

**ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF ARTS AND SOCIAL
SCIENCES**

**SONIC SIGNIFICATION IN ALTERED STATES OF CONSCIOUSNESS:
AN INQUIRY INTO MUSICAL TRANCE**

M.A. THESIS

Dilara TURAN

Department of Music

Master Program in Music

JUNE 2017

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(409141111)**

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Dr. Jane Ellen HARRISON
Doç. Dr. Jerfi AJİ**

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**OLAĞAN DIŞI BİLİNÇ DURUMLARINDA DUYSAL ALGI:
MÜZİKAL TRANS ÜZERİNE BİR ARAŞTIRMA**

YÜKSEK LİSANS TEZİ

**Dilara TURAN
(409141111)**

Müzik Anabilim Dalı

Müzik Yüksek Lisans Programı

**Tez Eş-Danışmanları:
Dr. Jane Ellen HARRISON
Doç. Dr. Jerfi AJİ**

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Dilara Turan, a M.A. student of ITU Graduate School of Arts and Social Sciences, student ID 409141111, successfully defended the thesis entitled “SONIC SIGNIFICATION IN ALTERED STATES OF CONSCIOUSNESS: AN INQUIRY INTO MUSCAL TRANCE”, which she prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

Thesis Co-Advisors : Dr. Jane Ellen HARRISON
İstanbul Technical University

Doç. Dr. Jerfi Aji
İstanbul Technical University

Jury Members : Yrd. Doç. Dr. Ozan BAYSAL
İstanbul Technical University

Doç. Dr. Okan ÇIRAKLIOĞLU
Başkent University

Doç. Dr. Evren KUTLAY
Yıldız Technical University

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FOREWORD

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ABBREVIATIONS

ASC	: Altered States of Consciousness
DMN	: Default-Mode Network
PFC	: Prefrontal Cortex
PCC	: Posterior Cingulate Cortex
MTL	: Medial Temporal Lobe
ANS	: Autonomic Nerves System
REM	: Rapid Eye Movement Sleep
EEG	: Electroencephalogram
BWE	: Brainwave Entrainment
Bpm	: Beats per minutes
Cps	: Cycle per seconds

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SONIC SIGNIFICATION IN ALTERED STATES OF CONSCIOUSNESS: AN INQUIRY INTO MUSICAL TRANCE

SUMMARY

The term altered states of consciousness is used to express the deviated states of normal awake consciousness, being altered by various causes. Musical trance, as a subcategory of altered states of consciousness, is a cultural and biological based phenomenon observed mostly, but not necessarily, in religious music rituals. As a result of the examination of the previous works on this area, it has been seen that the function of music in trance rituals has been predominantly associated with the cultural, sociological and contextual features, rather than in association with the sensory and psychoacoustic effects of sounds. In this study, besides the specific cultural contexts of traditional trance rituals, sonic qualities of musics accompanying trance experiences and their biopsychological and perceptual foundations and effects have been examined in terms of their relations with the altered states phenomenon.

In the first chapter, the nature of the altered states of consciousness as a general phenomenon has been investigated through studies concerning neural alterations in brain regions and their cognitive and perceptual effects. Additionally, in this chapter, the ideas put forward about the psychological and cognitive mechanisms of the musical trance in specific, have been brought together in order to provide the theoretical landscape of the subject topic.

In the following chapters of the present study, set of examples in which the musical trance has traditionally been performed, have been studied in terms of their cultural and sonic qualities in relation to the theoretical ground presented. Within the scope of this survey around the world, 125 different recorded examples of traditional musical trance, which were studied by ethnomusicologists, have been brought together for a systematic examination. In the second chapter of the study, cultural, sociological and contextual features of these samples have been presented in the context of seven geographical regions, and the broad cultural frames, such as the belief systems, intentions and motivations behind the ritual activity and the formal characteristics of ritual settings have been provided.

In the last chapter, collected samples have been systematically analyzed via manual ear analysis and music analysis program *Sonic Visualizer*, in terms of the basic parameters of musical sounds e.g., melody, tempo, have been presented categorically. It has been observed that the cognitive and psychological effects of these sonic attributes relate to the perceptual effects of altered states of consciousness presented before. Among these sound-specific characteristics, the statistical regularity in the musical flow (musical repetition and continuity) has been found to be the most determinant parameter and it has been examined in terms of its effects on time perception. The repetitive, short and clear structure of melodies, the predominant use of percussive instruments and temporal elements, multi-layered and interlocked musical texture and vertical time organization have been observed among the other common means of sonic signification in ASC context. Besides these sonic qualities, tempo variants and their correlates on the types of musical trance, and the psychoacoustic effects of communal chanting have been proposed as the diverging means of sonic signification.

OLAĞANDIŞI BİLİNÇ DURUMLARINDA DUYSAAL ALGI: MÜZİKAL TRANS ÜZERİNE BİR ARAŞTIRMA

ÖZET

Olağandışı bilinç durumları (altered states of consciousness) normal uyanık yetişkin bilinç durumunun, çeşitli nedenler ile değişikliğe uğraması durumunu ifade etmek için kullanılır. Olağan dışı bilinç durumlarının alt bir kategorisi olan müzikal trans, çoğunlukla dini içerikli müzik ritüellerinde gözlemlenen kültürel ve biyolojik temelli bir olgudur. Bu alanda yapılan önceki çalışmaların bir sonucu olarak, müziğin trans ritüellerindeki işlevinin duysal ve psikolojik etkilerinden ziyade, kültürel, sosyolojik ve bağlamsal özelliklerinin öne çıktığı görülmüştür. Bu çalışmada, geleneksel trans ritüellerinin kendine özgü kültürel bağlamlarının yanısıra, ritüellere eşlik eden müziklerin doğrudan duysal özellikleri ve bu özelliklerin biyolojik, psikolojik ve algısal yansımaları, olağandışı bilinç durumlarına etkisi açısından incelemeye alınmıştır.

İlk bölümünde, olağandışı bilinç durumları, beyindeki sinirsel (neural) ve bilişsel (cognitive) farklılaşmaları inceleyen çalışmalar üzerinden genel bir olgu olarak ele alınmıştır. Bu bölümde ayrıca, müzikal trans olgusunun psikolojik ve bilişsel mekanizmalarına dair ortaya konan fikirler bir araya getirilerek teorik bir alt yapı oluşturulmak istenmiştir.

Çalışmanın sonraki bölümlerinde ise, müzikal transın geleneksel olarak icra edildiği örnekler, sunulan teorik alt yapıyla ilişkili olarak, kültürel ve müzikal özellikleri açısından incelenmiştir. Bu inceleme kapsamında, dünya genelinde etnomüzikologlar tarafından çalışılmış ve ses kaydı bulunan, 125 farklı kültüre ait geleneksel müzikal trans örneği, sistematik bir inceleme için bir araya getirilmiştir. Örneklerin kültürel, sosyolojik ve bağlamsal özellikleri, yedi coğrafi bölge kapsamında ele alınmış ve örneklerin genel kültürel çerçeveleri (ritüeli şekillendiren dini inanış, niyet ve motivasyonlar, ritüellerin biçimsel yapısı gibi) çalışmanın ikinci bölümünde sunulmuştur.

Son bölümde ise, toplanan örnekler bireysel kulak analizi ve müzik analiz programı *Sonic Visualizer* yardımıyla, sesin temel özellikleri olan, melodik yapı, zamansallık, doku ve tını açısından sistematik olarak incelenmiştir. Bu inceleme sonucu ortaya çıkan ortak duysal eğilimler kategorik olarak sunulmuş ve bu duysal özelliklerin bilişsel ve psikolojik etkilerinin, olağandışı bilinç durumlarıyla ilişkili olduğu gözlemlenmiştir. Bu duysal özellikler arasında, sesin statik sürekliliğinin (müzikal tekrar), en belirleyici etken olarak öne çıktığı görülmüş ve zaman algısında yarattığı farklılıklar açısından incelenmiştir. Melodilerin tekrar eden, kısa ve basit yapıları, ritmik öğelerin ve vurmali çalgıların baskın kullanımı, çok katmanlı müzikal doku ve dikey zamansallık gibi doğrudan psikoakustik ile ilişkili duysal öğeler, müzikal trans örneklerinde ortak eğilimler olarak gözlemlenmiştir. Bu ortak özelliklerin yanı sıra, tempo değişkenleri ve bunun trans psikolojisi açısından yansımaları ve toplu olarak icra edilen vokal performansların (communal chanting) tınısal ve psikoakustik özellikleri, trans ritüellerinde kullanılan müziklerin daha az yaygın olan duysal nitelikleri olarak sunulmuştur.

1. INTRODUCTION

While *altered states of consciousness* is a relatively new term in the history of its scientific study, the phenomenon of altered or transcend consciousness is one of the oldest subjects in human history. It has been experienced through a wide variety of cultural practices, and has been the driving subject of many religious, philosophical and aesthetic doctrines. While some of these cultures continue to keep thier practices closer to their traditional forms such as, *mitote* (peyote meeting) of Yaqui American Indians (Castenada, 1968; Castenada, 1971), or *sama* (ceremony performed as dhikr) of New Delphi Sufis (Becker, 2004, pp. 77-82), spiritual experiences associated with it continue to exist in the context of individuals of modern city life, not only through spiritual centers, but also festivals and concerts such as free jazz sessions or psychedelic raves (Hamel, 1978, pp. 131-154).

As it is observable in the examples of both traditional and modern associations across different cultures of the world, music has a particular importance as both mediator and driving factor in the emergence of altered states. The present study here is primarily focused on the essence of the relationship between the altered states phenomenon and the sonic expressions attached to these experiences. More particularly, the fundamental questions that drive this inquiry concerns what the brain correlates of altered states of consciousness are, in which ways music interacts with brain and body mechanisms that lead to the phenomenon, if these interactions are different from our normative music-evoked emotion percepts and if it is possible to examine specific musical components in isolation as cues to alterations in cognitive states.

The long history of the subject topic and the cultural diversity attached to its various aspects, gave rise to complex terminology and wide range of study areas. Even the experience of the phenomenon itself is referred with different terms such as *mystical experience, trance, ecstasy, transcendental consciousness, enlightenment, oneness, spirit possession, unification, nirvana, meditative mind or disassociation*. Among the most frequently seen academic approaches, philosophy, theology, sociology of religion, humanities, psychology and neuroscience can be listed. Scholars form these

areas investigate and hypothesize about the nature of the experience with different conceptualizations, methods and focus points.

Before moving on to the particular perspective that frames this study, a brief summary of these different points of view might be significant in understanding the differential, yet also complementary sides of the subject topic. Sociological and anthropological searches and studies from humanities tend to handle the subject from a social / cultural domain in which they are more focused on values, traditions and sets of ritualistic behaviors that build up the experience of a specific group of people, who might conceptualize it as *spirit possession, trance, ecstasy, unification, oneness or emptiness*. This cultural standpoint is highly crucial due to the fact that culture as a study area, provides a more inclusive understanding by integrating human behaviors with thinking and belief systems, which as a whole, directly relates to the experience. Another approach to the study of the subject is exegetical method that investigate more on the expressive modes of the experience, such as writings and various forms of arts, rather than the experience itself. Therefore, exegetical studies refer to the altered states of consciousness as an intellectual conceptualization based on the interpretations of expressive and descriptive materials or *manifestations*. Hermeneutics can be considered as a well-suited example of exegetical approach. Philosophy, particularly epistemology, is another important study area that relates to altered states phenomenon from a point of view that questions the nature of *the knowledge or truth* that is claimed to be gained from such *mystical experiences or enlightenment*. While practitioners of the experience consider the issue as a process, a *meditation* or a *way* to an ultimate *truth*, epistemologists are concerned more on the axioms and the objectivity of that knowledge. Although one can find some other, more interdisciplinary approaches to the topic, these branches of study areas -along with psychology and cognitive science that will be mentioned in later paragraphs- can be seen as the fundamental standing points and they elucidate different but equally important aspects of this complex phenomenon.

The present study is multidisciplinary employing some of the research methods and strategies from the study areas mentioned above and connecting the pointed out discussions relating to musical trance. Firstly, my strategy in examining the nature of this phenomenon is based in the ground of brain and body mechanisms relevant to the experience. This foundation is mostly seen in psychological, neuroscientific and

cognitive studies in which the term *altered states of consciousness* (ASC, from now on) is generally considered as an umbrella term that includes both overlapping and differential aspects of the ASC experiences owing to cultural variables. Since neither the primary focus, nor my study field directly relates to the examination of brain and body during the experience, I prefer to gather relevant arguments and observations from these bio-psychology based areas and try to make connections that might help the experience to be understood, in order to make further connections with sonic components accompanying it. In this regard, the first chapter of this study is designed as a literature review, which provides a theoretical background based on mostly empirical data. Since this cognitive event is mostly described as a temporal state beyond the normative mental functioning, I bring up studies examining the ordinary activities of brain that involve in the perception of *self*, or *default mode of consciousness* and discuss the ways these basic mechanisms change during ASC.

The last half of the first chapter is dedicated to the reassessment of fundamental theories of musical trance, which methodologically follow a cognitive perspective in light of those psychological and neuroscientific studies. Among these theories, the most agreed upon point of view considers music primarily as a part of a cultural setting, which has no direct sound – specific relation to the experience. This approach signifies the music making as a ritual behavior, which functions in providing culturally familiar and predictable cues, mediating between the conscious intentions of individual, group and culture, and thus assuring the collective high-emotional mood that might possibly expand the consciousness state of the participants (Rouget, 1985; Becker, 2004). The importance of music in that context is attributed to its familiarity and the emotional codes that are attached to it. This perspective explains the connection between sound and altered states in terms of a social domain that is, beyond dispute, crucial in understanding the relation. This social science based perspective is mostly represented by ethnomusicologists in music-specific field.

On the other hand, there is also a biological/ psycho-acoustic side of the story which focuses on the relationship between the sonic qualities in the musics that are practiced in accompany with that non-ordinary experiences, and the direct responses of our brain and body to that sonic stimulants. Scholars, who examine the sonic elements in musical expressions of ASC, hypothesized a theory called auditory entrainment which simply means that soundwaves and the brainwaves (thus, also the body mechanisms) can

interact and synchronize to each other on certain conditions. Although the debate is still going on, auditory entrainment theory provides an alternative explanation that requires a reexamination of the role of sonic qualities in ASC in terms of the principles of psychoacoustics and music cognition in order to figure out whether there is any observable relation between the altered states and sound-based aspects. While the auditory entrainment theory can be considered as the main theory of musical trance, there are also studies that examine certain properties of sound in relation to musical trance, such as Fancher's study (2001) of subjective time perception during trance experiences or Neher's (1962) and Walker's studies (1972) on effects of ceremonial drumming.

In the second chapter, I aim to make a survey of the musics of the world that are categorically associated with altered states of consciousness either by their practitioners or the researchers who worked in the field. My intention is to observe these simultaneous occurrences of various sounds and their respectively associated mystical phenomenon in order to bring up some possible answers to the question of how musical trance works. While the approach that I take in the second chapter is closer to the exegetical method due to the usage of music – one of the expressive modes of ASC experience- as the primary source, I also take into account certain cultural variables, such as religion, ethnicity of the participants, differences in conceptualization of ASC, and the cultural settings in which the experience occurs. Throughout the second chapter, brief notes on these cultural data sets with a comparative perspective will be provided along with the methodology of the data sampling. Rather than testing or favoring one of the theories of musical trance, I prefer to study examples from the greatest diversity of cultures possible in the limits of practical constraints, and to collect any relevant data that can bring to the relationship between sound and such alterations in consciousness. With this approach, I believe that the collected data might organically lead to a broader view on the essence of the subject topic, without losing sight of culturally specific differences.

Finally, in the last chapter of the project, I will introduce the findings based on the collected data, in a framework of a comparative model in which the comparison criteria are directly related to the sound events of musical trance. Following the primary question of which sonic qualities indicate a significance, I focus on the patterns of particular sonic modalities, such as the effect of repetition, embodiment of temporality

and duration, usage of percussive instruments, and drumming effect. While this study seeks the most basic commonalities in order to make generalizations about the nature of the musical trance, certain sets of divergences are also utilized as criteria of comparisons. I will also reassess the findings in the light of cognitive studies of ASC that are introduced in the first chapter and general principles of music cognition hoping to be able to make new connections between sound and ASC.

2. THEORETICAL LANDSCAPE

2.1 Brain During the Altered States of Consciousness

The term Altered States of Consciousness (ASC) was first introduced by a German psychiatrist, A. M. Ludwig in 1966. He defined it as a 'sufficient deviation' in subjective experience from the normative functioning of waking consciousness, caused by physiological, pharmacological, or psychological factors (p. 225). Even though he does not explain the normative functions of the waking consciousness, the core of the definition is based on the quality of otherness, the 'alteration' in the 'normal' functions. This base is consistent with more recent studies concerning ASC. Still, the general assumption in hypothesizing the theory of ASC in the scientific field, is based on the examination of waking consciousness, known as Default-Mode Network (DMN) and observation of changings, 'alterations' of the mechanism in certain conditions that correspond to causal factors in the initial definition.

