a sitar/tambura bridge (see The Sitar).

My voice during the induction was live sampled on the Teenage Engineering KO 33 and run into the Red Panda Raster 2 Pitch Shifting Delay that makes the signal of this delay pitch shift upwards or downwards.

The video recording captured a moment where I felt a genuine connection, while also interpreting and deriving meaning from Emma's experience.

The Interpretation. The next section is an in-the-moment interpretation of the score, that is, what I was experiencing, what I was interpreting, and how it was expressed via the instrumentation. As with the other interpretation, this was from my memory, but also through revisiting the performance recorded on video.

Silence. I use the Intellijel Planar 2 to CV modulate the drone, creating a bouncing ball-like droning interplay**.** This represents her initial struggle to connect with the experience. I then scrape my mizrab (sitar pick) on the disconnected internal contact mic from Ears into Strega to further interpret and give voice to the sound of distraction during Emma's comment "I don't gravitate toward meditations." I also play the strings behind the bridge to give voice to her feeling of tension. I am also trying to make sense of what she's experiencing in her psyche as all her brainwave patterns appear to have declined. I feel that I was able to interpret and experience the discomfort she may have been feeling during the experience. I reflected in the moment that this is something that unfamiliar and even familiar meditators may encounter, and how I must be sensitive to it when wearing my clinician hat.

Induction. At around 1:37, I use the PO-33 sampler, a small device with an internal microphone that allows you to sample your voice and manipulate pitch, going through the Chase Bliss Onward while I speak parts of the induction live. The sampler malfunctioned here and played the recording later, but this allowed me to further experience the tension in the atmosphere. The sampler was to indicate Emma going in and out of mind oscillation with the guided meditation. At 2:21, I continue to interpret her tension by striking the mizrab and playing the back of the bridge.

Alap. At 3:28, I introduce the sitar, albeit glitchy, through small, random delay grains via the Beads module, integrating it with the original sitar signal. This process is to signify Emma's frustration in not initially connecting in the way she wanted to with the experience. At 5:00, the use of the sound effect by touching the touch sensors (exciting the internal random oscillator in Strega to manipulate the delay) gives the sound of an elephant. I was reflecting on Emma's comment about feeling clichéd stereotypes coming through in the music, while I was also considering how raga is thought to be inherently connected to animals and nature. Mutable Rings creates an extra resonation. This resonation is followed by a first strum on the sitar. I am also trying to connect with her idea that this music is not fading into the background. At 5:18, I begin to introduce a traditional motif of Desh, but realize the lack of movement in her brainwaves, so I do not move this melodic cell anywhere, through progressing up or down the fretboard.

Jhor. I introduce the theme again at 6:48. I also introduce the drone via the wave-folded analog oscillator. I notice alpha waves are starting to crescendo, but I haven't responded musically, so I need to catch up to her experience. I begin to ascend here melodically to signify the clear increase in alpha waves. At this time, I am noticing Emma's comment of relaxed meditative calm that plateaus. The dynamic also increases at 7:44; here, the modular synth responds and changes generatively. At around 8:45 my Morphagene live sample comes in with a hypnotic semigranularly spliced quality. The sample has presence; not what I expected, but I try to interact with its random nature. Is this how unfamiliar listeners experience the jhala? I wonder if this is how Emma and other participants might perceive more sitars, despite there being only one: a unique polyphonic timbre, separate yet in synchrony with one another, and very sharp and present. 9:40 Emma said she was "seeing the forest for the trees." I begin to interpret this as the jhala here; although, I am not technically in jhala in reference to the original phenomenon. Emma appears to be having a better time and experience with the music. I sense her comfort here as the energy intensifies. At the same time, I feel a slight discomfort as my pick is starting to fall off. I begin to descend in my motif according to her alpha waves. The modular synth and all the modular instruments and pedals resonate in sync with the sitar. I reflect on the divine resonance, feeling as though I am beginning to understand and interpret Emma's feeling successfully.

Jhala. I am experiencing and interpreting relaxation in the unique polyphonic timbre emanating from the sitar alongside the many modules. The modules take me into a new rhythmic area. Emma's comment that the music is more energetic at 11:50 feels like she is hitting a plateau, and I am experiencing this. I manipulate the Morphagene to see what it brings to the music and respond musically to what it randomly brings. At 12:24 I am noticing her alpha (signifying the relaxed meditative states) intensity dropping. Likewise, the bottom is beginning to drop in the music. I reflect on how Emma indicated a feeling that is both relaxed and energized. I feel the music is successfully interpreting and understanding her energetic calm. However, to do this, I am letting the modular synth take the lead here.

Return/Silence. The granulated, spliced and modulated sitar sample of Morphagene continues to play and respond as if a distant memory of the experience, calling and responding with itself as it leaves. At this point, I am removing various frequencies from the CV-modulated sample, signifying the return to peacefulness at 13:37, followed by brainwaves quickly returning to baseline at 14:02. It unfolds perfectly. Through removing various frequencies of the sample, I represent the brainwaves descending into silence, but never, as stated by American composer John Cage, pure silence (Fetterman, 2012).

Chapter Summary

In this chapter, I presented the qualitative findings first, with a description of each participant's individual experience of the receptive raga music therapy experience within the umbrellas of the 4 group experiential themes. In total, nine personal experiential themes were identified and corroborated using excerpts from the interviews. To show the quantitative results, I presented each participant's EEG data, highlighting notable alpha, beta, theta, delta, and gamma brainwave power at various moments of the experience. To further attune to the participants' experience as illustrated in both qualitative and quantitative findings, I engaged in an arts-based hermeneutic process in the form of a comprovisation. In this process, I created two visual scores using the EEG average minutes graph from Mind Monitor alongside excerpts from Geeta's and Emma's interviews. I interpreted the scores within Raga Desh on guitar and sitar, respectively, which was captured on video. I shared my process of creating and integrating each comprovisation, how it allowed me access to a deeper understanding of the interplay between the qualitative and quantitative data, and how it further became an integral means of embodying the participants' experiences. Next, I will discuss the findings in more detail, revisiting the group experiential themes while integrating the three types of findings and outlining the limitations and implications of the research.

Chapter 5. Discussion

This chapter is a discussion of the findings of this research study where I explore the research questions through the four group experiential themes that emerged. In line with the phenomenological aspect of this research, participants' EEG data are also interpreted within these experiential themes to enhance understanding of the participants' subjective experiences. In other words, the phenomenological findings were used to help make sense of the quantitative findings (Smith et al., 2021), which aided me in making sense of the participants' making sense of the phenomenon (Smith et al., 2021). Alongside the qualitative and quantitative data, illumination that emerged from the arts-based hermeneutic analysis (Geeta and Emma) are also included in this discussion. Consistent with experimental neurophenomenology, the three types of findings had mutual constraints, meaning they refined and influenced my understanding of each other. The study's limitations are acknowledged, and implications for clinical receptive music therapy and GIM practice are discussed. Future research directions are outlined, and concluding remarks are provided.

Curiosity and Interest With Indian Classical Music and Culture

Individuals' experiences of music can be unique and multidimensional; many political, interpersonal and contextual factors can come into play (Yehuda, 2002). Despite the participants' various cultural backgrounds and relationships to the music, all of them reported either a further interest in the music, culture, or both, in their own unique ways. Geeta, who was a classical Indian dancer who had already identified with South Asian culture and who identified with having some familiarity with the music, said her interest and curiosity was in the immersive process of listening to the various segments of the experience, including the silence, the induction, and the raga. In addition, she found some sections of the music to be familiar and related the experience to a performance on stage. Kabat-Zinn (2009) described mindfulness as being aware of the present moment and experiencing phenomena with a beginner's mind. With this understanding, Geeta was experiencing this somewhat familiar music in a new way or mindfully. This experience was also reflected for her in the presence of alpha, or focused relaxed meditative waves (Andreassi, 2007; Frohlich et al., 2021), which peaked during the induction and were amplified throughout her experience. It was interesting to note, and as interpreted through the ABR, that initially there were fluctuations of beta waves at the beginning of Geeta's experience during the silence, despite her finding the silence to be meditative. This presence did indeed diminish with the induction as her alpha waves began to increase significantly and throughout the experience.Through artistic means of mapping, (score creation, via the Decibel Score Creator) I was able to mindfully interpret and simultaneously bring awareness to this phenomenon. I did numerous takes, playing the music to the score as I tried to get her experience right, and as a result, I noticed this slight contradiction in her experience. In a sense, I was mindfully interpreting her mindfulness.

For Anton who did not identify with Indian culture, and who stated that he had never heard the sitar, or movements of a raga before, his curiosity was with the instrument, the timbre, and where the music was going or would take him. This curiosity continued throughout his receptive experience. In matching his EEG waves to his narrative, the presence of synchronized beta and gamma waves can indicate increased emotional engagement (DeLosAngeles et al., 2016). These waves presented at the beginning of the experience and continued to be synchronous throughout, concurring with what he expressed was cognitively happening for him. At the same time, his beta and gamma waves significantly dropped as he got closer to the jhala movement, a movement with more repetition and with continuous plucking and upper droning strings. The attack of the Ustad's pick was sharper at this time, and was where Anton may have felt that some moments were a bit sharp for him, as he had indicated in his interview. Like Geeta, his alpha waves increased in amplification throughout the experience. There was a moment, similar to Emma's experience, when he described many sitars. Through Emma's comprovisation, I sampled my sitar and observed the sharpness and novelty of the timbre created. I felt the music's interaction and overall gestalt that resonated, giving me a new perspective on how Emma and other participants might perceive multiple sitars, even though only one was played: a unique polyphonic sound, separate yet synchronized, and very vivid and present. I was reminded of what it might be like to be curious or surprised about an instrument I had played for years.