Default-Mode Network (DMN) is one of the largest scale brain networks and it consists of medial prefrontal cortex (MPFC), the posterior cingulate (PCC), inferior parietal lobe (IPL), lateral temporal cortex (LTC), and hippocampal formation (HF) (Koshino, et al., 2014). These regions have a dense connectivity with other brain mechanisms that puts DMN to a central position in integrating information and making connections with other regions. Rather than sensory information processing, functionally DMN is associated with higher level or metacognitive processes like self-referencing, social cognition, theory of mind, or conceptualization of time. DMN enables the brain to monitor the external environment and suppress the continuous input to minimize the uncertainty by referencing to the self and autobiographical memory (Carhart-Harris, et al., 2014). During the waking consciousness, DMN is highly active. By consuming more energy and receiving more blood flow, its metabolic rate is significantly higher compared to the other brain regions (Raichlea & Snyder, 2007), suggesting that our normative consciousness is rarely

detached from cognitive functions of DMN which explains the otherness quality of the ASC phenomenon in terms of the frequency rate of its occurrence.

The sense of self as the reference point in this mechanism is often associated with the coupling of posterior cingulate cortex (PCC) and prefrontal cortex (PFC) (Northoff, Heinzel, Greck, Bermpohl, Dobrowolny, & Panksepp, 2006). While the PFC is more active in integration of input data and attention, PCC is more active in self-reflecting and mind wandering in rest states, meaning not goal oriented tasks. Considering the PCC is one of the major regions of default mode, most of the time when the brain is not directed to a task, it is busy with metacognitive processes, such as recognizing self and other, thinking about past and future or wandering about all other higher conceptualizations, rather than the perception of present moment.

This deactivation of PCC during the tasks is significant when we consider trancing, a type of ASC that mostly occurs in communal religious ritual settings. Most of the time, participants of such events are busy with constant doing activities of ritual settings, such as dancing, chanting, clapping during the ceremony (Rouget, 1985; Becker, 2004). We might theorize that these doing activities may cause an enhancement in the attention and focus functions of PFC towards the over sensory stimulations of ritual, and as in the case of goal oriented tasks, this might result in decrease in PCC activity, thus sense of self. Reduced activity of PCC and enhancement of PFC are also consistent with Zen Buddhist practices other than the Zen meditation, such as gardening, ikebana, or art of archery, which aim to train the mind and body through mastering these activities following the principle of being in present moment that is detached from self-centered thoughts (Herrigel, 1953).

Consistent with the previous association of deactivation of PCC with decrease in sense of self, another theory suggests that there is a positive relationship between the synchronous oscillatory activity of alpha (8-13 Hz band) waves in PCC and self-reflection (Jann, et al., 2009). Similarly, Carhart-Harris, et al. argue that interaction of various oscillatory rhythms in brain, such as alpha, theta and gamma, promote ideal conditions for the structured activity of DMN and for an integrated sense of self. In their study, they measure the magnitude of alpha activity after the induction of psychedelic hallucinogen,

psilocybin, and the ratings of the participants on the various descriptions of the experience. Results show that the alpha magnitude in PCC significantly decreases after psilocybin. They also found a positive correlation between the decrease of alpha power in PCC and the ratings of “I experienced a disintegration of my ‘self ‘or ‘ego’” description which is one of the only two surviving items after Bonferroni correction for multiple comparisons. The other surviving description was “the experience had a supernatural quality” (2014, p. 21).

Alpha waves are frequently associated with integrated and internalized sense of self. However, in contrast to the previous results, researchers also observe that alpha band activity enhances during meditative tranquil states. This difference between the decreasing and the increasing activity of alpha waves might reflect the difference between the meditative and psilocybin states, but it still draws our attention to the fact that the changes in the alpha wave pattern have certain psychological effects in terms of the sense of self, thus the experience of ASC. Theta patterns also involve in the experience of ASC. Theta waves are often associated with dream- like near-unconscious states, such as those we experience just before sleeping and waking (Maxfield, 1990). In the EEG analysis during meditation by Splittstoesser, he observed that the high amplitude theta waves alternated with alpha patterns (1983). This suggests that the enhanced theta activity might be more related to the dreamy states, while enhanced alpha activity promotes for a more still and tranquil, yet waking, integrated and alert states.

The relationship between the waking consciousness state and ASC is investigated in another study, whose participants were meditators (Tang, et al., 2015). The cross-sectional experiment done with twelve expert meditators shows a decrease in connectivity of PFC and PCC. Similar with the previous results, PCC activity reduce during different types of meditations. They also conduct a longitudinal experiment with 30 participants trained in mindfulness meditation and 31 participants for active control. The results show an enhanced activity in PFC -which they associate the region with attention and emotion regulation functions- while the PCC functions (self-reflection) significantly decrease. The authors conclude that with the increase control on the DMN functions during different types of meditation, there is a significant shift from a self-referential processing state to a more detached sense of self which monitors the introspective and exterospective sensory

data more objectively in the present moment experiences. This result again shows that while the cognitive mechanisms of two states, meditative (enhanced alpha activity) and psilocybin induced ASC (reduced alpha activity, increased theta activity), are different in terms of the process, the overall result of the two is similar in terms of enhancement in receiving the sensory input.

The other main brain region that is involved in alteration of consciousness is Medial Temporal Lobe (MTL). It is suggested that there is a parallel between the frequently attributed qualities of ASC and the descriptions of patients who experienced temporal lobe epilepsy, such as senses and visions of supernatural existences or experience of extremely euphoric states accompanied by a sense of oneness (Jeeves & Brown, 2009). In general, MTL includes hippocampal structures that are functionally associated with 'declarative memory', meaning the conscious memory of facts (semantic memory) and events (episodic memory) (Squire & Clark, 2004). Considering the crucial memory functions of MTL, it is understandable that the temporal lobe lesions can cause to sensations that are highly different than the static patterns of experiences that are stored in the memory storages. Involvement of MTL in ASC is also observable in the psilocybin experiment mentioned before (Carhart-Harris, et al., 2014, p. 20). They suggest that the coupling of MTL, particularly the hippocampal structure, and DMN regions is a necessity for normal waking consciousness. Using BOLD signal variance, they observed changes in couplings of hippocampi with other brain regions under psilocybin. The results show a decoupling of hippocampi and DMN, which also reduces the synchronization and organization of DMN activity. Additionally, they suggest that the same decoupling mechanism and its effects on DMN is similar with the reports of other altered states of consciousness including rapid eye movement sleep (REM), acute psychosis, infant consciousness and temporal lobe epilepsy.

These changes in couplings of brain regions explain the activities of brain structures during ASC. However, they still don't answer the question of to where or to what the normal waking consciousness is altered, in other words what kind of a cognitive state it is when it is beyond the DMN functioning. In his study with Kabbalah mystical cult, Lancaster suggests a theory of pre-conscious state, and place it at the top of the hierarchy of lower / higher cognitive states. Consistent with the mainstream cognitive studies, his

theory is based on the isomorphism principle that is the equal interaction of bottom-up feed forward and top-down re-entrant processes that interact with each other via binding and reflexivity process. In an oversimplified expression, mind process the input data simultaneously (bottom-up feed forward) in respect to the data and connections already stored (top-down re-entrant processes). He argues that the mystical experiences work with the same cognitive process, but the top in such experiences is much higher, older and hidden to normal conscious states (Lancaster, 2011), in other words, some sort of a deeper consciousness.




A similar hypothesis, called entropic brain, is introduced in the psilocybin research. The term entropic means "a dimensionless quantity that is used for measuring uncertainty about the state of a system" (Carhart-Harris, et al., 2014, p. 1). Following the free energy and self-organized criticality principles, theory accepts that the brain develops static patterns of inferences and behavioral patterns to balance the uncertainty in between order and chaos in the system. This development of static cognitive patterns had already emerged in early ages. In respect to this function, they make a distinction between two types of cognition; primary and secondary. Secondary consciousness is the normal waking consciousness with lower entropy, meaning more ordered and constrained to the static patterns controlled by DMN, which is an evolutionary advantage of human beings. On the other hand, primary consciousness is more flexible (higher entropy) since it is less ordered and less constrained in terms of brain region couplings. While the primary consciousness is a pre-ego (less referencing and less reflecting self) and primitive thinking style of primordial man, secondary consciousness is attributed to the waking consciousness of modern human adult. Addition to psychedelic states, infant consciousness, dreamy state of temporal lobe epilepsy, near death experience, sensory deprivation and divergent thinking are some other exemplars of high entropic states. On the contrary, addiction, depression, coma, anesthesia, rigid thinking, seizure and deep sleep are listed as states with low entropy.

This entropic brain theory has parallels with various ideas from philosophical, psychological and religious theories of altered states. As Carhart-Harris, et al. discuss in detail, it is consistent with Freud's theory of unconscious mind and Jung's ideas on the archetypal themes emerged from collective human memory (pp. 30-31). This issue of

archetypal theme and distinction of primitive and modern way of thinking, also resonate with Lévi-Strauss's theory of myth, which represents a collective knowledge of human carried by stories and other expressive mediums through the ages and various regions (1978). Following Freud's and Jung's ideas, William James also refers to subliminal states as the underlying cognitive sources of mystical experiences. The high entropic primary consciousness can be a base for the explanation of James's 'noetic quality' - one of the four main criteria for the possibility of mystical experience- meaning a kind of knowledge gained in the mystical experience and not accessible to normal consciousness, often described as seeing the reality (James, 1958). Disappearance of self-reflection caused by the reduced activity of PCC and decoupling of MTL/DMN during ASC, can also explain some frequently mentioned qualities of mystical experiences, such as sense of oneness, timelessness or sense of the cosmic self (Shrader, 2008). It is convincing that when the brain is less busy with cognitive tasks like the self-reflection or mind wandering (deactivation of PCC), and when it is relatively less attached to the semantic and episodic memories (decoupling of MTL-DMN) in a high entropic state, it might produce a sense of union with all the introverted and extroverted inputs since they are free from the normal filtering of DMN during ASC.

Table 2.1 below demonstrates the mentioned changes in brain functions and their perceptual effects observed during ASC, in relation to the deviations in sense of self.

Table 2.1: Observed deviations in normal awake consciousness during ASC.

<p>Decrease activity in PCC</p> <p> meta-cognitive functions</p> <p>self-referencing, mind wandering</p>	<p>Increase activity in PFC</p> <p> integration of input data</p> <p>attention and goal oriented tasks</p>
<p>Decoupling of MTL & DMN</p> <p> integrated sense of self</p> <p>in mind and body clock time perception</p>	<p>Alternation of alpha to theta waves</p> <p>$\alpha \sim \theta$ in DMN regions</p> <p>dreamy and less awake sense of self</p>

2.2 Theories of Musical Trance

So far, I summarized the activities of brain regions during the altered conscious states. The examination of the changes in DMN functioning provides a mechanistic ground for understanding what is going on in the brain during such mysterious experiences. However, depending on what causes these changes in the default mode of network, there is a typology of ASC. Following Ludwig's categorization, we can summarize that ASC can be caused by physiological, pharmacological and/or psychological (behavioral) inducements (Ludwig, 1966). It is important to remember that most of the studies mentioned so far, investigate the alterations in the default mode of networks caused by either direct induction of hallucinogenic chemical, psilocybin or the dysfunction of certain brain regions, particularly the temporal lobe. These onsets of altered consciousness states can be objectively observable and consistently reproducible in laboratory conditions, and they correspond to the physiological and pharmacological categories.

On the other hand, psychological reasons that lead to alterations in consciousness constitute the largest category of ASC experiences. This type of ASC occurs in the environmental, behavioral and cultural conditions in which the normal waking consciousness of the individual subjectively transforms in response to the significant increase/decrease of external and internal stimulus. Depending on the attention level of individuals to these stimuli and personal and cultural motivations and expectations, the cognitive processing patterns and emotional states alter during the behaviorally induced ASC. The meditation study mentioned before is an exemplar of this type of ASC. Consistent with the chemically induced experiences of ASC (Carhart-Harris, et al., 2014), it might cause alterations in thinking processes, time perception, loss of sense of self and perceptual distortions (Ludwig, 1966).

Perhaps, the oldest and the most frequently associated condition for emergence of such alterations is the religious, ritual settings which are intended for the experience of ASC, mostly known as *trance* and *ecstatic states*. However, it is important to remember that alterations in normal waking consciousness can also emerge in secular, individual and even in unintended conditions (Ludwig, 1966). Music mostly takes places in such culturally constructed settings as almost an inseparable part of the experience (Hamel,

1978; Rouget, 1985; Becker, 2004). This suggests a link between ASC and music, which underlies in high potential of music in either creating or supporting the necessary conditions for the emergence of alterations in consciousness.

We can observe two main approaches to the question of which ways and functions music involves in the production of altered consciousness states. First is the particularist approach of ethnomusicology that highlights the emotional arousal, caused by the socio-cultural context, as the triggering cue to ASC. The perspective that is taken here considers music as one of the many other cultural stimuli in the occasion that might lead to a high emotional state. I think this standing point is also coherent with the general perspective in the field of ethnomusicology which generally tends to consider music primarily as a 'human behavior' and secondarily as the 'sonic output generated by human behavior'. In this framework, the qualities of musics associated with ASC greatly differ across cultures -as all the other cultural values- along with requiring a particular glass to differentiate the uniqueness of the each occurrence. The great variety in the musical styles of the world in general and also in ASC-specific that can only be absorbable through particular glasses, could rightly make it hard to put an emphasis on purely musical qualities in isolation from the cultural contexts in theorizing about music and ASC, more than highlighting musicking as a behavior of ASC in terms of commonalities.

However, this approach doesn't necessarily have to exclude the idea that certain modalities within the sonic output primarily generated within the culture, might significantly contribute to the explanation of the ways the music involve in the experience of ASC, not only as musical behavior, but also the sonic qualities of it. The second common perspective in the study field of music and ASC, tend to have similar view with this. Following a more universalist or a systematic approach, scholars from music cognition and music therapy field search for more direct connections among sound, brain- thus body- and perception. The following section concerns main discussions about the involvement of music in ASC experiences, in respect to these two points of view.

2.2.1 Music, emotion and altered states of consciousness

Rouget's book *Music and Trance; A Theory of the Relations Between Music and Possession* is one of the fundamentals of the literature concerning the ASC and music.

Rouget as an experienced ethnomusicologist, makes a clear distinction between *trance* and *ecstasy* (types of ASC). This distinction is primarily based on the types of emotional states of the individuals (high or low arousal) and effects of this emotional states on their bodily experiences. In his terminology *trance* is associated with high arousal emotional states expressed by extremely active body movements, and caused by over sensory stimulation in communal religious/ritual settings. *Ecstasy*, on the other hand, is characterized by means of top-down processes like meditation or contemplation, with low-arousal emotional states that results in immobility, silence, solitude, sensory deprivation and relaxation (Rouget, 1985, pp. 10-11). Another expert on the subject, Judith Becker follows the same distinction, only with an exception that she uses the word *meditation* for low-arousal states rather than *ecstasy* (Penman & Becker, 2009; Becker, 2004). Studies of both authors are mostly concerned with *trance* experiences in terms of the examples that they examine, rather than meditative or ecstatic states.

For both authors, emotions have a particular importance in understanding the link between music and *trance*. In their theory the emergence of *trance* in ritual settings is primarily depend on both individually and communally shared cosmology of people. Individual participants of the ceremony share same predictable expectations, intentions and set of behaviors which create a public, interactive and familiar communal space. This predictability and intentionality enable the *trancers*, especially the ones who are in charge of leading the ritual - particularly the music- to interact with the music in response to their emotional states for the emergence of *trance* possession. In other words, *trancers* know how to alter their consciousness via interactions within that extremely familiar ritual setting. In respect to this given importance to the whole pre-set cognitive familiarity, music functions as a catalyst for *trance* possession, and not as a direct element of induction. Thus, it is not possible to make a causality relation between the *trance* state and the specific properties of musical structures that the *trancers* interact. Rather, music combined with all the other psychological factors of ritual setting, functions in the creation of strong emotions which cause high degree chemical bath of serotonin, dopamine and oxytocin in brain structures. Thus, the theory suggests that the whole process might give way to alterations in consciousness and the frequently mentioned effects, such as loss of

sense of self and other, changes in attention, alertness or time perception (Becker, 2004, p. 56).

This emotion based theory of music and trance explains many common features of trance rituals, such as communal settings, shared cosmology or religious context, importance of the cultural and social familiarity between the trancers and strictly followed ritual conventions. It also explains why some ritual settings promote to the emergence of ASC experiences for some people, while the same music and setting might be meaningless, even boring or disturbing for others. Both Rouge and Becker highlight the great diversity in the musics and ritual settings of various cultures with respect to the particularistic point of view.

However, there are also neglected points in the emotion theory of music and ASC. The very obvious problem is that it doesn't explain the involvement of music in low-arousal or meditative states. If the core of the theory is the arousal of the emotions which give way to the release of certain chemicals in the brain that will result in some kind of alterations, we have no explanation of what leads to these changes in relation to music during the low-arousal, contemplation states. Herbert touches upon this neglect of meditative type of ASC in the music and trance literature by bringing up the issue of ASC experiences in the individual, secular and solitary contexts. In her critique, she says that "the only model of altered consciousness with music that Rouget presents us with is high arousal trance in communal contexts" (Herbert, 2011, p. 206). She also considers the particularist notion of Becker as a result of "etic constructions" and claims that both a universalist and particular point of view can be useful in understanding the relationship between music and trance (p. 208).

It is true that such a particularist approach might not be complete when we try to understand the phenomenon from a more universalist, mind-based point of view, such as the one I took into account in the previous section in explaining the ASC. One might question that how trancers are able to alter their DMN consciousness into an entropic state (more free from static patterns), by means of such a predictable, culturally determined and fixed settings. In other words, how one can experience the otherness quality, the alteration or loss of sense of self in such a highly static, predictable and culturally familiar context

to herself. This gap in the emotion based-theory is most observable in Becker's book, chapter named as *Magic Through Emotion* which the title reflects the missing connection itself (2004, pp. 131-150). Her theory of trance is based on two distinctive type of consciousness. One is the core self, "a transient but conscious reference to the individual organism in which events are happening" which corresponds to our cognitive ability of monitoring the body and sensory input and perceiving the external world. The second is the autobiographical self, "an organized record of past and experiences of an individual organism", which is our long term memory and our sense of 'me' that the events happen to (p. 135). She suggests that the autobiographical self is temporally suspended and transformed to trance self for a limited amount of time during trance. She details these two types of selfs and their functions in terms of the trance characteristics which are highly consistent with the deviated-DMN theory. However, the question of how the autobiographical self is temporally put aside, a question that she also asks, "How might this happen?" isn't really answered;

It maybe that learning to control deep-brain ANS (autonomic nerves system) emotional responses respiration, blood pressure, and skin temperature allows some persons to so change their consciousness that trancing becomes "allowed" and under voluntary control. Because emotional arousal is a prediction for deep listening and trancing, music map play as central a role as precipitator of trancing as it does as precipitator of transcendent feelings in deep listeners.

This explanation leads us to another discussion. Emotion-based theory considers the strong emotional responses of autonomic nervous system (ANS) whether voluntary or not, as the initial cue of trance states, and ascribes a special importance to culturally familiar music in creating such high arousals in nerves system. However, if we take the emotional arousal as the pre-requisite of trance theory, we are not only neglecting the deactivated ANS states (low-arousal), but also we might easily include many different states caused by emotional arousal in response to music as trance or alternating consciousness. In other words, in the emotion-based model, it is hard to differentiate trancing between having a strong emotional response to a piece of music, like listening a highly familiar and beloved piece in a concert hall. Probably because of this situation, Becker employs two terms, '*Trancers*' and '*Deep Listeners*', both of which correspond to people who have strong emotional responses to music and are moved by it, but with a difference that trancers have an enhanced religious context while Deep Listeners might be secular. In this respect

Becker includes individual experiences of ASC with music. However, the line between the strong emotional responses to music with no alteration in consciousness and high-arousal states during ASC still remains blurry. Moreover, the term itself, emotion, is open to a further discussion, considering the fact that the extent of the overlap between the music-evoked emotions and everyday emotions is still muddy (Koelsch, 2014, p. 178). Additionally, it is also possible to suggest that in the emotion-based theory it is not clear whether the emotional arousal caused by music, or the context of the setting including all the whole background cognitive maps of people. In Becker's point of view, there is no necessity to differentiate all the parameters, since she handles the issue of trancing as an integrated social behavior that all the parameters are interactive and equally involve via structural coupling. While I agree that there is certainly a dynamic process between music, individual, community and setting, I also think that there is more space to investigate specific relations among body, brain and sound which is similar to the universalist point of view based on biological-psychoacoustic principles, since the two possible explanations are not mutually exclusive.

2.2.2 Musical mechanics of ASC: temporality and auditory entrainment

Temporality is one of the most frequently mentioned factors in understanding not only the emergence of altered states, but also the outcome effects of the experience. As we already saw in the mostly described characteristics of ASC, the sense of timelessness or alternations in time perception are commonly reported in different studies. Time perception or the loss of it, as being a crucial key in the ASC experiences is a convincing argument, also, when we consider that time is almost an inseparable percept that allows our conceptualization of self, memory, and notion of ordinary and non-ordinary which are assumed to be alternate during ASC. Among all other art forms, music is the most frequently associated one with the ASC experiences and ritual setting, and it could be that this unique position is primarily due to its inseparable relation with time concept which is the fact that it happens and we experience it in a time flow.

Fachner mentions time as the key concept of the whole discussion of altered conscious states. Basing on the general opinion that is the relativity of time perception, 'subjective time', he suggests that music is capable to shape our time perception in respect to the

amount of sensory information per minute (2011, p. 367). According to Fachner, when the musical information is meaningful for its listener, brain zooms into certain musical parameters such as timbre or meter for a flow of time. This condition causes an enhancement in receiving the sensory information, which he calls hypofrontal state. This scaling of sensory events of musical time and space creates alterations in the perception via directing and framing attentional focus (Fachner, 2011, p. 367).

This conceptualization of ASC and music is consistent with another known mechanistic theory concerning the issue with a less direct relation to temporality. Needham points out the highly consistent employment of percussion instruments and rhythmic devices in ritual settings among different cultures, and suggests that drumming has a particular effect on brain and body in the creation of altered states (Needham, 1967). This idea is specified more in the study of Neher (1961, pp. 449-451) which is strongly criticized by Rouget. Neher experimented on the relationship between the brain waves, particularly theta and alpha ranges, and sound waves that are similar to drumming sounds of traditional rituals in terms of drumming frequencies. His suggestion was that the energy of loud sound waves at very low frequencies travel bottom-up the afferent auditory pathways and entrain with the brain waves. In order to synchronize the two waves, he imitates the EEG corresponds of the theta and alpha patterns which are 3-8 Hz drumming beats per second (theta) and 8-13 Hz (alpha). With this theory of auditory driving effect of drums, Neher suggests that drumming at a certain frequency, certain beats per minute in a certain amount of time create an ideal condition for the induction of ASC and the brainwave responses to drumming can be observable via scalp electrodes (Neher, 1961, pp. 449-451).

A comparatively recent study by Maxfield indicates a more direct correlation of drumming effect and induction ASC, especially in terms of theta waves (1990). In that study, participants many of whom had no previous experience of altered states or ritual, are divided into three groups and their EEG frequency response to three separate drumming tapes are observed. Three types of recorded drum music are shamanic drumming at 4-4.5 Hz, rhythmic drumming at 3-4 Hz and free drumming without a clear rhythmic pattern. Each participant is interviewed after the listening session on his or her subjective experiences and reoccurring themes in their interviews are categorized. Results indicate that drumming has particular neurophysiological effects on the listeners including loss of

time continuum, alterations in body temperature, emotional arousal. It is concluded that drumming effect in general has the ability to create temporal changes in brain wave activity, which promote for extra-ordinary imaginary and possible entry to ASC. Among the three types of drumming stimulus, shamanic drumming at 4-4.5 Hz is the most effective in initiating and enhancing the entrainment (Maxfield, 1990).

Concerning the consistent association of theta waves with ASC by both Neher and Maxfield, it is important to note that the effectiveness degree of drumming in creating the ASC experiences is highly dependent on the continuity of the sound stimuli for certain amount of time. In Neher's case constant repetition of rhythmic patterns, what he calls "monotonous drumming" is crucial to assure that the intended spectra and the frequency pattern of drumming occur. Perhaps, the repetition of the stimuli for a certain duration is also an effective factor in terms of the fact that it makes the auditory processing easier for the listeners (Deutsch, 2013, p. 195). Similarly, in her study Maxfield indicates three important epochs of the listening sessions that she chooses to analyze; 2 minutes after start to see the initial state of brain waves, at the minutes 13-15 which represents the optimal time duration for the changes in brain waves, and at the 20th minute to see the final state of frequency band powers of brain waves. The greatest peaks of the both alpha and theta waves recorded during the shamanic drumming occur at the minute 15 (Maxfield, 1990).

The suggested connection of brainwaves and a rhythmic sonic stimulus requires a closer look to the recent findings of the general theory of Brainwave Entrainment (BWE). Briefly, the theory propounds that a stimulus with pulsing patterns and the response of the brainwaves to this stimulus can interact and synchronize to each other. In the study titled '*A Comprehensive Review of the Psychological Effects of Brainwave Entrainment*', the term is explained as follows; "brainwave entrainment refers to the use of rhythmic stimuli with the intention of producing a frequency-following response of brainwaves to match the frequency of the stimuli" (Huang & Charyton, 2008, p. 38)¹. Auditory driving effect is one of the sub-division of the general term in terms of the types of stimuli which can be

¹ Further information on the brain wave entrainment theory can be found in the study of Huang & Charyton (2008, pp. 38-49). They collect, summarize and re-examine the findings of 20 different experimental studies of BWE in terms of the various psychological effects, while providing a highly comprehensive yet compact history of the BWE studies.

pulsing tones (auditory), pulsing lights (photic) and combination of both. BWE is effectively used as an alternative therapy aiming to help in reducing chronic stress and pain and improving cognitive functions such as memory and attention (p. 47-48), mostly by music- and psycho-therapists. The frequency bands of brainwaves that is intended to be synchronized with the frequency of the rhythmic stimulus in the procedure, follows the general categorization of brainwaves that we see in the previous studies. Four types of frequency ranges that are most common in auditory entrainment experiments are delta (1-4 Hz), theta (4-8 Hz), alpha (8-12 Hz), and beta (13-21 Hz). According to Huang & Charyton, the discussion in the recent studies of BWE shows that while some researchers observed synchronized 'frequency-following response' to 8 to 10 Hz, in certain brain regions (occipital lobe, parietal lobe, or temporal cortex), others claim that the same entrainment mechanism could be applied as well to other frequencies (2008, p. 39). In his auditory entrainment experiment, Neher used four different stimuli, 3, 4, 6 and 8 Hz frequencies as an experimental variable. However, he concludes in the results that "comparison of responses from one frequency to another was considered tenuous because of reduced loudness in the frequencies that were not easily obtained (6 and 8 beats/sec)" (1961, p. 449). On the other hand Maxfield (1990) as we saw already, signifies the low theta waves (4 and 4,5 Hz) in terms of the effectiveness of brainwave entrainment. While it is not certain whether or not the entrainment rate is higher at certain frequencies, 8 to 10 Hz, it is true that brainwave patterns respond to pulsing stimuli by altering fluctuation patterns to a level, in respect to the beating frequency of particular stimulus.

Returning back to our discussion of whether the sound itself has an inducing or facilitating relation to the experience of ASC, auditory entrainment theory makes it possible to hypothesize a musically induced type of altered states. It could also be that the psychological effects of auditory entrainment intensify or facilitate the experience in settings with music. While it is still not certain whether or not the brain is more sensitive to 8 to 10 Hz frequencies, we can generally say that the different frequency bands represent different states of consciousness. Recalling the findings from the previous section, the changing activity of brainwaves which are particularly alpha and theta, the frequency bands including these two brainwaves (3-8Hz and 8-13 Hz) indicate a particular importance in understanding the role of auditory entrainment during ASC.

While the laboratory studies concern with that mechanism of brain, sound and percept, as a possible cue in entraining with brain waves during ASC , the ethnomusicological point of view tends to reject the idea of inherited effects of sound as the primary parameter. I suggest that both perspectives cannot completely be rejected due to the fact that it is possible to determine which came first at the initial point. Considering that the association of music and religious / ritual context is at the top of the list of universals concerning the context of musical performances (Brown & Jordania, 2011, pp. 240-241), even the drumming sounds entraining with the theta waves might be part of our very deep, unconscious and collective memory for the conceptualization of music that we learned through the centuries, rather than an innate aspect. Though, this doesn't necessarily disprove the idea that certain movements of sound have common neuropsychological bases and affects in the perception, independent from specific cultural background and the mind set of individuals.

Basing on this perspective, in the following chapter I aim to make a comparative analysis of the musics of the world that are categorically associated with altered states of consciousness either by their practitioners or the researchers who worked in the field. My intention is to observe these simultaneous occurrences of various sounds and the trance phenomenon, as many as possible in the limits of practical constraints, in order to bring up some possible connections with the presented theories of musical trance. The two main questions in examination of these musics are: what is the signified sonic event in each example and is it possible to relate this sonic signification with the changing mechanisms in the brain and the psychological comes out. Term signification has certain implications in this context. Firstly, it refers to the sound specific qualities that are explicitly indicated or highlighted; the sonic characteristics in each sound example. It also implies that these sound aspects are indicated and experienced (played and/or listened), thus signified by the people in respect to the specific geographic, cultural, historical and as well as individual frames and codes defining the musical trance as an integrated experience. Therefore, along with the sonic characteristics and their psycho-acoustic effects, signification involves, at least not independent from, socio-cultural codes, meanings and associations of ASC experiences.

My point with this study is not to make a causality relation between sound and the phenomenon, but to fill the gap between the sonic elements of the experience and the cognitive mechanisms of ASC. With this approach, I believe that the collected data might organically lead to a broader view on the essence of the subject topic, by pointing out the main commonalities and tendencies of sonic signification and the main divergences due to cultural and contextual specifiers. In this respect table 2.2. below summarizes the mentioned observations concerning the theories of ASC in general and musical trance in specific, as well as the common psychological/ perceptual effects of the experience, which will serve as a base in analyzing and interpreting the signified musical components with the general topic.

Table 2.2: Theories of musical trance and its psychological/ perceptual effects.

Emotions and Musical Trance	Auditory Entrainment
High emotional arousal	Synchronization of sound waves and brain waves
Familiar drivers and predictable patterns	Via repetative drumming stimuli
Over stimulation and excitation	At theata range frequencies (4 – 7 Cps)
Effects: Deviated clock time perception, framed attentional focus, alterations in body temperature, alterations in autonomic nervous system.	

3. A PANORAMIC VIEW OF MUSICAL TRANCE TRADITIONS OF THE WORLD

3.1 Methodology of Sampling

To conduct this survey on the ASC associated musics of the world, I intend to work with a representative sample set of musical trance examples. Following a systematic approach, I examine the examples from the nine geographical regions of the world; Africa, Middle East, Central Asia, North and East Asia, South and Southeast Asia, Oceania, North America, Central America and South America. For the division of the geographical regions I primarily follow the structure of The Garland Encyclopedia of World Music Series, with two exceptions that I arranged South and Southeast Asia together, while dividing Central and South America.

The sampling methodology is formed by a two-step process and an additional strategy (see the figure 3.1). For each step, I use a list of controlled words that could possibly lead to the musics and musical traditions associated with ASC. These tag words are as follows; altered states, trance, spirit possession, spirit communication, meditation, ritual, rite, ecstasy, shamanism, religion (in ceremony) and healing. For a systematic search of the controlled words, I use two main data sources. In the first step, these words are scanned in the indexes of Garland Encyclopedia of World Music (Nettl, et al., 1998-2002) for each volume, except for Volume 8: Europe and Volume 10: The World's Music: General Perspectives and Reference Tools. This is a ground level examination to get familiar with the culture specific conceptualizations, main practices and common genres in relation to ASC. The second step of the sampling method is searching the same list of controlled words in Alexander Street Press Online Music Library with the name of each region, and filtering results based on the information in the liner notes before including to the sample set.