Individuals may have a unique cultural and political connection to music, and Anna's experience touched her in a way that also had political and hegemonic undertones. She felt the music had a serenity, with nothing "nerve jangling" (Anna) and with a sense of a woman journeying. She felt surprised and misled regarding the fact that there was much to learn from Indian culture. It reminded her of a time when she had had a discussion with her friend of Indian descent that allowed her to have a paradigm shift. Rather than viewing India as a struggling country, she perceived a country rich with history and knowledge with much to learn from. Kok

(2023) analysed case studies to discuss the hegemony and repression of South Asian musical forms and how Western influence repressed South Asian musical voices. Through the narratives of Sri-Lankan and North Indian individuals, Kok illuminated how colonial influences through the Associated Board of the Royal Schools of Music had worked to change the narrative of what music is; this was in part through the missionaries who were teachers training both Sri-Lankan and North Indian students and encouraging them to suppress South Asian ways of being through teaching Western norms, values, and practices while favouring those who learned the Western musical system (Kok, 2023). Bhatia, Ramesh, Jain, Swami, and Swamy, who are all music therapists of South Asian descent living in either North America or South Asia, all reflected upon the various ways that European and North American influences had distinctively shaped or colonized their association with music and music and healing practices (Bhatia et al., 2022). Bhatia expressed that some aspects of Western music therapy worked within her worldview; however, a lack of focus on the individual, as opposed to collective community healing, she felt disunited the individual from their community of care (Bhatia et al., 2022). In Swamy's research with North American participants originally from South Asia, culture-centred music therapy allowed an avenue to reconnect with their sense of identity (Swamy, 2018). As elements of European and North American music therapy practice can connect with people from other parts of the world, looking at narrative accounts and the brainwave power of the participants in this research, it is clear how Indian music, if given an opportunity, might not only connect and enrich those who identify with this music, but may also be meaningful for uninitiated listeners. For Anna, who had never been exposed to this music, the listening experience led to the realization that she could benefit and learn from something outside what she perceived as Western culture.

In a video (HKW—Haus der Kulteren der Welt, 2019), Bhagwati discussed that when unfamiliar listeners experience new music forms, creative misunderstandings can sometimes result, and powerful new experiences can open up from this. In this present study, it appears the music was also beneficial in bringing the participants out of their existing schema. There were also some parallels to my own improvisation experience and the general research. I see this as a symbolic representation of competing epistemologies as inherent to this research (positivist and interpretivist). A modular synthesizer is an instrument composed of separate, customizable modules, each with its own distinct function. Patching and wiring the modular synth involves the manipulation, amplification, and filtering of voltages in infinite ways. As the player, I combined this with the traditional rules of raga to create meaning or an aesthetic sense from these different musical forms. However, a lack of experience and the standard accidents inherent to the idiom caused the instruments to behave outside of my control and into the unexpected. As the performer, I adapted and responded to this phenomenon. Naturally, when I was musicking to the participants' experiences, I merged these two musical paradigms, languages, or bhavas with one another, and sometimes, the meaning was lost in the process. Interestingly, and more often, the meaning and my understanding of their experiences through the two paradigms of scientific brain measuring tools (quantitative findings) and the participants' accounts (qualitative findings) was enriched in the process. Playing the modulars with the traditional instruments in raga pulled me out of my own existing schema; I felt the intersectionality in the music and in the previously stated qualitative and quantitative paradigms. This confluence helped me to understand the two participants' accounts further in this new place; I again sensed their curiosity.

Imagery and Pre-Associations Despite Musical Unfamiliarity

In all of the participants' accounts, initially the imagery reflected their associations of what they knew of the music, such as listening to the Beatles (Scott), times in an Indian restaurant (Emma), Indian weddings (Sofia), Indian film soundtracks (Anna), watching a concert on stage (Geeta) or associating the instrument with instrumentation that was familiar (Anton). Emma even had a sense of frustration as her imagery was associative of what she described as cliché. This sense of frustration was also reflected in her EEG waves where her alpha or relaxed meditative waves (Kim et al., 2022) were quite static as well as her theta throughout the induction and alap and until the jhor. In interpreting Emma's experience musically, I could sense her frustration and witness her string of frustrated comments in the score, as the music appeared overly present and grabbing her attention, and moreover, not doing what she predicted. This experience is also reflective of my previous study with participants who were listening to a live sitar receptive raga music therapy experience of raga Desh. Participants initially related their imagery to their own existing schemata, such as visiting South Asian countries or hearing the Beatles (Venkatarangam, 2021). As time continued in the experience, the nature of the imagery and associations became less predictable and slowly became an avenue for heightened or more abstract sensory experiences and meaning-making.

In this study, both Scott and Sofia began to experience colours in their imagery in relation to the music although the induction was not visual, nor did it allude to any colours or imagery. In

GIM research examining music experiences related to mental imagery, a key criterion was defined as synesthesia: specifically, the connection of sensory experiences such as colour to music (Burns, 2000; Rosh & McConkey, 1990). Towards the later stages of the jhala, or as Scott described, “as it began to speed up, I think I got even more immersed in it at one point, I was getting flooded with like violet hues and wave-like patterns” (Scott) was when his delta waves began to increase, which is characteristic of deep meditative states (Bardekar, 2018; Frohlich et al., 2021).

I also reflect upon South Asian and East Asian healing practices. In Chinese Daoist healing practice, the violet hues are very much like the High Jade scripture of the Internal View of the Yellow court (4th century CE) where the purple haze is linked to colours of eternal wisdom (Archangelis & Lanwing, 2010). The somatic connection also presented in his imagery. “I noticed the thoughts were completely gone at one point and I started to notice sensations in my fingers and in my stomach… It was like a tingle but a lightness” (Scott). The stomach is a vital energy centre in both Chinese Daoist (Robson, 2015) and Indian yogic visualization (P. D. Williams, 2008) practices. When looking at both the qualitative and quantitative representation of his experience, it is evident that Scott was having a profound experience through the music.

Anna experienced imagery of a woman; she seemed to indicate this was a recurring image; the woman was covered head to foot in black, all robed in black with a veil (Anna). Carl Jung (1875–1961) a Swiss psychologist and psychiatrist and founder of analytic psychology who was highly inspired by Indian philosophy (including dream states and the use of mandala) and Chinese Daoism (in his understanding of architype; Jaffé, 1979) proposed that all humans share a collective unconsciousness containing archetypes, or invisible patterns that present themselves through various behaviors (Ward, 2019) and appear in different forms across cultures. Although these archetypes reside inside the collective unconsciousness, the individual may not be aware of them. Subsequently, various means including visualization, meditation, music, mandala/art (Summer & Bonny, 2002), and cultural practices (Swamy, 2011) can help the individual to be in touch with these archetypes. It is possible that this cross-cultural musical experience was bringing forth some of this archetypal imagery that Anna was unaware of and that she could continue to make sense of through continued experiences.

Many of my clients of various cultural backgrounds in my own GIM practice sessions have had experiences of vivid colours and sacred places in their imagery when listening to various Western classical music programs. As previously noted, the association of colours and religious architecture is also present in other South and East Asian spirituality and thought. In receptive raga music therapy experiences, it may also be possible that multiple factors are at play. Individuals may have imagery reflective of universal archetypes, imagery specific to the music, and material reflective of their previous experiences and cultural backgrounds.

Increased Immersion as Musical Movements Progressed

As stated, as the music progressed, five of the six participants' sensory experiences and/or interest increased with time. Likewise, participants' brainwaves also changed throughout the experience. Wong et al. (2009) found that non-South Asian unfamiliar listeners of raga (n = 12) considered unfamiliar classical Indian music as more tense, while Indian (n = 22) listeners found Western classical music to have more of a tense quality. Those identified as Indo-Western listeners (n = 13) who had been accustomed to both types of music, found no difference in tension. This indicates that uninitiated listeners may experience displeasure, at least initially in the unfamiliarity. Likewise, in this experience, there were moments for some of the listeners (Anton; Sophia) where the music was a bit sharp or distorted, thus speaking perhaps to the timbral nature of the instrument. As stated earlier, perception and cognition studies (Curtis & Bharucha, 2009; Kessler et al., 1984; Kopiez et al., 2003) have found that an uninitiated listener of a particular music system often defaults to their enculturated knowledge when processing music. However, it has been found that they can adapt quickly to these novel music systems (Krumhansl, 2000; Rohrmeier & Widdess, 2017)). In other words, as time goes on, learning takes place, and a participant's response to the music may change. In both Emma's and Sofia's accounts, there was a comfort when the music began to feel more familiar to them. As I reflect upon my process of musically interpreting Emma's experience, her being a completely unfamiliar listener of raga seemed important and difficult for her at times. The music I created had many unpredictable moments. As stated earlier, sometimes it is impossible to know how a generative modular synth will respond to my playing, so there were moments of discomfort for me, being in the unknown, experiencing new and unfamiliar timbres. However, something novel did emerge from the experience, both sonically and how it felt; it took me somewhere new, connected and mindful. I wonder if I captured some of the lived experience of what participants were going through in this new music (the original sitar stimulus). I ponder how much of my process paralleled Emma's experience of being in unfamiliar and unpredictable musical territory, but eventually connecting with the elements around me.

Similarly, during my comprovisation on the guitar and modular synths for Geeta, as a (relatively) familiar listener and while playing the more familiar instrument alongside what was happening in her score, I felt subdued and peaceful throughout, but with an element of turbulence starting with her fluctuations of beta waves at the beginning. As mentioned, Emma's score had moments of discomfort that I perceived as I interpreted her music. Like GIM, within mindfulness and other meditative experiences, relaxation is not the goal but rather a byproduct of the practice. The arts-based hermeneutic component of this research offered a unique way for me to process data from different paradigms. I was able to embody the findings, which allowed me to better understand what Geeta and Emma had experienced. I could feel both participants' discomfort at the start of the session, their imagery experiences, and their increased immersion into the process as it progressed in real time. Emma had a divergent experience, where her imagery process felt less fluid than Geeta, the more experienced listener who had more cultural familiarity with raga. I also connected their immersion to their rising alpha waves and decreasing beta and gamma waves, while also sensing their various states of consciousness.

As participants like Emma eventually felt more meaningfulness in their experiences and in a state of focused and relaxed awareness, this appeared to be the result of the change in intensity and nature of the latter movements. All of these effects were around the 17-minute mark which was later in the jhala. Scott began to feel "flooded with violet hues and wavelike patterns," for Anton, the "stronger it [was] the more he [liked] it," and for Geeta, she felt a turbulence. At 17:50 in the recording is the latter stages of the jhala where Geeta described a "flowing through the music as opposed to a general peacefulness." There was also a clear increase in Geeta's alpha wave power and a clear reduction in beta and gamma; the latter being more related to non-meditative focus. Delta, which relates to deep sleep (Bardekar, 2018) and meditation, and theta, to blissful or trancelike states (Aftanas & Golocheikine, 2001; Kim et al., 2022), dipped upwards. Here the intensity of the music purposefully increases through the nature of the movements, through fast rhymical and percussive picking. A similar theme emerged in my previous study with unfamiliar listeners of a live raga in the alap movement (Venkatarangam, 2021). Participants expressed that the further intensity facilitated their thought processes, and the increased intensity had a more profound or satisfying impact for them (Venkatarangam, 2021).

For participants in this study, alpha waves, or relaxed and meditative focused listening, increased either in absolute or relative power. It appears that the nature of the raga that slowly builds in intensity seems to facilitate this immersion. Sharma, et al. (2021) studied these gradual increased changes in tempo and movement toward the higher register that is characteristic of the subsequent movements in the raga. Participants who heard the excerpts with this musical variability while wearing EEG sensors and through their self-reports via anxiety-measuring tools indicated a decrease in anxiety as opposed to the participants who were given excerpts with slow non-variable movement (new age music, or the control of complete silence (Sharma et al., 2021). So, it appears something in the non-static nature of the movement is bringing this immersion.

The Music Allowing a Change of Consciousness

When recalling the experience, participants expressed feelings that were difficult to describe in words. However, all of them expressed feelings that encompassed elements that could be perceived as contradictory while related in some way to meditation or changes in consciousness.

Emma expressed an energetic feeling while also feeling calmer, again not unlike the Sharma et al. (2021) study that found that this music with its gradual progression of speed and intensity had a more profound meditative effect than more static forms of music. In Emma's case her alpha waves significantly increased when she self-reported these feelings as well as delta, indicative of deep forms of relaxation and sleep. For Scott, at 14:27 seconds, or the beginning of the jhala is where he described waves and "starting to float away." This was also when his delta waves started to curve upwards, and at the same point, Anton's alpha brain waves peaked while his beta waves dipped in synchrony.

Both Anna and Scott had an increase in delta towards the end of the jhala, indicative of sleep-like or deeply meditative states (Bardekar, 2018; Frohlich et al., 2021). Anna mentioned that there was a time when she may have fallen asleep but could still hear everything. We were unable to accurately determine where this might have occurred in her experience, although not at the beginning or end. For Scott it was around the 17:30 mark. Similarly, there was a strong presence of delta waves, and in his case an inverse dip in his other power levels, with the exception of theta, which is associated with deep relaxation and inner peace (Andreassi, 2007; Kim et al., 2022). Here, he described a falling sensation, and he reported that he had stopped paying attention.

GIM transpersonal experiences can be described as (a) a sense of unity or oneness, (b) transcendence of time and space, (c) deeply felt positive mood, (d) sense of awesomeness, reverence, and wonder, (e) meaningfulness of psychological and or philosophical insight, and (f) ineffability, a sense of difficulty in communicating the experience by verbal description (Dimiceli-Mitran & Creagh, 2018). One could view Scott's experience as encompassing (d) a sense of awesomeness and (f) ineffability. It is often these transpersonal experiences, when the individual is able and ready to make sense of themselves, that can be an avenue for healing, self, reflection, and universal connection. One can further reflect in Scott's account upon the aesthetic experience of shantha rasa (see Key Terms, p. 3) or a state of harmony between mind, body, and universe (G. Saxena, 2023).

In Sofia's EEG brainwaves, as stated, during the induction, there was a significant spike in her alpha, theta, and delta levels, which slightly decreased during the music but stayed well above the baseline throughout the experience. This was in accord with her verbal description of nothing jumping out for her and her enjoyed neutrality to the music until later when the music became "livelier." However, at the same time, she appeared to be in a state of relaxed and focused consciousness during the experience as per her alpha waves, indicative of relaxed, focused meditative states (Bardekar, 2018; Kim et al., 2022).

As previously discussed, the experience had a symbiosis with meditation for participants as reflected in their brainwaves. Likewise, they all appeared to compare the experience to a meditative and/or relaxing experience in their own unique ways. In GIM, the goal of the session is not only for relaxation but also for gaining insight, and often this comes through discomfort or music that can be tense at times. Likewise, participants did not always find each moment to be relaxing; some described the music as tense at times, and this music did not stay within one tempo, dynamic, or timbral attribute.

In the next section, I revisit the hypothesis as well as discuss the limitations an implications of the research.

Revisiting the Hypothesis

In this study, I hypothesized that (a) receptive raga music therapy experiences would enable individuals to enter meditative states of alertness and attention where there is an inhibited cortical state, where the brain remains active but internally focused; (b) these states would be reflected in the amplitude of various EEG frequency bands, considering that beta waves (14–32

Hz) have been linked to alertness (Bardekar, 2018), alpha waves (7–14 Hz) with relaxed meditative states, theta waves (3.5–7 Hz) with deep relaxation and bliss (Aftanas & Golocheikine, 2001), and delta waves with deep sleep and subconscious processes (Bardekar, 2018); and (c) changes in brainwave activity would correspond with shifts in the musical submovements within the alap (alap, jhor, jhala), as well as with the participants' subjective experiences.

Among the six participants, receptive raga music therapy appeared to induce states marked by relaxed alertness, where the brain stayed active but not intensely focused. This was supported by neurophysiological data collected during the sessions. Specifically, four participants (Emma, Sophia, Anton, and Geeta) showed increased alpha wave activity and decreased beta and gamma waves as the musical movements and experience progressed, possibly indicating a move toward attenuated external attention and a subjectively internally calm yet attentive state. In contrast, two participants (Anna and Scott) displayed increased delta wave activity, suggesting a deeper, more introspective or meditative experience; however, less significant movement in other brainwaves. These brainwave changes aligned with participants' subjective reports and transitions across the musical sub movements of the alap. This may indicate that the structure and progression of the raga played a role in shaping the depth and quality of the meditative experience. Thus, the results also aligned with the proposed hypotheses, although greater consistency was observed for four of the six participants (Emma, Sophia, Anton, and Geeta).

Limitations

This study had only six participants, and although I attempted an in-depth understanding of those six participants' lived experiences, the effect of the experience or phenomenon cannot be fully generalized to other populations. However, the findings may have applicability, particularly in the field of music therapy, where receptive raga experiences could be used to support diverse therapeutic goals with participants who have varying levels of familiarity with raga.

Only one raga played on the sitar was used in this study. As each raga can have its own unique emotional effect or rasa on an individual both initiated and uninitiated, this raga experience cannot accurately predict responses to other raga experiences. Furthermore, as mentioned, the sitar has a very distinctive timbre (Siddiq, 2012) and string arrangement. Findings from this sitar experience cannot be generalized to how other stringed instruments like veena, guitar, violin, or wind instruments such as flute, and of course the voice, might influence participants' experiences.