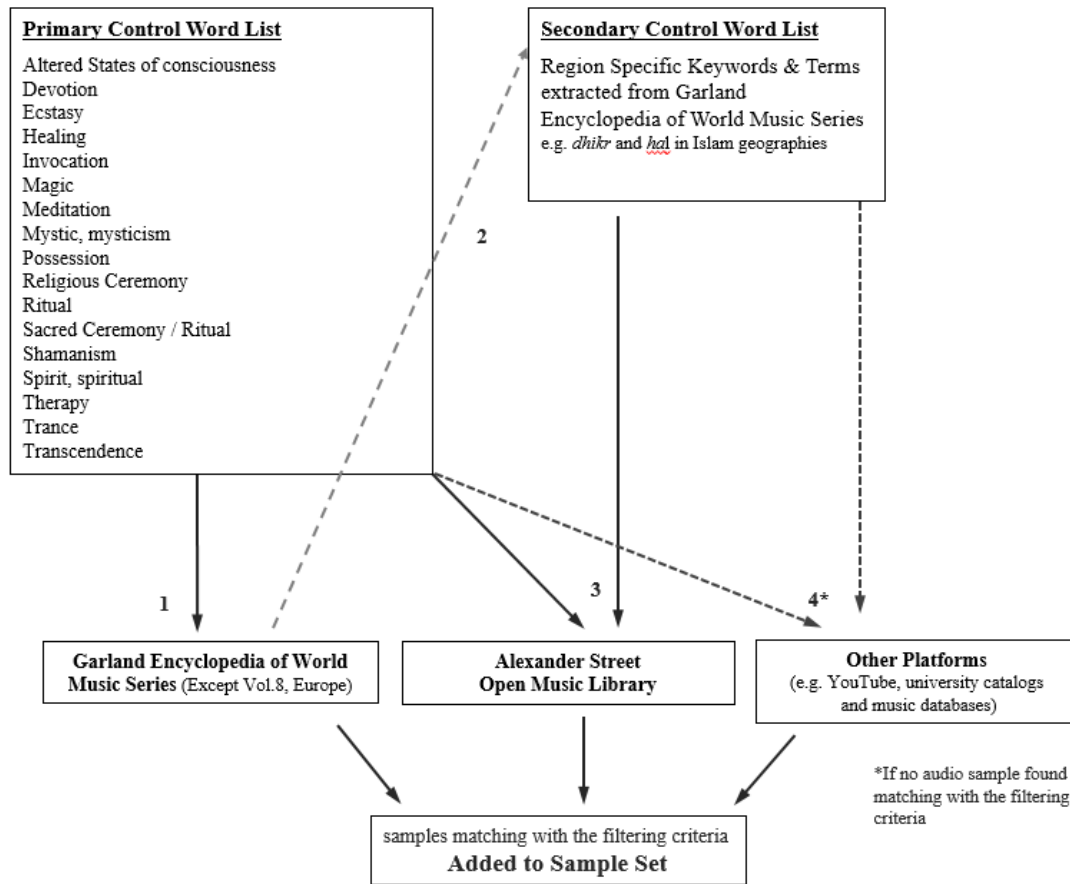


Figure 3.1: Sampling Method

The primary criteria in deciding which musical examples will be included in the data sample, is whether there is a clear indication of intention or a claim to have an ASC experience in relation to given music. This could be indicated by either their practitioners or the researchers in the field. While the initial list of controlled words generally directs the search to the related sound material, it is also possible to find examples which are not tagged with the control words in my search list, but rather described within their culture-specific terminology or the wording of the researcher, although the described form of musical practice corresponds to a type of ASC experience. Such as *dhikr* as a devotional practice aiming to reach a type of ASC. In such cases, it is possible that the first group of controlled words will lead to a region-specific secondary list of control words to use in both data sources. I think that employing these two different broad sources not only provides a double check, but also decreases the possibility of some missing musical traditions.

While the first two steps of the sampling method are mandatory for each region, sometimes these two steps are not sufficient to collect an accurate representation for a region in terms of the resulting numbers of musical samples, especially in comparison to the other regions in the overall list. In such cases, I directly search the controlled word list with the name of the region, freely on the web to find any example that has not come up in two data sources, but actually exist in the region. Therefore, it is possible to find an example of musical trance in my sampling that is not indicated in the primary sources. However, the results are again refined according to whether or not they are compatible with the initial criteria of having a direct experience of ASC described before.

The data sampling method described above has certain advantages and limitations in terms of the validity of the selection and the results based on it. Firstly, it is a type of sample that is called ‘nonprobability sampling’, which is not highly favored in statistical analysis. The primary reason for that is, each member of the population (each and every example of musical trance in the entire world) does not have an equal probability of being chosen, thus the sample does not represent the entire population of musical trance examples of the world. Rather the approach taken here is collecting the subset of this population that is already available, due to time constraints and other practical limitations. This type of sampling is called a convenience sample. Mostly, the generalizations and results, which are drawn from a convenience sample, are considered to have a high possibility of being biased.

However, it is also true that the nature of the intended data for the subject topic of this paper makes this type of sampling somewhat compulsory. One of the main reasons for that relates to the fact that musical trance experiences take place mostly in private settings, often considered as ‘sacred’, and the ceremonies can be considerable as rare events in comparison with many other cultural phenomena to observe. Therefore, observation of this cultural phenomenon requires long-term and careful ethnographic study, conducted by experts of the subject. This interpretation about trance experiences is easily observable when we consider the very limited number of recorded examples of musical trance. It is also true that, since the present study intends for a sample set collected from varying geographies and cultures across the globe, practically it is highly challenging to collect data first-hand. Therefore, if it is desired to examine the musical trance phenomenon from

a universalist point of view, rather than in the context of a specifically selected cultural group, a systematized survey through the recorded musics is the most convenient method of sampling among the very limited number of other sampling options that can be used.

Considering these problematics, certain strategies are taken to increase the accuracy of the sample set in terms of its representativeness and to avoid letting bias into the selection process. Most importantly, the present sample is geographically representative by covering quite a large part of the world, except the European region, and the balance of the distribution of examples in each region is considered as well (see the Figure A.1: Map of collected examples). Conducting a region-based survey, rather than using any other filter criteria, reflects the association of the phenomenon with a wide range of cultures all over the globe and helps to cast into question the much-discussed universality possibility of musical trance experiences.

The musical examples in the selection are primarily fieldwork recordings of ethnomusicologists, thus belonging mostly to the ‘world musics’ category, which increases the representativeness of the sample to a degree. Another advantage of this preference is that the recordings are collected by ethnomusicologists, who provide not only the audio material, but also the ethnographic findings and the cultural context of the given music in the liner notes. In contrast to the studio performances where artistic individualism might overshadow the original intentions of the given musical trance tradition, field recordings provide not only more information on the nature of the specific event, but also presents its ties to the more general, culturally shared conventions. Thus, generally the examples can be considered to be a representation of the people of the specific culture in a broader sense. Additionally, as it is mentioned before in the criteria of data selection, working with the fieldwork recordings provides a less biased approach in the selection process, since the decision of whether the musical sample in question is an example of ASC or not is given to the descriptions of another researcher, rather than my own interpretation, and any example of musical trance that is represented in the explained way above is included in the lists. This is an especially important point, when we consider that the ASC phenomenon is highly subjective in terms of the discussion on the ontology of altered states. This observer-based criterion in selecting the examples eliminates the possibility of bias towards certain musical qualities. In order to strengthen

the validity of the sound analysis and comparisons in relation to ASC, listening to the samples during the sampling process is avoided.

Finally, the present sample set can be considerable as temporally representative, since most of the current trance cultures tend to be old, while there are few contrary examples. Working with the highly old and traditional forms of musical trance also supports the accuracy of the generalizations drawn from the sample by providing a historically broader perspective. Of course, this is a philosophical assumption that has parallels with unified theories and evolutionary points of view. In that context, I refer to the following explanation of American philosopher, Robert M. Pirsig; if there is a “primordial source of all our understanding then it followed that the place to get the best view of it would be at the beginning of history when it would have been less cluttered by the present deluge of static intellectual patterns of knowledge” (1991, p. 432).

While it is still questionable whether the presented adjustments in the sampling methodology are sufficient to form a representative data sample of musical trance, I think the present collection is well refined and at least, guaranties a high relevancy rate concerning the research question, since the method requires a detailed examination for each sample.

3.2 Cultural Frames

The present section of the study aims to provide an overview of the varieties of the culture-specific frames, which shape the pre-set components of the musical trance phenomenon. While it is not my intention to fall into the traps of overgeneralizations, these cultural frames are highly significant in understanding the relation between the sound and the altered states phenomenon. Along with many other reasons for this assumption, most importantly, cultural frames are considered as the fundamental driving cues to the trance experiences from the standpoint of the emotion-based theory of musical trance. The most highlighted argument of Becker and other researchers who share a similar perspective is the importance of (1) culturally defined mind-sets, expressions and given meanings that shape the surface setting and ritual behaviors, (2) intentions and belief systems which provide the theological background of these customs, and essentially (3) the modes of

interactions in which individual (self) relates to these cultural ties (Rouget, 1985; Becker, 2004).

Accordingly, during the examination of each example of musical trance these cultural/contextual characteristics are also valued, along with the sound-specific considerations (that will be discussed in the following chapter). For a systematic observation of these cultural values and practices through the sample set, the following questions were asked for each sample and the given answers are organized as clusters, aiming to represent the broadest characteristics of the present sampling as well as to point to the concerns of the particularist view;

- Which kind of belief system, religion and theology form the conceptual ground of the experience?
- What kind of a ceremony is it? What are the characteristics of the cultural context of the ritual on the level of action and surface setting? How is it named?
- How is the experience conceptualized? What are the motivations and intentions behind the ritualistic practice leading up to an ASC?
- Is it a collectively shared experience of a group or more of an individual experience?
- Following the general categorization of musical trance types based on emotional states (high arousal/active and low arousal/still), which type of musical trance defines best the given example?

Perhaps the most decisive of the above listed questions is religion. For all of the 125 examples in the sample set, a kind of religious frame is indicated and mostly the characteristics of the ceremony are conceptualized in relation to this theological ground.

As another frame, the cultural context of the example is highly significant in understanding the actual experience of people. The contextual frame relates to further questions about what people are doing during the ceremony. Do they dance, chant, sit or something else? What kind of a ritual atmosphere facilitates the experience? How is the ceremony culturally defined?

The third question can be considerable as an extension to the preceding questions. The intentions in reaching an ASC by means of musical trance are often directly linked to the belief systems and religious practices. Thus one can consider all of the ritualistic practices as sorts of worships, performed with spiritual / inward motivations. However, the specific goals for different ceremonies sometimes are related to the vital issues of material life such as healing and protection. They can also be related with the customs of the geography, like the trance examples performed in wedding ceremonies for auspicious reasons. In this respect, the intentional characteristics behind the practices are valued and mentioned when they have an operative role.

The last two questions are somewhat linked together by relating to the psychological states of the practitioners in trance ceremonies. Briefly, the group experiences tend to be more intense in terms of the level of stimulation and they are considered crucially effective in creating the ritual surrounding with which individuals (selves) interact. On the other hand, individual or more in person experiences (like a setting with two persons) are considered less linked with the external surface. Consistent with those frequent associations of group and personal experiences, types of musical trance or ASC are also divided as Trance and Ecstatic/ Meditative. As we saw before, this division is inherited from Rouget and used by many others with some adjustments. While the definitions are still compatible with the world practices, the terminology leads to some complications due to the fact that the term trance is used to mean both the general term of all kinds of experiences of ASC with musics, and particularly the high arousal emotional type. Additionally the term ecstasy is used to refer to both the meditative type of ASC and the extremely emotional state of individuals in Islamic ceremonies (*hal*). In order to avoid this terminological confusion, I will use the term *high arousal* to refer to emotionally tense and bodily active type of ASC (type referred as ‘trance’ in Rouget’s terminology). For the meditative type of ASC I will use the term *low arousal* indicating a tranquil, meditative and bodily immobile state.

These questions constitute the cultural frames, which are considered directly influential in musical trance experiences, yet in a broad sense. Nonetheless, they are designed to give a panoramic view of trance practices through regions in terms of the culture-specific conceptualizations.

3.2.1 Africa

Of the 26 samples collected from the Africa region, 19 are related to the practices of traditional religions and seven are related to Islamic Traditions. What is meant with the traditional religions indicates local belief systems based on spirits and spirit activities. Generally spirits are divided as ancestral and nature spirits. Traditional religions are mostly oral traditions rather than scriptural practices. They are comparatively less institutionalized in terms of operating in the large social structures, but rather more related to the indigenous practices. While they are often associated with African Traditional Religions, the term traditional religions also includes various forms of paganism, animism and other folk religions in other regions, though they might be called differently (Park, 2004, pp. 239-234) .

In Africa, *spirit possession* or *possession* ceremony is the most common expression for the ASC experiences with music. The ritual is directly linked to the belief system. According to the spirit based beliefs, in possession rituals human body and behavior is controlled by spirits. While the general argument indicates that the control of the spirits on human body can be voluntary or non-voluntary, most of the examples in the sample are voluntary experiences. Highly active bodily responses to music in intense ritual settings often described as *trance dance* are considered to be a sign of the presence of the spirit, and it is crucial in terms of the ritual activities. Another ceremony that is also linked with spirit beliefs, but slightly different from possession rituals, is called *spirit communication* ceremony in which the practitioners just intend to invoke the spirits without seeking signs of possession. For the examples belonging to the Islamic Tradition in Africa, we can say that the general characteristics of Islamic ceremonies, primarily *dhikr* and *hadra* - which will be discussed in detail in the Middle East section -, are observable (Ex. No.13-14). However, an important detail to indicate here is that some of the Islamic cultures in Africa, mostly in Morocco, Algeria and Sudan, tend to preserve their indigenous practices and customs relating to spirit beliefs, though they are primarily Muslims. In that context, it is possible to find examples similar to possession rituals in terms of ceremonial context and settings.

When we look at the pre-determined intentions behind the trance practices, to invoke spirits about the vital issues of material life is common in possession and communication

rituals. Among these vital issues, healing is the most frequently seen goal, and has a specific association with musical trance experiences. What is meant by healing can imply both mental and physical conditions. The ritual with a healing aim is mostly performed as a spirit possession ceremony which is carried out by a healer, medium or diviner, and it includes the diagnosis of the problem and the treatment which are both again associated with spirit activities. The Vimbuza Ritual of Tumbuka People, Zar ritual from Sudan and Stambeli Ceremony from Tunisia can be some of the strongest examples of this healing function of the spirit possession traditions, as being a significant part of the social health care system in those regions (Ex. No.15-20-23). Though I don't have any statistical observation of it, possession rituals especially with a healing goal tend to be more common among women than men. On the other hand, for most of the Islamic trance practices of Africa, the aim of the ceremony can be considerable as a mere devotion to supreme concerns and less relating to material life concerns.

If we examine the psychological aspects of the ritual, all of the African trance rituals are performed as a group, except one example, implying an overly stimulated ritual setting and collective experience. Consistent with this observation, 25 out of 26 examples in the Africa region are more similar to the high arousal type of musical trance, indicating emotionally tense and bodily active states.

3.2.2 Middle East

All of the 16 examples from the Middle Eastern region belong to Islam Traditions in the sample set. What is interesting about the belief system in those examples is that most of them are performed by Sufi Orders, which is the mystical dimension of Islam religion. Sufism is also often known as *Taşawwuf*. While Sufism is not considered as a separate sect and Sufi Orders mostly choose one of the sects of Islam, Sunni, Shia or Ibadi, the practices and conceptual approach to religion is different in Sufi Traditions. We can generalize that the most explicit aspect of the Sufi orders is that they intend to experience and embrace the divine presence of Allah (God) in this life, through practices and doctrines mostly under the supervision of a sheikh (master). Those practices are considered as a means of taming the primordial nature of the self (ego) and expanding the static conceptualization of one's self in order to be closer with the *One*, an all-

encompassing and unifying supreme. While such a theological ground may prevail for all Muslims, Sufis differ from the mainstream Islamic traditions by forming their daily life practices on the basis of this belief.

The most common ceremonial practices relating to musical trance in Islamic Traditions is called *dhikr*, while *hadra*, *sama* and *zār* are also frequently used by different cultures. *Dhikr* (also *Zikr*), means remembrance or recall of the names or the attributes of Allah by means of repetition. It is a mystical technique to achieve a highly emotional and ecstatic state² which they name as *hal* (meaning state). *Samā* (hearing) is another form of devotion, especially known in relation with the whirling dervishes of the Mevlevi order in Anatolia. *Dhikr* and *samā* are means of dissolution of self and the material world, and unification with Allah. These two devotional practices form the mystical ritual, mostly called *Hadra* (presence) that are wide spread across the Islamic world and sometimes used interchangeably with *dhikr*. Sufism is the mystical dimension of Islam, thus the meaning behind their practices is considered to be hard to describe verbally. Jean During, who is one of the main scholars of the topic describes it as follows;

The unfolding of most *dhikr* rituals can be represented by a series of concentric circles starting with the largest and culminating with the smallest, that is, the center. The *dhikr* begins as long, articulated, sung phrases (wird), but these are followed by shorter and shorter phrases. The final *dhikr* is no longer articulated and no longer has contrasting differentiated parts. It is reduced to a unity—a breath—as a circle can ultimately be reduced to a point. Thus it is no longer a rhythmic cycle of six, four, or two periods but a simple, pulsating point. Dervishes can be said to have reached the center when they no longer need the material assistance of the *dhikr* but are submerged in an empowering supernatural force. At this stage, they are suffused with the *dhikr*, or rather with its essence. This suffusion (*tajallī*) gives its name to the ritual: *hadra* 'presence', 'manifestation', or *maḥall-i zuhūr* 'epiphanic place'. (During, 1947, p. 185)

Dhikr is a devotional practice in which the practitioner intends to expand her static conceptualization of self to experience the beyond. Therefore, in terms of the aim and the context of experience, such Islamic practices differ from spirit possession ceremonies of

² The word *ecstatic* shouldn't be mistaken with Rouget's usage to refer to the division of trance and ecstatic states. In Rouget's context it indicates the tranquil, meditative and low arousal type of ASC. In the Islamic context it is considered as an extremely intense climax state.

traditional religions in which the goal of practice often relates to the vital issues of material reality, such as healing or protection. In that context, ceremonies of *dhikr*, *hadra* or *sama* tend to be acts of worship relating to more internal meanings. Beside *dhikr* ceremonies, there are also examples which can be considered as more like a performances of music, yet with a religious/devotional context. Genres like *Qasida*, where the performer improvises on a religious love poem, are also common as separate practices (Ex. No.35-36). While they can be seen less intense as trance experiences and more like an ordinary musical performance, Sufis consider certain genres as means of devotion and reaching extraordinary cognitive states.

While *dhikr* and other primarily Islamic practices are the most frequently seen ceremonies in the region, it is also possible to find ceremonies that are similar to possession rituals of Traditional Religions, in which the practitioners perform a trance dance with a healing aim. These examples are collected from Pakistan, Oman and Yemen. The most common of those ceremonies are called *Zar* or *Zaar* rituals and they are also common in Islamic Traditions in Africa region, implying a cultural interaction between those regions (Ex. No.37-38-39-40-41).

The *dhikr* ceremonies are mostly performed collectively, while there are soundless, and/or individual modes of *dhikr* practices. An important detail in those group ceremonies is that mostly there is a leader who generally is the sheik of the sect and leads the ritual. The leader might also be a professional musician who performs an improvisatory or solo section. However, examples that are more like a performance, as in the case of *Qasida*, are mostly performed individually or within a smaller group of musicians. In the present sample set, except two examples which are possession ceremonies performed by solo healers, all of the rituals are group performances.

Correspondingly, nine out of 16 examples from the Middle East are high arousal type, emotionally intense rituals that observed mostly in *dhikr* rituals. Even for the seated performances of *dhikr* ceremonies, it can be said that the body is still highly active with swinging to the rhythm and employing forceful breathing techniques that tend to increase excitation level. The remaining seven examples on the other hand, seem to be more similar to the low arousal type of musical trance, in which the practitioners are experiencing much

more tranquil and meditative states. This type is mostly seen in performative examples mentioned before, rather than dhikr or possession events.

3.2.3 Central Asia

Out of seven examples collected from Central Asia, four belong to Islamic Traditions and three to Traditional Religions. Muslim ceremonies of the region are performed by again Sufi Orders, as in the case of Middle Eastern examples. On the other hand, what is meant by traditional religions can be similar to the belief systems in Africa in certain ways. The belief systems in the region are often referred to as Paganism and the term traditional religion is used to refer to the various spiritual practices of local people.

Central Asian region is one of those regions in the sample set for which the number of examples is comparatively low. We can hypothesize two reasons for this situation. First, it is possible that the number of recordings and scholarly studies about the region in general is comparatively low in number, thus the topic-related examples are also rare to find in the sampling resources. Secondly, I also suspect that the ceremonial contexts of the trance traditions of the region are not as clearly defined as the examples from previous regions. Examples performed by Pagans can be considered as mere performances of music with a religious context, rather than a ritual with a culturally standardized setting. While this doesn't imply that such performative context decreases the importance of the practice in terms of altered states of consciousness, it is true that the means of reaching to an altered states of consciousness is contextually different for the people of the region. Consistently, there is no commonly used culture- specific word to refer to musical trance events. Rather the 'sacred or divine' quality is attributed to the certain instruments, rather than the ceremonial event. Therefore it is highly common that a pure musical experience of a sacred instrument can be understood as a trance experience. Examples from Kazakhstan, Tajikistan and Uzbekistan are representatives of such a performative context (Ex. No.46-47-48-49). Apart from Pagan performances, three of the remaining examples belong to the Islam Tradition, performing dhikr ceremonies.

When we examine the intentions behind the practices, dhikr ceremonies are carried out with devotional concerns as in the case of Middle Eastern examples and they are performed communally. Pagans on the other hand tend to perform on their sacred

instruments for both a self- expanding religious practice, as well as for auspicious reasons during culturally important events such as festivals and weddings. While the Pagan examples in the sample set are performed solo, implying a more tranquil surrounding in contrast to communal dhikrs, still they can be considerable as high arousal musical trance in terms of the emotional intensity. However, it is important to indicate that the level of emotional arousal in those events may not be as vigorous or wild as in dhikr or possession ceremonies, due to the fact that instrument playing and performance psychology requires an awake cognitive state and body control to a degree.

3.2.4 East and North Asia

Out of the 16 examples from North and East Asia, 13 are highly similar to the local religions of Central Asia. As in the case of Pagan examples, regional belief systems are more related to local customs and practices, rather than a clearly defined theological background. However, rather than spirit beliefs or Paganism, the traditional religion of the region is often referred to as Shamanism, though the practices are very similar. The remaining three examples belong to Buddhism: Chinese Buddhism, Zen Buddhism and Shingon Buddhism.

Trance practices of Shamans of the regions is often mentioned as *Shamanic Session* in the resources. During these sessions, the primary activity is chanting which is one of the most important ceremonial characteristics of the entire region. For the Far East region, chanting should be understood primarily as a praying activity, rather than a musical one, especially when we compare the contextual meaning of examples from other regions. This contextual character is also prevailing in Buddhist examples, though there are also rare examples of sacred instrument playing with a performative manner, as in the case of performances of *Shakuachi* (Sacred Flutes) in Japan (Ex. No.62).

The primary intention behind these ceremonies is invocation of certain deities to consult on vital life issues. Among these issues, healing is again the most common subject. In that context the shamanic sessions of the region are highly similar to African possession rituals in terms of their intentional meanings. However, Buddhist examples in the region differ from the others in terms of the intentions of participants and the structuring of the ceremonial context. In comparison with the Shamanic sessions of local belief systems, the

intentions behind Buddhist ceremonies are less pronounced in parallel with the idea of mysticism that is highly important in Buddhist philosophy. In many versions of the Buddhist ceremonies it is mostly the case that musical trance is not necessarily an aim that they formalized, rather an outcome of their practice. Those ritualistic practices are held in respect to the religious calendar and other customs of monastery within a formalized structure. Ceremonies can be daily, monthly or annually, and performed for varying intentions, such as the initiation of young monks or honoring the Buddha and other deities in special days.

Nine out of 16 examples from the region, are solo personal practices, mostly performed by traditional shamans. When we consider that the main intention is healing, it is consistent that the practitioners are mostly the healers. The remaining seven examples are group activities mostly belong to the Buddhist traditions and performed in monasteries in which the monks are primarily chanting Buddhist *sutras* which are ancient canonical scriptures from India originally in Sanskrit. Buddhist repertoire of sutras in the region can be found in China as *bonbai*, and in Japan as *Shōmyō*.

Shamanic sessions mostly (7 examples) indicate an emotionally high arousal state, often employing trance dancing as in the case of possession rituals. On the other hand, 8 of 16 examples are more similar to low arousal trance states. The North and East Asia region significantly differ from other regions, with this higher proportion of low arousal type of musical trance because this is the only region in the entire sample set in which the meditative type is more common. This is directly related to the doctrinal aspects of Buddhism based religions which highlight meditation as the primary practice. The primary activity in Buddhist ceremonies is the communal chanting which is considered as a religious and meditative practice. Actually the qualities associated with meditative type of musical trance originated in those traditions, such as tranquil state of mind, calming surrounding with less stimulus, the importance of silence and immobile bodily activity which all point toward a low arousal emotional state.

3.2.5 South and Southeast Asia

South and Southeast Asia can be considerable as a collection of all different cultural conceptualizations of the phenomenon, discussed so far. The region has the highest number of examples (27) in the entire sample set. In general, all the major religions are practiced in the region; Buddhism (10), Hinduism (9) and Islam (7). While this implies a richness in the cultural context, it is also true that the practices of those different traditions are often similar contextually. The reason for that is many smaller sects and groups belonging to these major religions often reject or adopt certain aspects of the doctrines and interpret in their own specific contexts. While this increases the number of different religions, terminologies and customs in the region, this also allows for active cultural interactions and emergence of newly hybrid belief systems (McLoughlin, 2004, pp. 526-527). The local customs remaining from the indigenous belief systems that are still prevailing in the region can be considerable as the common component in such a religious richness. Even though they differ from each other in many doctrinal aspects, the most predominant characteristics are related to the traditional belief systems religions, especially in terms of ritual practices. For instance most of the Buddhist examples belong to the Theravada Buddhism which is also known as Southern Buddhism, and originally it is a belief system based on ancestral deities, primarily *Sthāvirīya*. While the monastery practices of Theravada Buddhists can be very formalized and conservative with respect to the religious principles that they believe, the local practices of laymen are highly similar to the traditional belief systems, employing trance dances and healing ceremonies. Islamic examples from the region indicate a similar interpretation, since 5 out of 7 Islamic samples have connections with spirit beliefs, such as having a healing aim by means of trance dance ceremonies. Hinduism as a religion is originally used to refer to the varying folk beliefs of Indian Subcontinent and later it has been used as an institutionalized and doctrinally structured world religion.

Consistently, the most common practice of musical trance is possession ceremony with 14 examples out of 27. The remaining examples don't have culturally defined names or forms, but rather they are dancing and chanting ceremonies performed within the scope of local customs, such as sessional practices, festivals, weddings and other important social traditions. While those custom-based ceremonies are done for auspicious reasons,

possession ceremonies are related to invocation of spirits and deities for healing. Two Islamic dhikr examples (Ex. No.72-73) from the region are not compatible with this contextual generalization, by conceptualizing the ritual base around the Islamic religious doctrine, rather than local traditions.

24 out of 27 samples are performed communally, while the remaining three are solo and duo performances of healers during possession ceremonies implying a more private psychological atmosphere. 18 examples indicate a high arousal type of trance, employing trance dances and other bodily movements. 9 examples are closer to low arousal trance states, yet sometimes having a performative state of mind discussed in Central Asia, rather than a meditative mind. The extreme examples of emotionally low arousal and deep meditative states can be found in chanting rituals of Tibetan Buddhist monks (Ex. No.87-69).

3.2.6 Oceania

In the Oceania subset there are only four examples of musical trance. Due to this insufficiency in the number of example, there is a very high possibility that the observations may not represent the accurate characteristics of the region. Therefore, for the Oceania, I prefer to introduce only the most salient features of the subset. As a significant difference, one can observe the influence of Christianity, especially the Evangelical Church as religious frame. However, as in the case of Southern Asia, even though Christianity is adopted as an official religion, the indigenous practices and beliefs are also prevailing. Half of the examples are spirit possession ceremonies performed communally with a highly active manner. The other two examples have a more performative context in which the practitioners sing divinatory songs and perform fire walk and magic ceremonies. All of the examples are group activities and they all are high arousal, emotionally active states.

3.2.7 Americas

Through the sampling process, the American continent was examined in three separate parts as south, central and north. Considering that each part is geographically large, cultural aspects of each part in general differ greatly. Thus most of the anthological sources reasonably divide the region into smaller parts for any cultural explorations. However, for the cultural frames related to our subject topic of musical trance, there are consistent patterns through the entire region. Therefore I prefer to introduce those characteristic frames all in one, in order to avoid any redundant repetition. The distribution of 29 total number of examples by the sub-regions are: South America 13, Central America seven and North America nine.

The most dominant religious frame in the America subset, is the traditional religions with 19 examples. Those local belief systems are highly parallel with the African Traditional religions by both emphasizing the spirits (nature and ancestral) as the primary worship subjects. The remaining 10 examples officially belong to different churches of Christianity, though 9 out of 10 follow the indigenous practices when it comes to the issue of trance. The main reason of this relates to the fact that almost all of the examples are performed by American Indian Cultures, such as Peyote Cult (Ex. No. 118), Petro Cult (Ex. No.115) or Iroquois (Ex. No.121) and Yaqui Indians (Ex. No.124). Beside the native American traditions, there are also examples from African ancestry cultural groups like Afro-Brazilians (Ex. No.97), Afro-Dominican (Ex. No.112) and Afro-Jamaican (Ex. No.113), mostly in the South American region.

The predominant trance activity is spirit possession ceremony, observed in 17 of the 29 examples. The others are mostly spirit communication rituals in which a spirit is invoked for various reasons, yet does not possess the body of practitioners. Through the American continent, trance dances are mostly referred to as *drum dances* and they are frequently employed during ceremonies, even the ceremonial context is not possession of spirits. Therefore, highly active and wild dancing doesn't necessarily represent the presence of spirits.

As we saw in other regions, possession ceremony primarily indicates dancing as the ritual activity and differs from chanting sessions in which the focus is on singing. However, in

the American region, chanting is also employed and is highly significant during possession and other dance rituals, since the spirits are mostly associated with specific melodies. This signifies extra importance of melody singing as a ritual activity, in comparison with other cultures. This difference also relates to the goal of trance performances. All the examples are performed to invoke certain spirits and 13 out of 29 performances aim healing. While singing spirit songs can be found in various contexts, it is especially common in healing ceremonies. The remaining examples are simply for the sake of invocation of spirits, without any declared specific intention relating to material life. Therefore unlike the examples of spirit rituals in Africa and other regions, meaning of the ceremonies can be purely devotional through the Americas.

16 examples from the region are communally performed and rarely employ a solo leader (Ex. No.122,123). They are mostly high arousal trance dances, and often observed in possession ceremonies. The rest is solo performances in a more private setting and represent the low arousal type of musical trance. These examples are mostly performances of curing songs of the healer mediums, while there are also examples of solo trance dancing (Ex. No.117, 120, 124).

4. DISCUSSION OF SONIC ELEMENTS

4.1 Notes on Sound Analysis

The underlying question in modelling the sound analysis is simply “what is sonically signified in the given sound recording”. Signification in such a context implies the stimulative sonic elements, either the components that are constantly highlighted, or the components that contrast with expectations formed through the flow of given musical sound, such as a sudden change in texture. This perspective is based on the general agreements in the field of musical perception. As David Huron states “how minds represent music has repercussions for what listeners remember, what listeners judge to be similar, and other musically important functions”(2006, pg. 73).

In general, the entire perception of musical sounds is formed through three levels of processing of auditory and memory functions (Snyder, 2001). First is called *Level of Event Fusion* (pp. 12-13), in which the initial sound information is processed by auditory system, analyzing the individual acoustic vibrations that are not accessible to our perception since they are coming continuously and happening so quick. Thus the auditory system fuses and groups those individual vibrations to form perception of pitches, loudness and timbre. This is the first step initiated in the ear to lead the sound information to the higher brain centers. The second level of processing is called *Level of Melodic and Rhythmic Grouping* (pp. 13-14) in which the sound events are grouped in the *present* time as melodic and rhythmic patterns. This is operated in the short term memory which is related to the immediate past. The last step is called *Level of Form* (pp. 14-15), in which the sound events that are larger than the short term groupings, are processed in a time order, as being ‘earlier’ or ‘later’. This is the formation of what we call musical forms and flows. However, it is important to indicate that this temporal ordering of larger groups is not a given percept as in the case of short term memory functioning, rather it must be reconstructed with respect to long term memory (Snyder, 2001, pp. 12-15).

The sound analysis that will be presented is based on this processing structure of ear and mind, by asking the same question of what is signified in any of those levels of musical experience. However, in comparison with the general approach to musical analysis of Eurogenetic art compositions, certain aspects are excluded from the analysis, while some other factors are much more emphasized. Firstly, the primary standing point that I take as the analyst is much closer to the listener's point of view, rather than the theorist. This means that the examples are not necessarily treated as art works in which even the smallest detail might have a significance in terms of intellectual conceptualization of sound which relates to higher level functions of mind interacting with long term memory. An example of it can be a specific melody that is quoted, or a specific harmonic progression that has certain association with nonmusical conceptualizations. Therefore, contrary to the Western manner of music analysis which emphasizes the representation of sound over bodily experience, the present examination of musics is not concerned with the abstractions or extra-musical associations. Rather, it is more concerned with the direct experience of the musical moment in terms of the initial auditory processing and perception primarily related with short term memory functions and direct bodily responses to the sound. Therefore, special attention has been paid to sonic properties relating to temporality. Secondly, the pitch content or the frequency based relations between tones in either melodies or vertical structures (harmony), is intentionally excluded, regarding the great variety in the sample set which indicates no coherent result to be drawn in relation to trance phenomenon. In a way this is an approval of emotion based theory of trance, stating no direct relation between the sound specific aspects - in this case, it is specificity of pitch content- and trance psychology. However, while the scales, modes and other tonal structures in terms of degree relations in a melody or a chord, are not included in the analysis, a few tendencies in the employment of melody are included, since they have an important cuing function that we will see in relation to psychology of trance experiences. In that context it can be said that though the internal organization of melodies is not the focus of sound analysis, temporal properties such as the length or the form of melodies are evaluated.