In the raga system, there is a system known as the time theory of ragas, which was not within the scope of this study. Within this theory, certain ragas are traditionally associated with specific times of day or night, and when performed at the appropriate time, can evoke desired mood states more effectively. Desh is a late afternoon or early evening raga. On an aside, in some contemporary contexts, it becomes more difficult to observe this with the advent of recorded music as well as the fact that performers often do not follow the traditional time assignments strictly, as performance schedules are usually based on logistical considerations rather than the raga's associated time of day. Still, in North India, many efforts are made to revive this conception, and concerts are being arranged to accommodate time theory of ragas (S. Sundar, personal communication, May 3, 2025). Although the time of day was indicated in the participants' EEG graphs (see figures in Chapter 4), this element may pose a confounding variable as the participants met at various times of day and not necessarily in the afternoon or evening.

Although raga Desh conveys a similar sentiment in both North and South India, there are some differences in the exposition, various movements within the alap, and the microtonal ornaments in how the notes are approached with a Carnatic versus Hindustani style musician. In addition, it is a semi-improvised modality and for that matter, a different Hindustani sitarist of a different gharana (conservatory) or even the same musician on a different day may play these movements differently for various reasons such as how they are feeling, the acoustics in the room, the time of day, and the energy of the listeners. Thus, one can never fully generalize this sitar stimulus in alap Desh to all performances.

At certain points in the music experience, participants mentioned a sharp tone. Although this can be characteristic of the specific timbre in the jhala movement, the nature of the Shure SE 215 noise-cancelling headphones tended to favour higher or sharper frequencies. Additionally, because this was a live recording that was not mastered, it may have contributed to the perception of the sharp tone and, consequently, influenced brainwave responses and the overall experience. As the researcher, I was involved in all aspects of the data collection process, so there was a possibility for researcher bias. To mitigate this factor, I wrote an epoché where I acknowledged my biases to the best of my ability and bracketed them at various points during the analysis process.

Although the Muse 2 headset was a measuring instrument that allowed ecological validity as it could be used in a room with an atmosphere where an actual music therapy session might take place, it was further subject to more of what is considered noise interference in EEG as opposed to a level that one would experience in a lab setting. Noise interference would be attributed to the fact that it is a delicate portable instrument with fewer sensors than a nonportable EEG device. Similarly, it was difficult to position the sensors correctly on different individuals' heads in a manner that would prevent them from being affected by various head or facial muscle movements, or participant jaw clenching when entering non-ordinary states of awareness, thus causing this interference. Consequently, as mentioned earlier, some participant data were rendered unusable. Also, because sessions were conducted in a room not designed for EEG, there was a greater chance of noise interference from electrical equipment.

Participants were asked to close their eyes or maintain a soft gaze towards the floor during the induction. All appeared to have their eyes closed. However, based on at least two participants' accounts (Emma, Geeta), there seem to be moments when their eyes were open. Although the Muse 2 headset did not target the occipital region of the brain, which would be significantly affected by eyes closed versus open and cause alpha bursts when eyes are suddenly closed, it may still have somewhat influenced brainwave patterns, such as lowering alpha waves, if participants had opened their eyes at moments during the experience. Therefore, this introduces a confounding variable at certain points. In the arts-based hermeneutic analysis, only two participants were chosen. This provided a rich and embodied understanding of their accounts, and group themes indirectly influenced each account. However, it means that the lived experiences of the other participants were not included in this part of the research.

Implications

Future Research

This portable EEG technology offers ecological validity regarding the environments in which it can be conducted and how it can be combined with the user-friendly Mind Monitor software. This technology could be utilized in further neurophenomenological analysis of other music systems as well as traditional GIM programming. Additional research with a larger number of participants, as determined via a power analysis, is warranted, where more crossreferencing of the EEG brainwaves could be administered via software like Matlab's EEG lab; hence, the effects of this experience on others could be further generalized to other populations. Furthermore, since there was no pre-processing software to handle artifacts, further research using pre-processing software is warranted.

Although the Muse technology and other portable head devices continues to develop rapidly, further research is warranted in a standard lab with an EEG measuring tool with more sensors that would mitigate noise interference and also give further access into observing brainwave power in various regions of the brain. This in turn could bring further understanding to receptive raga music therapy experiences with non-culturally specific participants.

In my previous research, (Venkatarangam, 2017, 2021) one participant explicitly mentioned physiological changes in her body during the various movements. Although this was not explicitly addressed in this research, participants did mention feelings such as being both relaxed and energetic (Emma), and changes coincided with the various movements. When combined with EEG, the parasympathetic nervous system can be a strong indicator of various meditative states (Borghesi et al., 2024). Measuring tools that simultaneously use biofeedback readings to understand heart and pulse activity would serve as a suitable accompaniment to this research topic, addressing the mind-body connection. With devices such as smartwatches, smartphones, and more specialised medical technology, these tools could also be noninvasive and more accessible than EEG technology. Therefore, future research that combines measurement tools to record both autonomic responses and EEG could yield valuable findings.

In addition, at the time of writing this, Muse has released a new headband that combines EEG and functional near-infrared spectroscopy technology. Future research could look at studying prefrontal oxygenation indicative of stress reduction, while coupled with what can be learned from the EEG brainwaves. Clinical applications could have music therapists using this tool to assess how clients might be responding to receptive music therapy experiences, facilitated over a longer duration in clinical research settings. The research possibilities are compelling when researchers can use technological tools to conduct studies like this one that provide ecological validity. For instance, over a series of weekly sessions, one could explore how participants' imagery might change during raga experiences across multiple sessions and observe how this is reflected in their EEG brainwaves. Additionally, stress levels could be examined via prefrontal oxygenation using non-invasive measurements in client participants throughout the weekly sessions.

This raga experience used a simple induction to focus the mind. It was not overly visual, such as an induction where one is prompted to gain awareness of the body and perhaps starting with a linking image of a scene that is comfortable for the participant, and also, not overly metacognitive, where participants focus on their breath and bring their awareness back, noticing that their mind has wandered, and gently redirecting themselves (Kabat-Zinn, 2003). Future research could explore how more immersive induction techniques from different paradigms and rooted in Indian centuries-old meditative practice (Cousins, 1996; Timalsina, 2017) might be used with raga, a musical tradition with roots to healing (Sundar, 2005) and at times, entering transpersonal mental states such as samadhi.

As mentioned previously, this research used one musical instrument (the sitar), and one raga. More research with the same or different ragas on various instruments would bring further understanding of raga in music therapy experiences in international settings. Likewise, the research only focused on the sitar in alap movements, which is without accompanying percussion. Indian percussion follows an advanced and intricate music system that in my experience has elements unlike any other rhythmic system in the world. The other movements, with their unique and often highly synchronized interplay between the tabla player and the sitarist, singer, or other instrumentalist, bring a new and very important element to the raga experience. Particularly, the jhor jhala or fast rhythmic movement with the tabla can be extremely powerful and evocative. Further research that includes the other movements is also warranted.

As there was EEG involved in the experience, the research did not follow a traditional GIM process where the guide asks the traveller what they are experiencing in real time. Such jaw movement (from speaking) would cause noise or artifact interference rendering the data unusable. Qualitative raga research that does not use EEG but follows a more traditional GIM process may yield rich outcomes. One could also focus only on the EEG during specific moments of interest in the session, as done by Fachner and Maidhof (2019). This way, these moments could be analysed with EEG when the participant is not talking.

The participants were not recruited for their experience with visual inductions, as the research focused on how participants remain in the experience, in addition to how they visualize.

As an advanced student of GIM, I recognize that the process of imaging to the music can be further learned with numerous sessions. Emma was aware she needed to explain what was happening, but that made it initially harder for her to let go and become immersed in the experience. Thus, depending on the goals of the research and whether one is looking at how participants image, as opposed to how they stay in the experience, researchers might recruit participants who have experience with imaging and/or mindfulness meditation. Varela (1996) and his colleagues have recruited such participants (experienced meditators) for their neurophenomenological research. Similarly, Hunt (2017b) realized her neurophenomenological research protocol with experienced Bonny Method of Guided Imagery and Music practitioners to ensure participants were already skilled at imaging to the music, allowing them to focus on what occurred in the imagery. Although this research provided an understanding of how raga might be experienced by unfamiliar listeners in a general music therapy group or individual setting, raga research with experienced GIM participants would give further understanding of raga's visual, and consequently therapeutic, potential in non-culturally specific contexts where the clients are experienced in imaging. Similarly, it would also be relevant to conduct longitudinal studies of periodic receptive raga music therapy experiences in non-clinical research settings to see what unfolds for participants both phenomenologically and neurophenomenologically over time.

In clinical settings, I noticed there can be a learning curve when learning to visualize. Comfort level to disclose also increases with time. This comfort level in disclosing personal information and comfort in achieving relaxation, consciousness expanding, or transpersonal states of awareness with the therapist could likely extend to research settings as well. Thus, it would be interesting to see how experiences and EEG power change over time and with repeated meetings.

Further experimental neurophenomenological analysis using arts-based practices, particularly comprovisation, could generate valuable insights into raga experiences, as well as other receptive music therapy or GIM research. There are also modular synth modules that can be paired with mobile EEG headsets, where brainwaves directly influence the modules, offering researchers another artistic method to engage with the data.