However, while the pitch related musical aspects are not included, other sound specific elements are valued and investigated as effective factors in trance experiences. Of the

importance as it is just mentioned, temporal qualities are analyzed in detail, including pulsation, tempo, rhythmic structures, temporal relations of musical layers and the ordering of musical events, regarding the mechanical theories of musical trance, from a perceptual point of view. Beside these temporal aspects, sonic qualities that have an important role in creating the sound surrounding, such as instrumentation and texture are analyzed as well.

The analysis of this sonic content is executed in a two-step process. The first is primarily ear-based analysis, accompanied with reading the notes of field scholars provided for each example. In the second step the samples are run in the sound analysis program *Sound Visualizer*, in order to provide a double check mechanism, and obtain a more measurable data as well. The program is used, especially for highly subjective sound components such as textural density or bpm extraction, to form a relatively objective ground for comparison. Two different analysis models are used for these qualities; *Constant -Q Spectrogram* for the factors relating to texture, layering and repetition, and *Tempo and Beat Tracker: Onset Detection Function* for tempo and beat analysis.

With a similar approach taken in the analysis of culture-specific aspects, certain characteristics are clustered as categories corresponding to certain questions relating to instrumentation, melody employment, texture, tempo, rhythm, etc. The results are introduced as divided into two parts according to what extent they are common. The first category represents the most frequently observed sound aspects relating to musical trance phenomenon, the *Common Means of Sonic Signification in ASC*. None of the listed sonic components should be considered as ‘universals’, implying *all* the examples in the sample set have those qualities, or these are the ‘musts’ of musical trance. Rather, *common means* represent the sonic qualities that are observed in *many* of the examples in varying degrees as means of sonic signification, thus considered as possible significant data in understanding musical trance phenomenon as a unique human experience shared globally. Additionally, the listed sonic qualities are ordered hierarchically according to their predominance, beginning from the most predominant pattern to the least, though none of them are less significant in terms of the research question.

The second category is titled as *Diverging Means of Sonic Signification in ASC* representing the sonic qualities alternating with the common patterns categorically. They are observed in lesser number of examples representing smaller geographies, yet they are highly important in tracing the relation between sound of ASC mechanisms. Therefore, sonic qualities that will be introduced in diverging categories, doesn't represent a lesser degree of effectiveness in musical trance, rather they are simply alternative means to musical trance, not necessarily contradicting with the common means presented.

4.2 Common Means of Sonic Signification in ASC

4.2.1 Statistical regularity and repetition

As mentioned before, all the sonic qualities observed as common patterns are linked to temporality -time related issues-, directly or indirectly. All above the other sonic qualities that one could possibly discuss as signified factors, high statistical regularity or we can say stability in what is heard in the given example, is the most predominant quality observed in the sample set. While other factors might differ in terms of the degree of their commonality, constancy of the given sound is significantly high and it is observed in 87.5% of all the examples.

The most common word used for constancy in music is repetition. However, repetition in music is frequently used to describe the repetitive patterns of melodies or segments mostly in terms of repetitive pitch content, such as an ostinato line, a lead melody, or an entire musical section like refrain because of the harmonic content. The way I will use repetition should be considered more in the sense of any temporally static pattern, including steady pulsing beats, smaller figurative units, non-pitch percussive rhythmic units, or constantly sustained drone tones. Repetition with this constant periodicity focused definition is the most frequently employed sound specific aspect observed through the analysis of examples. It is utilized in at least one, but mostly three of the musical units or simultaneous layers for each sample in the sample set.

Before moving on to the specific ways that the repetition is signified which also indicate common patterns in itself, it is important mention to the perceptual effects of the repetition briefly. First of all, repetition of any type of sound units – a rhythmic or melodic unit or a single tone –is one of the most important factors that makes auditory

process possible. When we recall the stages of auditory processing, repetition has crucial role in the level of melodic and rhythmic grouping, as well as the level of form (larger scales of musical time); both are perceived by means of repeated groups of sonic events. Without these reoccurring patterns of harmonic or non-harmonic frequencies or units of frequencies, it would be impossible to talk about any segmentation of earlier and later sound events (Snyder, 2001, pp. 12-15). Additionally, statistical regularity is a highly crucial factor in auditory functions such as streaming of musical layers, auditory continuity, detecting temporal values and musical memory (Deutsch, 2013, pp. 191-204). Therefore the degree of repetition directly influences the auditory processing and the more recursive sonic events tend to be easier to process by reducing the cognitive load, perhaps in each level of sound processing.

This cognitive ease in the processing of repetitive or statistically regular sounds has certain psychological results which we can relate to musical trance. In terms of the participants' point of view, it provides a comfortable, thus available cognitive state to learn and memorize the sonic patterns, participate in the music and even improvise on the flowing musical surrounding. By simplifying the auditory process, decreasing the cognitive load it "gives us feeling of freedom, luxury and expanse", as J. M. Ortiz perfectly states in his book *The Tao of Music* (1997, p. 275).

Another perceptual and psychological effect resulting from the same principle of auditory and cognitive ease, is that repetitive sonic events make entrainment (organic synchronization of multiple waves) more possible and easier, not only in between the sonic material and the person experiencing it, but also in between the participants in the communal realm. Because statistically regular sonic events are easier to process, to anticipate and to entrain, those constant units correspond to the most interpersonally and socially shared parts of the sonic experiences, in the entire flow of musical time by being accessible to all. This is an important effect in terms of emotional arousal, especially when we also take into account the highly effective role of repetition in terms of body movements and other motor functions. What enables a group of people to move synchronically to a music is primarily a result of the very basic type of temporal regularity, the pulse. This entire chain of synchronizations which increase the possibility of having an experience of musical trance, as it has already been

discussed in the theories of musical trance, is built up essentially starting with a statistically regular, static unit.

4.2.2 Units of statistical regularity

4.2.2.1 Melody

As it has already been stated, pitch content of the sonic units that are repeated through the flow of music can vary greatly in terms of both vertical and linear intervallic relationships. Therefore no significant pattern in those pitch relations is observed with respect to melodic structure. Yet, beside this diversity in their culture-specific context, the most frequently employed repetitive unit in the sample set is also the melody or motivic phrase. In most of the collected examples of the musical trance, there is a single specific melody, mostly via human voice (%78,4) rather than instruments, and it employs verbal context relating to the cultural content of the trance experience (curing songs, spirit songs, modes and melodies of deities, etc.) Because melodies in general tend to be listened to and perceived by means of “mental schemas, developed from early childhood in the course of hearing many of the culture’s melodies” (Dowling & Harwood, 1986, p. 152), with this joint of the pitch and lyrical content, melodic units as sonic signifiers can be considerable as primarily associative cultural cues of the entire sonic event, which is highly effective as an arousal factor³.

While the pitch and the cultural content of those melodies vary greatly, there are also common patterns in the way they are structured. Most of the melodies in the sample set are formed by a single motivic figure that is not longer in length than the time span of short term memory processing, and simple by having small number of pitches moving by smaller intervals (mostly central degrees of the scale or mode, often using repetition of same frequencies). They are repeated through the flow without a significant change to alternative melodic pattern. Unlike the melodies in the song forms which are formed in relation to sections as verse or chorus, the entire melodic content and the formal flow mostly follows the manner of looped single melody. Because of their clear, short and reoccurring character that tends to lack contrast, they

³ For further information on the relationship between the melodic structures and the trance specific ritual context, see Dale A. Olsen’s examination of South American shamanic healing songs (2008, pp. 343 – 346).

4.2.2.2 Drumming and percussions

While rhythm is one of most important cues in the perception of all kinds of musics, its active and determinative role in the experience of musical trance is significantly observable, perhaps as it is not in any other context of music making. A very direct indicator of this is traceable when we examine the instrumentation in the entire sample set. 98 out of 125 examples in the sample set employ at least one percussion instrument and 86 out of those 98 examples utilize an idiophone (30) or a membranophone (26) or both (30). Those percussive instruments are mostly associated with sacred meanings relating to contextual specification of trance ritual. Especially the association of drumming and healing rituals are highly common across large geographies. The most frequently seen drumming instruments are different types of frame drums as membranophones and sticks and maracas as struck idiophones. Additionally, lamellophones are also common in certain places (Africa and East Asia). Besides drumming instruments, the second most commonly employed instruments are aerophones, the *sacred flutes* of many cultures.

As it is discussed in the section regarding the mechanistic theories of musical trance, Neher (1961) and Needham (1967) already point out the use of drumming at certain frequencies in auditory entrainment as a sonic cue to trance states. Similarly, the predominant use of mostly percussive sounds is perhaps an explicit signification of time related sonic properties. It is also true that drumming in most of the examples is utilized constantly as being the most active and continuous layer in the overall flow. Even at the musical moments when all the other layers of music are muted, it is mostly the pure drumming line that we hear. This cross cultural signification of drumming is highlighted in Hamel's work *Through Music to the Self* (1976), in relation to a 'magical consciousness' which is a collectively shared and ancient cognitive state and considered to be reached by means of drumming;

For the African tribes, as for the Asian peoples of the Arctic, the drum is the voice of the 'One above', the Thunderer, the Father of All, the Almighty. The drum therefore also represents a means of communication with the underworld. Among the Koryaks it is called the 'lake', which the shaman enters in order to reach the underworld, just as the Eskimo shaman climbs down to the sedan in the submarine depths of the underworld. For the Yakut and Mongolians 'the drum is the horse'... On it they ride in their initiation-dreams to the center of the world, to the site of the world-tree, to the Lord of the Universe. (Hamel, 1976, pp. 78-79)

As it can be clearly seen in the cultural conceptualizations of drumming, it is somehow sanctified, indicating qualities such as forcefulness, spatial extent, its importance as a mean to divine concepts and yet its centeredness and worldliness. Perhaps we can speculate about the sound properties that might have possibly caused such an association, based on certain biological and perceptual mechanisms. It is most probable that drumming sounds tend to have high volume and intensity levels causing a perception of bigger, closer and more powerful sound sources. It is also true that the bodily experience of temporality is much easier with percussive sonics, since they are primarily relating to the organization of time and its perception. Additionally, the spectral range that is heard during drumming tends to be at low frequencies - especially in membranophones - which are more favored in auditory processing stages allowing us to process the harmonic frequencies in a larger span of time. Together with their spectral characteristic formed by quick and sharp onsets, drumming sounds have crucial advantages in dominating the entire musical perception and embodiment of trance metaphors.

While the discussed relation mainly focuses on drumming mostly on membranophones, Needham suggests that the essential characteristic relates to *percussive* quality. He explains that neither the melodic or rhythmic components, nor the varying spectral qualities of different percussive instruments, such as the difference between body percussions and pentatonic scale gongs, explains completely the relation between the sound and trance phenomenon. Rather, he suggests that it is the *percussion*, “noise produced by striking or shaking” including any instrument - that *marks the transition* (to altered states) (Needham, 1967, pp. 610-611). The reasons that he gives for that assumption provide a brief summary of psychological, cognitive and historical explanations of embodied associations of percussions and trance. First, referring to the studies of Huxley (1967) and Crawley (1912), he explains the body/mind mechanism working behind the drumming *effect*;

The effect in question is said to be produced through disturbances of the inner ear, an organ which modulates postural attitude, muscle tonus, breathing rhythms, heartbeat, blood pressure, feelings of nausea and certain eye reflexes. Huxley convincingly proposes that 'the apparatus of drumming, dancing, and singing' can not only affect the inner ear, but is actually 'aimed at it in an effort to dissociate the waking consciousness from its organization in the body' (287). (Needham, 1967, p. 613)

Here Needham points out the use of drumming as a sonic means of deviating the normal waking consciousness and the effects of deviation on body and mind. Furthermore, he also suggests a cultural observation on the relation between percussion and ASC. Referring to the cross-cultural use of varying types of percussion instruments that he calls noise makers as the material symbols (sound markers) of rites and ceremonies with different cultural contexts and intentions such as healing, marriage, initiation, birth ceremonies, sessional fest and trance as well, he states;

What is it that these events have in common? Obviously that they are rites de passage. In other words, the class of noise-makers is associated with the formal passage from one status or condition to another. Once again, though, I am not saying that such rites cannot be accomplished without percussive noise-makers, or that only such devices are used to mark them, but simply that there is a constant and immediately recognizable association between the type of sound and the type of rite. What I am proposing, namely, is that there is a significant connexion between percussion and transition. (Needham, 1967, p. 615)

He points out the use of percussive effect in cultural contexts which signify an alternation states or conditions. The transitive quality of percussive noise makers that he question here is not only relates to bodily responses to them, but also their function in cuing or marking the specific content of the experience. For Needham, it is mostly the specific sound of a noise maker percussive instrument that is used to signal the associative meanings and experiences with trance phenomenon. While it is hard to observe the connection empirically, the predominance of percussive instruments in the sample set supports his reasoning. It is also true that, beside the constant use of percussive instruments as part of the music in many of the examples, the symbolic usage to mark the beginnings and endings of ceremonies, or to indicate the changing phases of trance ritual or simply to call the others to participate in the ceremony is observed in certain number of examples.

4.2.2.3 Pulsation and rhythmic units

The predominant use of drumming and percussion instruments primarily indicates the temporal organization of sound events such as rhythmic patterns, meter, tempo. I will introduce two of those temporal units; pulsation (steady drumming) and rhythmic units (patterned drumming), as the two most common layers of temporality in sample set of trance musics. While pulsation and rhythmic units are mostly played on percussive instruments, they should be considered as simply two different types of temporal units

in composition that can also be voiced variedly on other instruments, as well as human voice as in the case of Kecak of Bali, example numbers 77-78.

Pulsation is the time level often conceptualized as points in musical time that we can easily detect and tap into, which is also considered as a sign of auditory entrainment. Perceptually, pulsation is formed via periodic and short-durational beats and the term tempo corresponds to the speed of pulse (beats per minute). Pulse has a central position in the perception of temporal hierarchies by both grouping the smaller / faster divisions of beats and being part of the long durational metric levels. In the extremes of statistical regularity in pulsation, beats are spaced equally (isochronally) in time and they are identical without any variability in accentuation (strong or weak) that might indicate any metric grouping (Fitch & Rosenfeld, 2007, pg.43-44). In such cases pulsation turns into a signal-like, consistent and persistent singular sonic event. Such a high statistical regularity provides a great cognitive comfort even at the first stage of auditory processing; at the level of event fusion when the brain is busy with grouping the very initial continuous data. That perhaps explains the extreme quickness in our ability to detect the pulse which is often considered as intuitive.

Yet in more variedly patterned versions of beating, beats can also be non-equally spaced and accentuated differently, thus only allowing pulse groups, as in the case of additive groups such as 2+3 or 3+3+2. Or, they might be equally spaced in time but accentuated variedly, such as triplet groups articulated as strong, weak, weak. The temporal spacing and accentuation of beats allow us to perceive the rhythm, the units of patterned beats. Rhythmic units differ from pulsation with having a more figurative character (patterns) in contrast to the steadiness of pulse. Since when very short rhythmic units at fast tempos might be perceived as pulse groups, there is an inter-transition between pulsation and rhythmic units depending on the length and tempo of patterned beat group. However, the figurative patterned quality unique to rhythmic units still remains, in contrary to steady pulse. As we will see in the following discussions, the difference between pulse and rhythmic units corresponds to significant changes in the perception of musical time.

In the musics of trance experiences, both temporal units are employed mostly via drumming, but also signified in many other possible ways. To a degree different than many other types of musics in the world, pulsation in trance-like musics is so much

clearly and insistently signified that sometime it can be too rough and uncomfortable to our modern spectral experiences. If we put certain genres and musical styles that are specifically interested in pulse (such as minimalism, or any type of modular musics) aside, in most of the musics listened in the contemporary world, pulse is not necessarily signified, rather it is implied in the overall textural rhythm or composite rhythm. In other words, most of the time it is not just steady pulsation that the drummers play, rather elaborate rhythmic patterns with great variety.

On the other hand, through musical trance examples in the sample set, pulsation is one of the most active elements of music. Pulsation in musical trance mostly and ideally isochronal and non-accentuated results in the pure steadiness, though there are few examples of additive groups collected from Middle Eastern cultures. Pulses are distinctive in the entire sound because they have higher volume at lower frequencies especially when they played in frame drums, and also they rarely go silent during the musical flow. Examples No.10 (Possession Ceremony in Cameroon) and No.110 (Possession Ceremony in Belize) are exemplars of this periodic membranophone pulsation. When the steady pulse is signified in sticks like lightweight idiophone-percussions, its sound is distinguishable resembling to a metronome beating, as No.2 (Sacred Flute Ceremony in Sudan), No. 51 (Shamanic Session in Siberia) or No.87 (Spirit Communication Ceremony in Tibet). Pulsation can also be signified via hand clapping and other body percussions as in the case of No.40 (Zar Ritual in Oman).