In music therapy clinical settings, the arts-based hermeneutic approach can be compared to Bruscia's reimagining technique, where the therapist revisits the client's image, using their imagination to deepen personal reflection and growth related to the client's imagery (Bruscia, 1998). It also aligns with Carl Rogers (1957) and is similarly discussed by Bruscia in relation to music therapy and GIM settings, as attuning or establishing a profound emotional and intuitive link with the client; this allows the therapist to empathize with the client's inner experience as if it were their own, moving in and out of the client's world while still maintaining clinical awareness of their (the therapist's) self (Rogers, 1957; Bruscia, 1998). Therapists wouldn't necessarily need to use modular synthesizers: different types of instrumentation and scoring methods could be employed to access this space.

Fachner and Maidhof (2019) also used hyperscanning, where the brain is recorded by both client and therapist in real-time during GIM to identify moments of attunement and neuro-synchrony between client and therapist. This could also be used in raga experiences, and combining this with an arts-based medium could add another layer of understanding.

In the current study, participants had no opportunity to give feedback in the comprovisation and scoring process. Thus, participants could also be invited to provide feedback in future arts-based hermeneutic comprovisations, transforming the process into a co-constructed experience.

Clinical Indications and Contraindications

In this next section, I discuss indications and contraindications in clinical settings as per the findings of this study and the literature on the topic. Further input stems from my clinical experience, insights from this research, and my previous work (Venkatarangam, 2021) in potentially applying these learnings to clinical practice settings. Although the results of this study may be applicable in a variety of contexts, they may not be generalized to all populations. Equally, as with introducing any new activities to clients, clinical judgment is required.

Receptive raga music therapy and guided imagery experiences outside of India are beginning to be acknowledged in the music therapy literature (Bhatia et al., 2022; Swamy, 2018; Venkatarangam, 2017, 2021). When music therapists use only their own music, particularly that which has a history of colonization, like Western classical music (Bhatia et al., 2022; Kok, 2023), it can pose a power dynamic between therapist and client, particularly if the client does not belong to the dominant group that the therapist may identify with. Thus, it can pose ethical concerns when therapists use limited music systems and genres of music with their clients (Bhatia et al., 2022). As Swamy stated, receptive raga experiences with South Asians or those of South Asian descent can allow participants a means to connect with their cultural ethnic subconscious. Geeta's experience allowed her an avenue to reconnect with a familiar music in a new way and gave her a curiosity to listen to more of the music of her culture. Such experiences could perhaps be the beginning of a rediscovery of a sense of self in a therapeutic context. Although music brings about new insights or sensory experiences for participants, they may not be at the stage to discuss their experiences. So, in clinical settings, it may take time for participants to make sense of these new experiences.

For unfamiliar listeners, both RMT (Schwabe et al., 1987) and GIM (Bonny, 1969) recommend that the music used encompasses flow and movement so clients will not ruminate on particular imagery. Both Bonny and Schwabe gravitated to Western, or more specifically, Eurogenetic classical music with its changes in tempo, themes, and contrasting movements. Raga has many of these qualities and could be facilitated when clients might benefit from an unfamiliar music that gradually builds and might allow for new insights. Furthermore, the movement of the jhala might allow clients to enter transpersonal states and enter new realms of self-awareness and discovery.

As with any music, people can have culturally negative associations with raga. As Western classical music can bring associations of hegemony or trauma depending upon the social locators of the client in clinical settings, so too has raga, a classical art music, been associated with hegemony for individuals of South Asian descent. Krishna (2017), a Carnatic musician described how the Carnatic system in Chennai was a result of one particular caste deciding which ragas were to be included in what was deemed to be an ideal system, while at the same time, decision makers kept the sharing of this system from others (Krishna, 2017). As with any music, it is necessary to understand the needs of the client as well as the social locators and traumatic experiences that they may have encountered around particular genres or systems of music. Importantly, clinicians should be aware of the history and cultural significance of these musical systems.

In my clinical experience and in the literature (Wong et al., 2009), certain new music, such as raga, might bring tension to unfamiliar listeners. Introducing music gradually or allowing the client the opportunity to end the experience if needed is indicated, as in any receptive experience. I have noticed in my own clinical work and this research that occasionally a client may find the resonance of the jhala movement on the sitar a bit overwhelming or sharp, and this is something to be aware of when selecting specific recordings. Also, there can be musical interpretations by the artist where the jhala is softer, shorter, or even omitted, which could be considered depending on the needs of the client.

Similarly, as with any receptive experience, it is important to develop a broad understanding of the music and to listen to it several times in different contexts. This includes listening in the same state of awareness that the client would be in when they listen; this may involve mindful induction or visualization-based induction, among other clinical applications. Also, many raga recordings in the alap movement can be very long. It is important to let the participant know how long the experience will be beforehand and to begin with shorter musical experiences that can be gradually increased as the client becomes more accustomed to the process.

Music Therapy Education

As raga has been used traditionally in meditative, consciousness expanding and relaxation experiences, more understanding of raga in music therapy listening experiences could be directly and sensitively applied to music therapy training and practice. In India, schools such as the Chennai School of Music Therapy continue to integrate traditional music therapy practices with contemporary practice. This research supports the advancement of more culturally responsive music therapy education and practice. Lee and Houde (2011) have created a comprehensive chapter for students and practitioners of music therapy and music education. Such a thorough introduction can give the foundational tools for music therapists to begin their personal and eventual clinical exploration. During my time as an instructor teaching both the clinical improvisation and advanced clinical improvisation for music therapy graduate students in the Department of Creative Arts Therapies at Concordia University, I would often introduce raga either as a dedicated lecture within the curriculum or as a guest speaker session if I was not teaching the course. Before the class, I would assign students to listen to various ragas by specifically selected artists, encouraging them to explore the music attentively. They were encouraged in their repeated listening to focus on elements such as music theory, like the mode, and motifs, as well as on more subjective ways of sensing the music. Afterwards, I had them consult the Lee and Houde (20011) chapter to identify the raga, learn about its specific motifs and modal features. On the day of the class, I would demonstrate some of these techniques for a particular raga, as well as concepts of bhava and rasa. Students then paired up with their primary instruments or chosen instruments to explore the raga. Following the activity, they would share their experiences. Besides developing their music improvisation skills, this can serve as a helpful first step for future music therapy clinicians to engage with the music in different ways, listen to it more attentively, and gain a deeper understanding before using this music in receptive music therapy sessions.

Raga research, like this one, could also be relevant to music psychology courses, helping to understand how the contours and various elements of the music impact subjective experiences and brainwaves. I believe all students could benefit from learning about raga, not only because it could be relevant to their practice, but also to introduce them to a musical system and a way of viewing music that might differ from their previous conceptions. This, in turn, would help develop their cultural humility and contribute to shaping their clinical philosophy and clinical adaptability in the field. Specific training on how to use raga receptively in music therapy could also be developed as a continuing education program. Raga listening might also be included in advanced training such as GIM, where specific listening programs incorporating raga could be created and taught with suggested therapeutic objectives. Another important element that could be addressed in the training is learning about the history and cultural significance of the ragas.

Personal Learnings

Personally, conducting this research has allowed me to deepen my understanding of raga in ways that I did not imagine going into this journey, as it required me to integrate different ways of knowing, doing, and learning. In this way, the study has allowed me to acknowledge the complexity of existing in professional spaces where oral musical traditions are not always respected and/or understood and to leverage my capacities within dominant ways of knowing (such as academic writing) to make this valuable knowledge more accessible. I am excited to bring this deepened understanding to the diverse professional spaces I occupy, including clinical and educational spaces. Importantly, this research helped me make sense of many personal, musical and clinical experiences that had generated curiosity and interrogations for many years in my roles as educator, music therapist, GIM trainee, musician, and improviser. I developed a more refined understanding of traditional methods of accessing and engaging with non-ordinary states of consciousness, transpersonal experiences, and their therapeutic value. Ultimately, this research has affirmed my personal intuition around the deep healing potential of raga and its relevance in receptive music therapy practice.

Conclusion

The purpose of this research was to gain a multimodal understanding of the perceptions and conscious experiences of adult individuals experiencing a recorded receptive raga music therapy experience. Despite a relative lack of clinical research on this topic, music therapists have indicated that raga could be beneficial in music therapy with non-culturally specific clients in receptive relaxation and visualization activities (Moreno, 1988). My foundational research exposed further understanding of alap in Raga Desh with unfamiliar listeners (Venkatarangam, 2017, 2021), in receptive music therapy experiences and this current research reaffirmed themes, such as raga being a space to embrace thought processes, as well as emotional and physiological changes as the music continued (Venkatarangam, 2017, 2021). Findings from this mixed methods research highlight the therapeutic potential of raga in receptive music therapy experiences outside of the South Asian diaspora, although there is still much to learn. Receptive raga experiences seem to provide enriching experiences for non-culturally specific participants who may be unfamiliar with this music, and these benefits are evident in physiological changes observed in EEG readings. In addition, the arts-based hermeneutic research offered a deeper way to understand participants' experiences and provided new insights into how such hermeneutic processes could be applied in client and therapist attunement within clinical practice. ABR also created a means to communicate participant experiences in a way I found accessible, enabling individuals from various academic backgrounds to grasp the findings despite the research's overall complexity.