On the other hand, the rhythmic units observed through the sample set, greatly differ from each other in terms of the temporal spacing in the division level in which the rhythmic patterns are formed by divisional spacing and/or accentuation of smaller, thus faster durations. Except drone musics, a certain diverging subset in the sample set that will be discussed in the following section, almost all of the examples employ at least one layer of rhythmic pattern with a percussive manner, and mostly there are at least two layers of patterned rhythms (beside pulsation level) employed simultaneously.

The internal structure of rhythmic units in musical trance is mostly short, corresponding to the auditory processing that is the grouping stage in short term memory. Additionally the temporal divisions of the rhythmic patterns as well as the accentuations are not complex. Rather they consist of short periodic rhythmic figures

of smaller durations, mostly grouped with the pulse level, rather than metric levels, allowing again an ease in entrainment. In musical trance, rhythmic units not only function in framing time perception, but also, they are the primary accompaniment layers filling the texture. Since most of the collected examples don't use harmony (vertical intervallic relations) in the same way of western polyphony, the accompaniment in trance is also provided by rhythmic units of mostly percussive instruments. Though rhythmic units are observable in many of the examples, example numbers 5, 13, 24, 29, 58, 63, 79 explicitly show the accompaniment function of rhythmic units in the drumming layer. Though it is less common, it is observed that rhythmic units are undertaken by pitch-based figurative modules in certain number of examples, providing not only rhythmic but also melodic patterns. Example numbers 2 (Sacred Flute Ceremony in Sudan) and 74 (Religious Gamelan Music in Tenganan, Indonesia) are exemplars of rhythmic units played on pitch-percussions.

4.2.2.4 Texture and musical time

In the examples of musical trance mostly both pulsation and rhythmic units are employed causing at least two dimensions of musical time at once. As we have already seen, since most of the examples are performed communally with multiple number of participants, often the number of layers in the textures are more than three. Each layer has its own temporal dimension in terms of both its internal patterned structure and its relation to entire sounding, including the melodic unit.

Although these static units are repetitive, short in length and clear in internal structure, the way they are relate to each other, so the texture offers a unique experience of listening. In most of the examples, units are temporally interlocked to each other creating a synchronized overall beating pattern formed by all the sounding parts of texture, often called *composite rhythm*. The composite rhythm can be audible or implied via the functions such as auditory continuity and temporal streaming (Cameron et al., 2015, pp. 366-368). The synchronization of units can be simple, when the entire texture consists of two layers, like melody and drumming. In such cases the units are mostly interlocked to the pulsation layer. However, in most of the examples, units are linked in more than one way. This is created by having higher numbers of short patterned units in layering and using syncopation or durational rests in between units and their replacement.

Increase in the layering means direct increase in the degree of stimulation requiring a certain type of cognitive processing load for auditory streams. However, this load is highly affordable in musics of trance, because of the ease discussed so far in detecting and processing of each layer. Generally the streaming process is considered to be based on the frequency-separation in between layers, and the load of streaming decrease when the frequency difference between two layers is larger. Additionally since frequency separation takes a certain span of time to process the proximity in order to stream two layers, streaming becomes harder when the tempo of sounds increase (Deutsch, 2013, pp. 196-198). Since most of the examples in the sample set indicate less signification of pitch content having mostly single line melodies and percussive non-harmonic spectra, this cognitive load of frequency separation in streaming is mostly avoided in musical trance.

Rather, the streaming of layers is mostly based on spectral and temporal qualities of layers with respect to each other. In trance musics the primary layers are significantly different than each other in terms of their sound sources (contrast of voice and drumming instruments) and spectral envelopes that they indicate. Especially the differences in attack times (onsets) of sonic units which is very distinctive in percussive sounds, is observed as a highly determinative factor in streaming (Deutsch, 2013, p. 201). The temporal structuring of layers also contributes to streaming process. On the contrary to the frequency-separation based streaming, in temporal streaming, the periodic, quick and short units are easier to detect separately and they become much easier to stream when the speed of reoccurrence of sonic events (the rate of periodicity) increase (Deutsch, 2013, p. 203). Consistently, the observed tempos in musical trance examples tend to be fast and furthermore in certain number of examples intentional increase of tempo is clearly observable. Therefore, the cognitive load in streaming that might be possibly caused by having multiple numbers of interlocked layers is mostly relieved in musical trance because of the statistically regular character of units in the texture.

The interlocked texture in musical trance offers enough comfort in streaming, enabling the listener to enjoy each unit coming and out, yet within a more inclusive time dimension which is the amalgam of all the temporal units of texture. This smooth fusion of distinctive layers with their own temporal dimension is what creates the

‘altered’ or ‘unique’ quality in perception of musical trance. While each layer of sonic events are linked to a point of overall textural and temporal flow, they have their own musical time in their internal structure. The temporal connection points (the spacing of units in time flow) are organized with syncopations or rests in order to increase the audibility of each units and to reduce the streaming load. Pulsation is one of those units as we saw, providing a constant base and causing a steady time perception similar to a signal like sonic experience. As it has been suggested before, the time perception of pulsation is more vertical, in comparison with moving linear character of patterned sonic events such as melodies. On the other hand, the variability in the internal structure of each short rhythmic units provide glimpses of patterned linearity which create the perception of moving in a slightly longer musical time, yet not more than limits of second level grouping process. Melodies that are mostly short in length and repetitive in character are added in this interlocked texture, providing an extra dimension into the musical time, with their more linearly organized pitch content, moving in a longer span of time in comparison with the pulsation or rhythmic units.

Besides these three common units, it is also possible to find examples which have more sonic units added to this layered texture as filling sonic material to dense the multi-dimensional perception of texture and temporality. These units often employ a clear pitch content which is formed by limited number of tones (not more than 4-5) that are accentuated and rhythmically patterned. These modules differ from melodies structurally and functionally. Structurally, they are much shorter in length than the melodies, and they have a figurative character in their internal structure, in contrast with the complete character of melodies tonally and motivically. Functionally these units are used to fill up the silent points in the overall texture and they are treated in a way that is more similar to rhythmic units which occur over short stretches of time with quick onsets in their internal patterning. Rather than the leading quality of melodies at higher registers on the top of texture, filling modules are fused into the entire sound mass. Therefore these modules are used to enrich the texture by filling it and to contribute to the multi-dimensional time perception by adding more layer/s.

This entire textural and temporal connectivity of layers, creates a unique experience of musical time, allowing multiple dimensions all at once, but within a comfortable cognitive load threshold to process each and all. The time perception that is described

above as a signified factor in musical trance is highly different than our normative perception of time, which is mostly linear not only in everyday functions, but also in time perception of music in general. We tend to think about musical components such as melodies, longer phrases, section and forms in relation to linear movement of frequencies. Although there are certain genres of music such as spectral, minimal or drone musics and individual works of avant-garde composers, in most musics the vertical dimension of a given musical moment is secondary to the linear, progressive perception. What is often meant by the vertical dimensions in music is linked to the harmonic/intervallic pitch relations, rather than temporal perception. However, in the described interlocked texture of static units observed in musical trance examples, linear perception of time is limited to short rhythmic and motivic patterns and vertical time is created by pulsation and other means of static components. This simultaneity of vertical and linear temporal percepts, along with the constant character of the interlocked texture can be called as circular yet not progressing, signifying not only ‘the flowing’ quality, but also ‘the perpetual’ at the very ‘moment’ in its own dimension.

A similar observation on temporality can be found in the description of *Kirtan Chanting of Vaishnavas* (worshippers of Radha-Krishna) in Bengal by Sukanya Sarbadhikary;

The spirit of kirtan lies in its entrancing iterative zeal: the constant repetition is addictive, yet it also creates anticipation in the listener. Thus constraint and freedom together create tensions in the body ..., becomes tunes. While the repetitious routine generates an inescapable sense of habitual pleasure, the certitudes of security, one also feels the urge to break through the same, to wander off beat. This sort of perceptual experience points to ‘a genre of being with respect to which the subject is not sovereign but without his being imprisoned in it’. (Sarbadhikary, 2015, pp. 26-27)

Such a perception of musical time is termed as ‘*pure*’ *ostinato cyclic*’ time category in Michael Tenzer’s cross cultural topology of musical time. Ostinato cyclic time refers to the extremely *statis* type of musical time in which the pulsation ‘structurally’ matches with other units in the higher temporal hierarchies, and ‘the unchanging identity’ (patterns) of rhythmic and melodic units creates the ‘static aspects’. Tenzer uses ostinato referring to the larger grouping of patterns, mostly the main melodies, and the term cycle highlight the moving quality of patterned units, such as the rhythmic

units that we saw in musical trance. Regarding the simultaneity of movement and steadiness of this musical time, he says “each ostinato cycle (the longer metric units) may in fact sound partly transformed and can also be experienced in terms of this change. The flow is nonetheless $\parallel A \parallel$ because although there is some variation, it is limited to other ostinato cyclic music⁵” (Tenzer, 2011, p. 429).

In Tenzer’s terminology, though the extremity of static aspect is underlying in the periodicity and synchrony of units, building the interlocked texture, starting from pulsation to ostinato cycle, the place of articulation is indicated as *cycle boundaries*, corresponding to mostly short or moderate length patterns of sonic events. Similarly, in the textural layering of musical trance that I described, cycles match with mostly rhythmic units of drumming, or other filling modular patterns. The difference that we can point out as specific to temporal and textural percept in trance experiences is that the pulsation is slightly more emphasized than it is as in Tenzer’s ‘*ostinato cyclic time*’ favoring vertical time and contributing to the embodiment of the dimensional structure of the entire sound event.

So far I had introduced the most common sonic tendencies that are observed in the sample set. Briefly, the statistical regularity in what is heard through the examples is observed as the most predominant sonic aspect that relates to many other sound specific discussions. The statistical regularity or repetition of any sound event is suggested as not only the most commonly signified component, but also as the most essential because of the very mechanism it triggers in auditory processing. Certain types of sound units and the specific tendencies in their usage are examined as the common means that contributes to this perpetual character in musical trance examples. Melodies tend to be shorter in length and repetitive in internal structure and they are treated as one of the modules in the entire musical texture, avoiding a sectional and progressive character. Frequent use of percussive instruments and psychological effects of drumming are discussed in relation to trance states. Pulsation and the embodiment of steadiness is indicated as a frequently employed element in musical trance because of its temporal and spectral effects. Varyingly patterned rhythmic units

⁵ The other category that is referred is the second most static musical time called ‘*cyclic-discursive*’ (Tenzer, 2011, pp. 420, 430).

and their cyclic motion as different from pulsation are examined in relation to the effect they create in perception of time and texture perception. Finally and most importantly, it is observed that these units of sound events described so far, tend to be interlocked in the texture mostly in a synchronic way articulated in pulsation, allowing a comfortable cognitive state. I suggest that the whole combination of this multi-layered texture, and simultaneity of pulsation and cyclic units has a high potential of creating a non-ordinary time perception signifying both vertical and linear perceptions of musical time. All these qualities specific to sounding of musical trance experiences are considered to be compatible with entrainment based theories of musical trance, while not necessarily neglecting the culture specific musical cues.

As it has already been stated, those common patterns are not shared by all of the musics in the sample set. Rather they are treated as commonly employed sonic means in larger geographies of the world, promising to provide relevant discussions relating to music and altered states of consciousness. While the statistical regularity, the constancy of sound is highly predominant for each musical example, the characteristics that are observed in each sonic component such as pulse, rhythmic units, melody or texture can vary in degrees. For instance, it is possible that in some examples the melodic unit might be longer in length or not consisted of a single pattern, but still repeated periodically, accompanied by drumming and compatible with the textural and temporal commonalities, creating a similar musical perception. My intention in listing those common tendencies is to establish a base to discuss the essential parameters, rather than the universals that are applicable to all trance musics. However, it is also true that the combination of those discussed common tendencies at extreme degrees, promise a higher potential of musically induced trance states, because they are highly compatible with the general principles of sound processing, perception and auditory entrainment. Therefore it can be said that according to the varying degrees of employment of listed means of sonic signification, the *possibility* of a sound-induced trance experience increases. Nonetheless, one should always keep in mind that it is just a possibility rather than a causality factor, since subjective conditions and intentions of individuals are always the primary determinatives in inducing ASC. No.1 (Akan Spirit Possession Ceremony from Ghana), No. 8 (Bondo Divination music from Central African Republic), No. 10 (Buma Dance from Cameroon), No.26 (Zar

Ceremony from Sudan), No. 28 (Dhikr ceremony from Afghanistan), No.44 (Sufi Music from The Chechen Republic, Russia), No. 58 (Rituaş Music from Japan) and No.110 (Trance Dance from Belize) are exemplars of strong combinations of discussed sonic qualities.

4.3 Diverging Means of Sonic Signification in ASC

The function of the present section is to introduce the diverging means of sonic signification observed in altered states experiences through the sample set. The sound related concepts that will be discussed in the following paragraphs should be considered as alternating sets of musical tendencies that are employed only by certain cultures, not the majority of the sample set, yet they demonstrate alternative sonic cues that we can relate with musical trance theories. As I will suggest later, while the diverging tendencies might alternate with the common means that are already discussed, we will see again the underlying mechanisms of auditory entrainment as the primary sonic reasoning, though it is utilized with varying musical tools at varying degrees, resulting in different types of musical trance. Throughout this section, we will see first the contrasting percepts in embodiment of varying tempi, especially through the examination of drone psychology as an extreme opposite to fast and/or increasing tempo percepts. Secondly, monophonic communal chanting will be discussed as an alternative sonic experience to multi layered percept of musical time and texture, especially in terms of unison communal chanting psychology.

4.3.1 Tempi

Tempo is one of those aspects of music whose measurement becomes highly subjective, though it is sort of standardized in a metronome scale of beats per second. Generally, bpm corresponds to the beating rate of articulation point in time, in which the smaller durations of notes are grouped, especially in notated music. However, even though the articulation point can be and mostly is the pulsation stream, it could also be any indicated or preferred durational value that groups the melodic or rhythmic units. This unstable definition makes the measurements of tempi somewhat problematic to categorize and compare, since it highly depends on the specific musical content.

Another problem that makes the tempi discussion highly problematic is specific to musics of trance phenomenon. As it has been stated before, the auditory entrainment

theory is based on the synchronization of brain waves and sound waves. The common unit of measurement in between the two is the frequency of periodic movements of both waves, indicating as Hz equal to cycle per minutes. In the laboratory experiments concerning the relationship between the sound and brain waves, the measurement of brain waves are obtained through EEG and other tools of neural activity imaging, indicating well defined and precise data. However, for the tempi measurement of sound waves used as stimuli, it is often the case that the information about the Cps of sound stimuli and how it is obtained is neglected to a degree. Cps is a measurement unit that is convertible to bpm, yet, it is not clear in which articulation point (as it is often called the *beating rate*) in musics that they choose as the bpm. Thus it is hard to predict the real tempo of the given stimulus that they used without listening.

A very direct consequence of this problem can be found in the study of Veit Erlmann who worked on Boorii Ceremonies of Hausa People. Erlmann criticizes and disproves Neher's theory that the beating rates slightly below than 13 Hz, are specifically associated with trance experience. Providing his own tempo measurements in the field, he states that only %6,1 of 179 tunes are in range of 7 to 10 beats, and the rest is lower than 7 Hz (Erlmann, 1982, pp. 49-58). This is a highly logical objection, regarding that even 7 Hz corresponds to 420 bpm which is far beyond the limits of normal metronome tempo ranging.

The highly contradicting results of the two scholars is caused by perhaps the complication in the terminology and converging of measurements of bpm and Hz (cps). In his study of auditory entrainment in relation to Shamanic drumming, Maxfield gives a slightly more precise information about the speed of beating of sound stimuli, stating that the beating is the *total number of hits per second* in the entire sound wave (1990, no page number) corresponding to the articulation at the smallest repeating durational value in the composite rhythm. Based on this reasoning, each example is also examined in terms of *beating rate* of smallest durational value (hits) which I will call *hypo-beats per minute*. This is a temporal level in which we hear the fastest divisions of time, equally and periodically grouped under bpm. Hypo beat measurement is more advantageous in understanding the tempi in musical trance in relation to entrainment theory because it is more compatible with the measurements of brainwaves. Additionally, *hypo-beats per minutes* are also important because in a

majority of the examples the smallest time durations are explicitly audible, signified by drumming instruments, rather than implied, thus alternating with pulsation layer. Therefore, hypo-beat level of tempi is considered as the closest to the total number of hits per minute, and they are used in converting the tempi to frequency (Hz) in order to compare the brain wave correspondents in sound examples.

Tables 4.1 and 4.2 demonstrate the observed tempi rates with respect to the two measurements; bpm and hypo-bpm.