It has become clear that this research is only tapping into a vast oral and scriptural database of knowledge from the East that threatens to be lost with modernization. I do not identify as a purist of any musical system; however, from a compositional framework, my own study of raga, with its microtonal ornamentations and nuanced approach and descent of notes, its lack of vibrato unless purposeful (gamak), and its inherent minimalism while far from minimal at times, has allowed me to understand music in a way that changed my perspective of what music is and why music is.

Greater understanding of raga's embodied and measurable experience in alap movements, with both active and non-active listeners, within a natural experiential context, could lead to the knowledgeable incorporation of raga into non-culturally specific receptive music therapy and GIM experiences. As previously indicated, further research could contribute to the safe and evidence-based use of this music in settings with unfamiliar listeners. It would also develop an interdisciplinary and intercultural understanding of sound perception, emotion, and the therapeutic process.

In closing, through listening to music in non-ordinary states of consciousness, humans can continue to elucidate the vast potential of the human mind and its capacity for wellness. The increased accessibility and evolution of portable EEG measuring tools enable music therapists and other health professionals to better understand meditative processes and the potential that receptive music therapy can unlock. A great deal can be learned about visualization, Asian healing practices, and raga through contemporary qualitative, phenomenological, arts-based, and quantitative methods.

More than ever, the global community needs avenues to cope with stress, depression, emotional regulation and grief; this makes continued research on raga, this time-tested avenue for insight and wellness timely and vital. At the Nordic Music Therapy Conference in 2024, keynote speakers discussed how the actual music used in music therapy is often the mysterious black box in research and clinical practice, while everything around it is thoroughly deconstructed and contextualized. A return to the music emerges as a natural progression. Raga offers a musical paradigm that combines a structured therapeutic intention with the freedom of improvisation, rooted in centuries of practice and spiritual connection across diverse cultures in India. It is a form of music that goes beyond the egos of the individual composers; they usually do not claim ownership of a raga but credit the region where it was first created. One can reflect on the cosmic travel described by Bonny in GIM, a subset of transpersonal experience where one transcends ego and attains personal healing and unity (Dimiceli-Mitran & Creagh, 2018). This description is not far from how one might define elements of raga and rasa. Perhaps it is music that becomes the avenue to wellness when needed the most.

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Appendix A: Induction Script

Preparation

Take a few moments to get as comfortable as possible in the chair

. As you get comfortable try to make your body symmetrical…feet on the floor, arms either in lap or loosely at each side… Feel the support of the chair for your neck, shoulders…back, hips….and under the legs. Allow your body to sink into the chair, knowing that you are physically supported. You may choose to gently close your eyes, or to maintain a soft gaze towards the floor.

Induction

Slowly become aware of your breathing…Notice what your breathing is like… It might be quite fast, or irregular…Notice the movement in your chest as you take in the breath… and as you release all other air from your chest…Notice how your body is feeling…you might feel your body is lighter, or it might be heavier…both these feelings are fine…gradually allow yourself to take deeper breaths….gently taking in the breath, gently releasing the breath…allowing the breath to fall into its own natural pattern… As you breath in…feel energized and as you breath out, feel relaxed… Feel the body fully and deeply relaxed… and now become aware of the music…

Return to an Alert State

The music has finished…Become aware of the sounds around you…the sounds inside the room, and the sounds outside of the room…Become aware of the room we are in… and the people with you in the room… Begin to move your body, stretch out your arms…and legs… Take a deep breath… and release (the therapist might model an audible release of breath)… And when you are ready, open your eyes.

Appendix B: Ethics Approval Certificate

Figure A1

Ethics Approval Certificate

UNIVERSITÉ Concordia UNIVERSITY

CERTIFICATION OF ETHICAL ACCEPTABILITY
FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant:	Stephen Venkatarangam
Department:	Faculty of Fine Arts\Creative Arts Therapies
Agency:	N/A
Title of Project:	Participants' Perceptions of a Receptive Raga Music Therapy Experience: A Mixed Methods Inquiry
Certification Number:	30016904

Valid From: February 23, 2024 To: February 22, 2025

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Richard DeMont

Dr. Richard DeMont, Chair, University Human Research Ethics Committee

Appendix C: Digital Recruitment Poster

Figure A2

Digital Recruitment Poster

SEEKING RESEARCH PARTICIPANTS

Participants' Perceptions of a Receptive Raga Music Therapy Experience

Principal Investigator: Stephen Venkatarangam, Certified Music Therapist (MTA), MT-BC

Doctoral Student, Concordia University, Montreal, Canada

Goal of the Research: To examine the experiences of participants after listening to a recorded musical performance of classical Indian music (Raga).

Full participation in this study involves: Participating in a single in person session receptive music therapy experience, which will include a breathing relaxation induction (4 minutes), followed by a recorded classical Indian music performance (15-20 minutes) on the sitar—while wearing a portable EEG headset that measures brainwaves. Following the musical excerpt, you will be given the opportunity to free-write any words, thoughts or images that emerged for you during the experience After the experience, you will take part in a 30-45 minute exit interview (Total duration: 60-90 minutes).

You would receive 35 dollars for your participation in the study.

Participant Inclusion Criteria:

- Be 18 years or older
- Not be on any anti-anxiety or mood altering medications
- Not have history of brain injury, stroke or degenerative neurological conditions.
- Be able to hear without loss or physical pain
- Be proficient in the English language
- No musical knowledge required

For more information about this study, or to volunteer for this study, please contact:
Stephen Venkatarangam, MTA, MT-BC
Email: s_venk@live.concordia.ca

This study has been reviewed by and received ethics approval through the Concordia University Research Ethics Committee.

Concordia University
FACULTY OF FINE ARTS
Concordia Arts in Health Centre

Concordia Université
FACULTÉ DES BEAUX-ARTS
Centre des arts et de la santé de Concordia

Concordia University
PERFORM Centre

Appendix D: Raga Familiarity Likert Scale

Please circle one box that best describes your relationship to classical Indian music (raga).

1.	**2.**	**3.**	**4.**	**5.**
To my knowledge, I have never heard classical Indian music.	**I rarely encounter classical Indian music.**	**I often encounter classical Indian music.**	**I have years of musical training in classical Indian music.**	**I identify as a musician of classical Indian music.**

Appendix E: Brief Demographic Questionnaire

1. Please identify your age:

____

2. What is your current gender identity?
(e.g., male, female, trans man, trans woman, genderqueer/gender non-conforming)

____

3. Please state the ethnicity you identify with:
(e.g., African Canadian, Indigenous, East Asian, South Asian, White, etc.)

____

4. What is/are your primary language(s)?

____

5. Please identify your primary occupation(s):
(e.g., student, health care worker, artist, construction work, etc.)

____

6. What style(s) of music or artist(s) do you feel deeply connected to?
(e.g., rock, gospel, jazz, reggae, classical, rap/hip hop, etc.)

____

____

Appendix F: Consent Form

INFORMATION AND CONSENT FORM

Study Title: Participants' Perceptions of a Receptive Raga Music Therapy Experience: A Mixed Methods Inquiry.

Researcher: Stephen Venkatarangam, MTA, MT-BC, PhD Candidate in the Individualized Program

Researcher's Contact Information: (514) 619- 0582; S_Venk@live.concordia.ca

Faculty Supervisor: Dr. Guylaine Vaillancourt

Faculty Supervisor's Contact Information: G.Vaillancourt@concordia.ca

Source of funding for the study: N/A

You are being invited to participate in the research study mentioned above. This form provides information about what participating would mean. Please read it carefully before deciding if you want to participate or not. If there is anything you do not understand, or if you want more information, please feel free to ask the researcher or faculty supervisor.

A. PURPOSE

The purpose of the research is to examine your experience of one (15 minute) recorded musical performance of classical Indian music (Raga). This study hopes to contribute to the field of music therapy practice by providing insight into peoples' experiences of this musical style.

B. PROCEDURES

If you participate, you will be asked to attend a single in-person receptive experience, which will include a 5-minute breathing relaxation induction, followed by a 15-minute recorded classical

Indian music excerpt on sitar. During the breathing relaxation and musical experience, you will be required to wear a headset that can read electrical activity in the brain (EEG). After the music experience, you will have the opportunity to free-write any words or thoughts that describe your experience. Prior to the experience, you will be asked to take part in a brief demographic questionnaire. You will also fill out a Likert-scale raga familiarity assessment to understand the level of familiarity you have with the musical style classical Indian music (raga). This involves receiving a paper with a chart with a series of statements and circling the box that best describes your relationship to classical Indian music (raga) . You will also do a 30–45-minute exit interview.

In total, participating in this study will take 60-90 minutes.

As a research participant, your responsibilities would be to attend the recorded musical performance and answer relevant questions in the form of a questionnaire. You will also be asked to fill a self-assessment Likert scale assessing your familiarity with classical Indian music. You will participate in a 30–45-minute semi-structured interview. You will also have the option to review the written interpretation of the interview as created by the researcher. This will involve reviewing selected sections of your verbatim transcript that have been organized into themes and to add any clarification if necessary. This will be sent to you through email correspondence and is a step to ensure the results are trustworthy/valid.

C. RISKS AND BENEFITS

Risks may include some initial emotional discomfort in response to the musical experience. This may be a result of the aesthetic quality of the musical performance itself, as ragas can often create a mood of introspection.

You may experience potential benefits including the therapeutic benefit of a live improvised musical experience. This may include lowered stress and anxiety levels, as well as potential moments of introspection. You may also benefit from an introduction to a novel music, being the raga musical genre. You would have the option to access this musical genre after the research study.

D. CONFIDENTIALITY

We will gather the following information as part of this research: recorded EEG data, the paper with the free-write response to the raga, a brief demographic questionnaire, and the Likert scale describing familiarity with raga. We will gather the recorded and transcribed interview in which you describe your experience of the musical performance.

By participating, you agree to let the researcher have access to your demographic information provided in the brief questionnaire, the Likert raga familiarity scale, the free-write information on your experiences of a live musical raga performance, as well as the recorded EEG data. The researcher will also have access to the semi-structured interviews which will be audio-recorded and transcribed.

No one will be allowed access to the information, except people directly involved in conducting the research. The information will be only used for the purposes of the research described in this form.

The information gathered will be identifiable; this means that the researcher will know the participant's real identity, but it will not be disclosed.

All information will be kept confidential. However, please note in some instances, the law obliges the music therapist researcher to breach confidentiality regarding the information that participants have offered. The instances would include if it were determined that there is imminent danger to the participant, a minor, or a vulnerable person. If such a situation arises, the researcher will be obliged to follow the law and divulge the information to the appropriate parties.

The raw EEG data will adhere to the privacy policies of Mind Monitor. Personal information collected may be identifiable (for providing and improving the service) to Mind Monitor but will not be shared. Mind Monitor strives to use commercially acceptable means of protecting information, however they note that no method of transmission over the internet, or method of electronic storage is 100% secure and reliable.

We will protect the information by encrypting files on a laptop with password protection to which only the researcher and research advisor will have access. Any hardcopy material will be in a locked filing cabinet.

The transcription of your responses will be aided by a digital transcription service, NVivo https://www.qsrinternational.com. All media files and transcripts uploaded to or produced by NVivo Transcription are encrypted while in storage and in transit. Data will be securely stored in Canada. QSR International accesses files only for the purposes of providing or supporting the transcription service. Otherwise, only the researcher can access the files.

It is possible that results of research may be published in written form and as part of an arts-based interpretative performance; however, it will not be possible to identify you in the published or artistically interpreted results.

You understand that transcriptions and research results may be used in presentations to educate other music therapists about the research findings and to benefit future music therapy practice.

The researcher will destroy the information 7 years after the end of the study.

E. CONDITIONS OF PARTICIPATION

You do not have to participate in this research. It is purely your decision. If you do participate, you can stop at any time. This includes leaving during the musical experience or declining/discontinuing the interview. You can also ask that the information you provided not be used, and your choice will be respected without prejudice. If you decide that you don't want us to use your information, you must tell the researcher anytime up until 2 weeks after the interview (if applicable). Should you choose to withdraw information after two weeks we may not be able to exclude the data, but we will make every effort to remove any identifiers if requested (and if possible).

There are no negative consequences for not participating, stopping in the middle, or asking us not to use your information.

You will be compensated a fixed payment of 35 dollars for your participation in the research paid in cash the day of your participation.
You will receive full payment even if you discontinue the musical experience or interview (please see paragraph 1): however, you will not be renumerated if you do not participate at all in the listening experience.

F. PARTICIPANT'S DECLARATION
I have read and understood this form. I have had the chance to ask questions, and any questions have been answered. I agree to participate in this research under the conditions described.

NAME (please print/type)

____

SIGNATURE (please sign manually or digitally in box).

____

DATE

____

If you have questions about the scientific or scholarly aspects of this research, please contact the researcher. Their contact information is on page 1. You may also contact their faculty supervisor.

If you have concerns about ethical issues in this research, please contact the Manager, Research Ethics, Concordia University, 514.848.2424 ex. 7481 or oor.ethics@concordia.ca.

Appendix G: Interview Questions

1. What was your experience of the music selection (raga)?

2. Were there any sensory (visual, tactile, kinesthetic) experiences that presented for you during the experience?

3. Are there any words that come to mind in describing the raga?

4. Did the music elicit any imagery, memories, or insights?

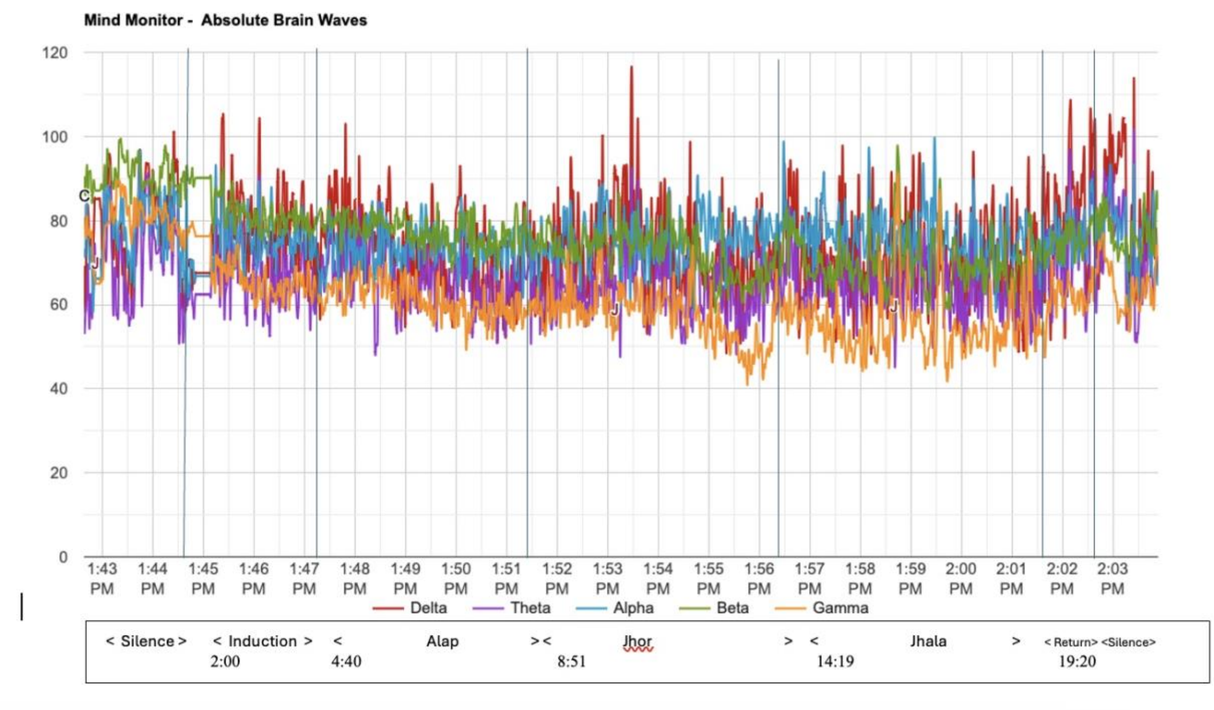
5. Was this an experience you would take part in again in the future should there be an opportunity.

6. Do you have any other comments you would like to add?

Appendix H : Anton’s EEG: All Data Points

Figure A3

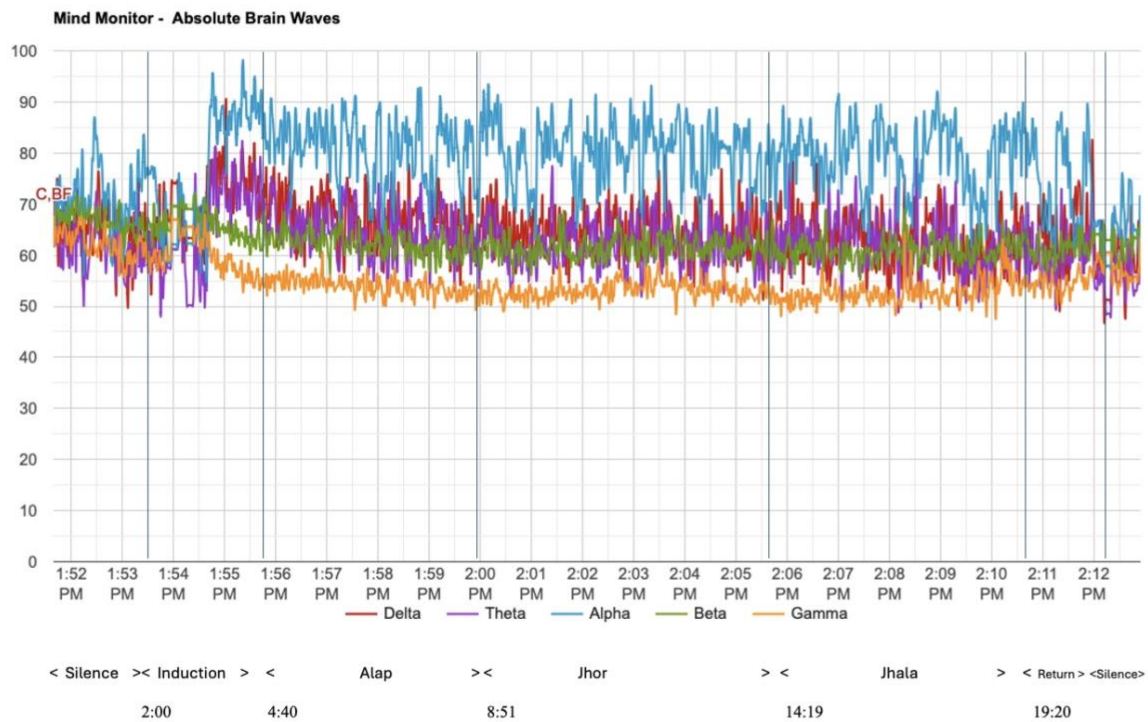
Anton’s EEG: All Data Points



Appendix I : Sofia's EEG: All Data Points

Figure A4

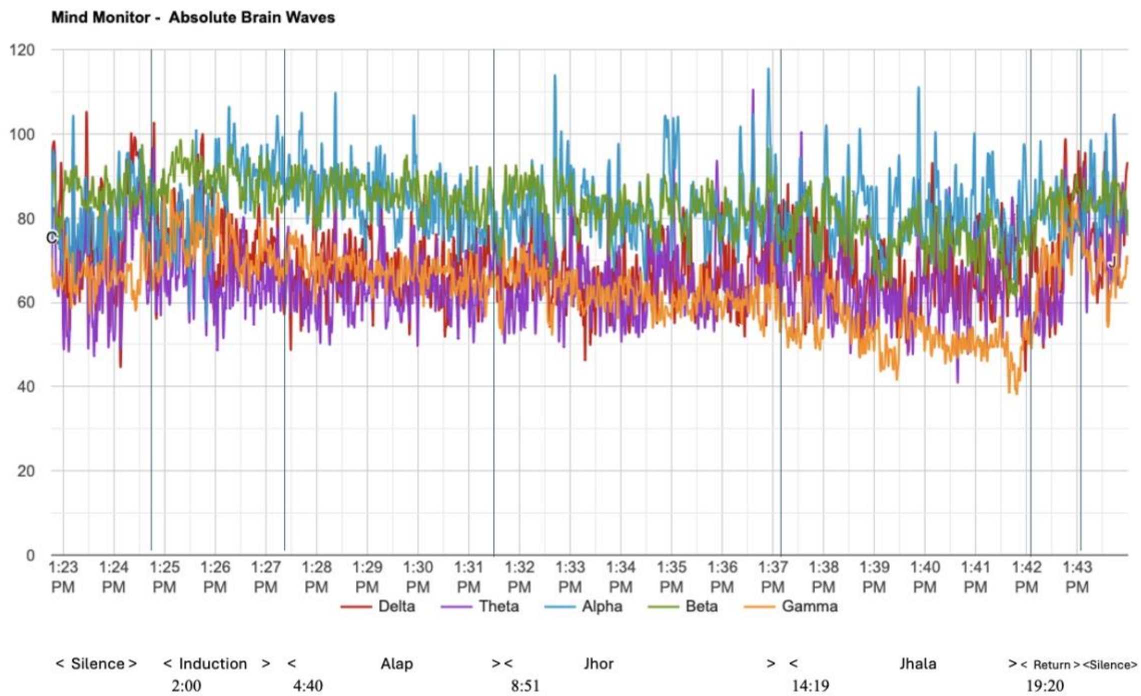
Sofia's EEG: All Data Points



Appendix J: Geeta’s EEG: All Data Points

Figure A5

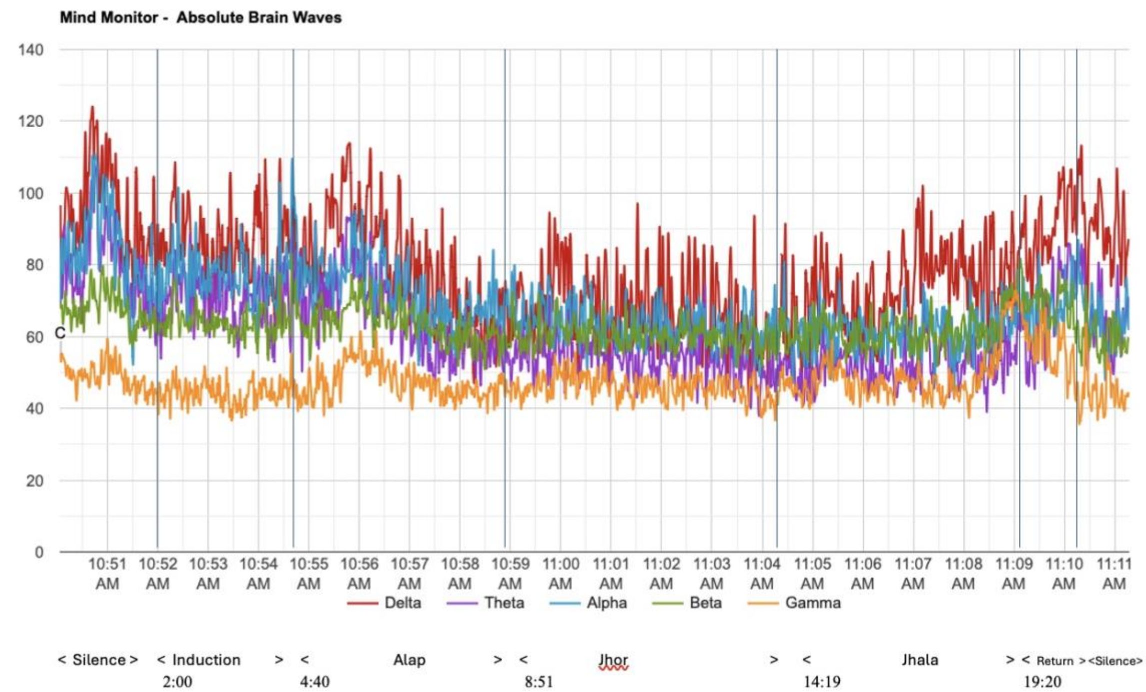
Geeta’s EEG: All Data Points



Appendix K: Scott's EEG: All Data Points

Figure A6

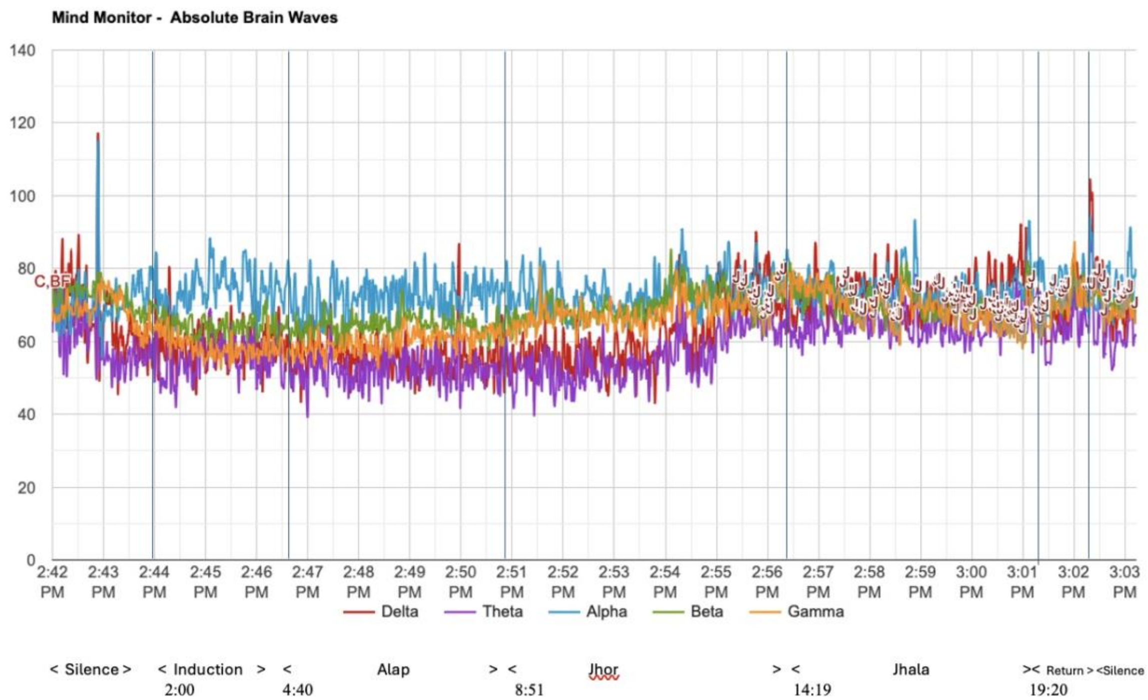
Scott's EEG: All Data Points



Appendix L: Anna's EEG: All Data Points

Figure A7

Anna's EEG: All data points



Appendix M: Emma's EEG: All Data Points

Figure A8

Emma's EEG: All data points