Table 4.1: Observed tempi at Bpm level

Bpm (Beats per Minute)	Cps (Cycles per Second)									
	Infra Low / Delta			Theata				Alpha		
	<2	2	3	4	5	6	7	8	9	10+
20-50	7	2				1				
50-80		2		3	5	1	2			
80-120	1	3	5	1	9	7	4	1	1	1
120-150				6		4	1	6	7	2
150-180					1	1		3		1
180-210						4			1	2
210-240			2	1			2			
240+				3						

Similar with many of the music in the world, musics of altered stated of consciousness also show greatly varying tempi levels in terms of bpm rates. The increase in the number of examples corresponding to the tempi ranges between 80 to 150 bpm indicates a tendency for faster tempi in terms of normal metronome scaling. However, considering that the indicated ranges are too wide and inclusive for any type of music, it is also true that it indicates no specific signification in terms of the subject topic. Yet, unlike many musics, there is a clear indication of Bpm rates at the extremely slow and fast tempi, indicating the diverging categories of musical trance. Accordingly, examples corresponding to the 20-50 Bpm represent mostly the low arousal type, while the ones at ranges above 150 Bpm represents the high arousal, active type of musical trance.

Table 4.2 demonstrates the distribution of number of examples in terms of the hypo-bpm. According to the table the highest number of examples are clustered at ranges 240 to 420, indicating the fast tempi tendency much more explicitly. Additionally, the

Table 4.2: Observed tempi at Hypo-Bpm level

Hypo- Bpm (Smallest Periodic Time Duration per Minute)	Cps (Cycles per Second)									
	Infra Low / Delta			Theata				Alpha		
	<2	2	3	4	5	6	7	8	9	10+
120-150		3								
150-180		4								
180-210			3							
210-240			3							
240-270			1	12						
270-300				3						
300-330					11					
330-360					7					
360-390						8				
390-420						12				
420-450							5			
450-480							4			
480-510								8		
510-540								2		
540-570									7	
570-600									2	
600+										6

number of examples that are at 500+ hypo bpm are fairly high, representing the high-fast category of tempo in the sample set. On the other hand, the table indicates that the slow tempo, low arousal type examples have fairly slow tempi hypo-bpm rates, considering that the hypo-bpm is the fastest time duration audible⁶.

While the tempo is considered as a diverging sonic quality, representing the different type of ASC, there is a specific tendency for theta waves (4 to 7 Cps) as it can be seen in the table. This is especially important when we recall the auditory entrainment theory. As it is already discussed, Neher and Maxfield pointed out the theta waves alternate during the ASC experiences. Consistent with their findings, observed hypo-bpm rates throughout the sample set tend to correspond to theta ranges (see Figure 4.2). Furthermore, the frequent indications of tempi rate around 240 hypo-bpm and its multipliers shows a specific tendency for low theta waves at 4 and 4,5 Cps, which are considered as the most effective in inducing trance states in Maxfield's study (1990).

Different ranges of tempi can be considerable as the main sonic indicator of the type of ASC in terms of the emotional states. While faster tempo examples correspond to the high arousal bodily active states, extremely slow tempi examples (especially the

⁶ For a more detailed view of bpm, hypo-bpm and cps levels, see the Table. A. 1 and Figure A.2 in the appendices.

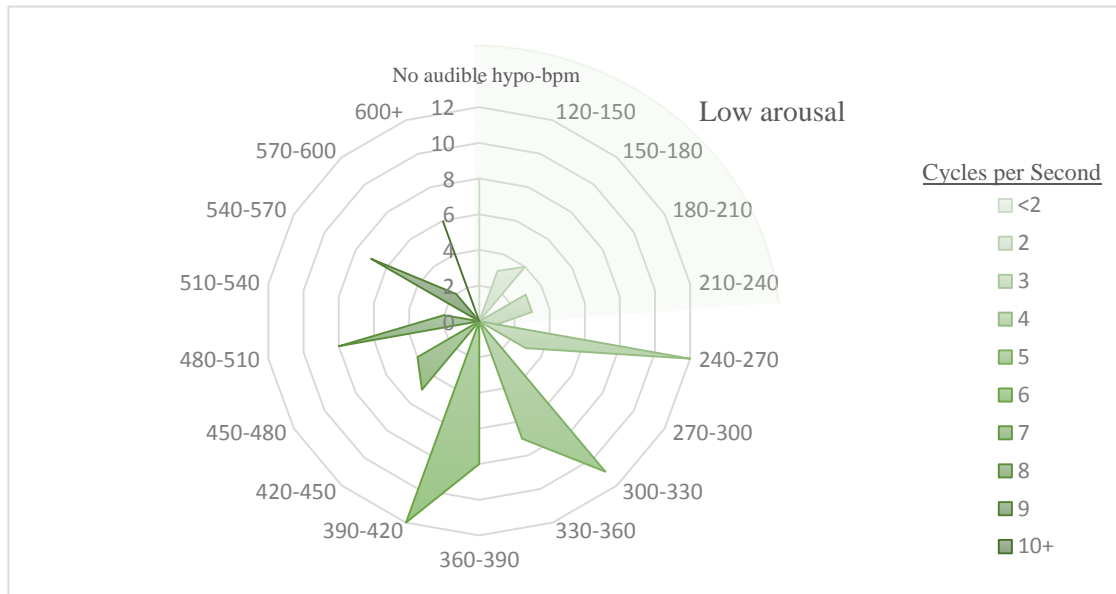


Figure 4.2: Observed tempi at Hypo-Bpm level and corresponding Cps

range between 20 and 50 bpm) corresponds to the low arousal still type of ASC (see Figure 4.2⁷). Both the temporal structure and its perception is highly different in those low arousal, slow tempo musical trance examples, contradicting with the common patterns that are discussed in the previous section. Especially, in terms of the auditory entrainment theory, they lack the pulsation or any temporal indication of periodic beats and multilayered temporal percept as well, which all enables the synchronization. However, they are still compatible with the essential idea of statistical regularity, since they create a constancy in what is heard in the given flow of music. This is especially valid when we consider the drone tones, which are simply the exact perpetual sounding of a single tone. It is also true that even the continuum-like melodies have a static character since the frequencies are changing too slowly to form a perceivable patterned order. Because of the slow tempo, allowing for a comfortable auditory processing and smoothly changing sonic continuity, they are also creating a non-ordinary musical time perception, though the means of sonic signification are extremely opposite of the fast tempo examples. Conceptually, the vertical temporality percept caused by the fast tempo-pulsation stream that we observed in the common patterns, is replaced with a

⁷ The numbers indicated around the outer circle correspond to hypo-bpm levels and the concentric circles indicates the number of examples matching with the indicated Bpm.

single sonic event that is the continuum which is very slow, like it has almost stopped indicating no time unit. The smoothly and slowly changing frequency content is the only motion of shift. This highly stable, yet continuing time perception is mentioned in Sean Williams's study of Tibetan Tantric chanting, which is an extreme example of slow tempi musical trance. He states that;

Many outside Tibetan culture are accustomed to think of melody as a sequence of rising or falling pitches. In Tibetan Tantric chanting, however, the melodic content occurs in terms of vowel modification and the careful contouring of tones. In other words, it is in the shift of timbre or tone color that the melodic content and forward movement occurs. (Williams, 2006, p. 180)

I suggest that this type of sonic signification is at the other radical end of the same scale of statistical regularity, working with the same auditory processing principles, yet with exact opposite means of signification. The difference in the listening experience is that the multi-dimensional musical percept that we examined in the common patterns is replaced with spectral yet still vertical deepness. Although it favors a comparatively more linear time perception because of its form of continuum, it also allows for unique experience of musical verticality by slowing down the time percept as though it will stop.

4.3.2 Communal chanting

The tempo differences are highly effective determinatives not only in auditory entrainment but also in emotional arousal levels. These slow tempo examples that constitute for low arousal type of ASC categorically follow certain other tendencies along with diverging tempi. The most important of them is the specific importance of communal chanting, mostly in unison as a signified sonic means. Many of the slower tempo examples are performed in a communal setting in which the participants are mostly chanting in a monophonic texture.

We can point out two important psychological and perceptual effects of communal chanting. First it is a very effective way of creating a socially shared musical atmosphere, providing a single line mutual sonic experience that is both sung and heard by all. Additionally, because of the verbal content that it has, chanting is also a cue to the common conceptualizations of the entire ritual activity with respect to cultural

doctrines. The following lines describe communal chanting experience in Kirtan Singing;

The auditory space resonates synchronously with the beat of the heart. The tactile sensibilities are equally in operation as people sit close together singing. Boundaries dissolve as the skin of individuals touches and their discrete voices merge in unison. The intense emotion and devotion that results creates an altered perception and an indomitable community spirit. In such settings, the embodiedness of each listener 'carries an anticipation of others' bodies'. (Sarbadhikary, 2015, p. 26)

Group chanting psychology is often associated with the common themes of religious altered state experiences, such the unity in the Oneness or the dissolve of sense of self. Similar with Kirtan singing Sean Williams notes on Buddhist musics;

Chanting certainly is capable of assisting in the creation of a heightened state of consciousness in the performer. When a person performs Buddhist music as a part of crowd of chanters, the individual self disappears into the Sanga, or community... Group chanting, mostly in unison, causes the self to become absorbed into the community. (2006, p. 186)

In both descriptions, communal chanting is conceptualized as a way of worship by its practitioners in many religions, rather than a mere musical activity that serves as a social means of prayer. Beside this socio-psychological effect that it provides for ritual setting, it is also true that there are certain sonic qualities in communal chanting that might relate to the issue of musical trance. It is frequently observed in the low arousal musical trance that even though the chanting is mostly signified in monophonic texture, in a form of linear continuum, the spectra of the entire sound is not information-poor perceptually, since the communal singing, especially at the unison, creates its own density in the texture. Often the listening experience of communal chanting is highly tense because of the high level volume, originated in the communal singing. It is also true that frequencies that are used in monophonic chanting tend to be at lower ranges of spectra creating a more elaborate experience of overtones and other spectral details of the sonic event. These lower frequency sounds are also favorable in musical trance, as we saw before, since they are also more effective in terms of the bodily experience of sound. With all these sound specific aspects, communal chanting is capable to contribute to musical trance as a diverging sonic means, especially observed in low arousal altered states of consciousness.

5. CONCLUSION

As discussed at the start of this study, altered states of consciousness in general, and also musical trance specifically, are comprehensive subjects topics that are examined by a variety of study fields. The previous three chapters are designed to provide these different perspectives concerning differential sides of the phenomenon.

In that systematic context, the first chapter aims to provide basic information on how altered state of consciousness is conceptualized and empirically observed from a neuropsychological point of view. Basing on the fundamental theories and related experiments, it is observed that the altered stated of consciousness is considered as a family term of varying types of non-ordinary experiences, that can be induced by different means, such as pharmacologically induced states, behaviorally induced experiences or just dissociative cognitive states that emerge unintentionally. While the brain and body mechanism can slightly change according to the specificities of each ASC experience, the deviations in the functioning of awaking consciousness is pointed out as the main core of the neurological and cognitive mechanism behind the phenomenon. As it is seen in many experimental studies conducted with respect to different types of ASC, certain changes in Default-Mode Network (DMN) and Medial Temporal Lobe (MTL) are observed along with their perceptual effects (see also Tables 2.1 and 2.2). Briefly, they are;

- 1) Decrease activity of the posterior cingulate cortex (PCC) which is generally associated with the meta-cognitive functions such as self-referencing and mind wandering,

- 2) Increase activity of the prefrontal cortex (PFC), functioning in integration of input data and attention, especially in goal oriented tasks,

- 3) Decoupling of MTL, especially the hippocampi structure, with DMN system, which primarily relates to an integrated sense of self in mind and body, and functions in clock time perception,

4) Alternation of alpha waves to theta waves activity in DMN region indicating a dreamy and less awake sense of self.

As a result of these alterations in brain regions, psychological effects such as loss of sense of self, loss of clock time perception, and weakening in semantic and episodic memory functions are observed. The perceptual and psychological effects are considered as compatible with the frequently seen descriptions of participants of ASC experiences. It is also suggested in certain studies that the cognitive state of the participants during ASC is similar to a pre-ego thinking system that is flexible in accessing a hidden and deeper consciousness which is free from static codes and patterns that the brain “programs” to reduce uncertainty for practical reasons (Lancaster, 2011; Carhart-Harris, et al., 2014)

While musical trance is considered as a sub branch of ASC experiences, parallels in neural mechanisms and psychological effects are suggested in theories specific to musical trance. Among them, the emotion-based perspective is introduced as the main theory. Fundamentally following the studies of Becker and Rouget, it is considered that music functions as part of the facilitating ritual setting that is primarily designed with respect to the principle of cultural familiarity. As it is discussed through the chapter, the role of music is considered from a social domain in which it is responsible to cue the expectations, intentions and pre-set conceptualizations in the given cultural conditions, and to contribute to the entrainment of individuals to this interpersonal ground. According to the theory, the alterations in the brain regions are caused by the emotional arousal which as a result causes a chemical bath of brain and body mechanisms (Rouget, 1985; Becker, 2004).

Though the emotional theory of musical trance explains one of the core aspects of the phenomenon, which is the importance of individual and cultural intentions, *the will* of people in the entire process, it is suggested that there are also psycho-acoustical mechanisms originated in auditory functioning. Following the general theory of brain wave entrainment that is the synchronization of brainwaves to any periodic external stimulus, auditory entrainment is suggested as the main mechanism that takes place during musical trance experiences (Neher, 1961; Needham, 1967; Maxfield 1990). Auditory entrainment studies conclude that the periodic (repetitive) sound stimuli, especially on percussion instruments, is capable of inducing ASC when they are played

with long durations. While the synchronization of brain waves and sound waves is empirically observed, the specific rate of periodicity, the tempi of sound stimuli that is said to be favored to induce ASC are indicated differently in each study (Neher suggested that it should be between 7-13 cps, and Maxfield suggested that it is most effective in 4-4,5 cps). Beside the auditory entrainment theory, studies concerning certain properties of sound in relation to musical trance are also introduced, such as Fancher's study (2001) of subjective time perception during trance experiences or Walker's study (1972) on effects of ceremonial drumming.

For a better understanding of both the cultural and sound aspects of the experience, the second and third chapters of the study are designed to provide a cross-cultural survey on the recorded examples of musical trance. Through the second chapter, a brief summary of each region's cultural frame that defines the ASC experience for its participants is given to see how the intentions, expectations and ritual setting differ from one to another. Despite the variety in the contexts, certain patterns are observed as common in different geographies. Among them religion is observed as the main determinative factor in conceptualization of the experience that provides the ground mindset of participants and the ritual setting. It is seen in the sample set that the traditional / ethnic religions constitute the majority of the examples in which the phenomenon is frequently observed, in comparison with the world religions. Regarding the intentions of participants in trance ceremonies, a healing (physical or psychological) aim stands out as the most frequent and it is followed by devotion and worship purposes. In terms of the content of the ritualistic activities that take place during the trance ceremonies, trance dances – mostly to a percussion instrument - are observed as the major ritual activity, though there is a certain category of chanting ceremonies in which the participants are bodily less active – mostly in the Far Eastern and Central Asian geographies. As it is already mentioned, since the types of musical trances are divided according to the emotional state and bodily activity of the participants, majority of the examples indicate a high arousal and active type.

The third chapter is designed to examine the musics that accompany these trance experiences. The collected recordings are analyzed in terms of the main components of the given compositions, such as use of melody, rhythm, texture etc. and the tendencies commonly observed in the use of sound components are introduced as the

common means of sonic signification. As a result, statistical regularity in what is heard during the example or repetition of any type of musical unit is observed as the main compositional essence. It is suggested in this paper that the constant repetition of sonic units (harmonic or non-harmonic) form the foundation of the mechanism that enables the auditory entrainment, because (1) repetitive sonic events are easier to process and to respond to, (2) constancy and repetition provides a base to frame and lead the attention and (3) constantly repeated sounds provide a social sound surrounding in which participants can experience both the communal and individual interactions.

While constant repetition is suggested as the most frequently highlighted musical component in the sample set, the common patterns in the way that they are used in music are also observed. In that respect, the sound units of statistical regularity and their perceptual effects are listed as follows;

1) Melody: Melodies employed in musical trance tend to be formed by single motivic material that is often short or at least moderate in length, and they are repeated through the flow of music without much alternation. It is suggested that such an economic usage of melody contrasts with the linear and segmented musical time and creates a percept of cyclic verticality. It is also observed that the melodies often have a verbal content relating to the specific intentions behind the trance rituals, thus they are also considered as contextual sound cues.

2) Drumming and Percussion: It is observed that many of the examples employ at least one type of percussive instrument, mostly membranophones. The dominance of the percussive sounds are interpreted as signification of the non-harmonic attack sounds and temporal qualities in music. Following the auditory entrainment theories, drumming is suggested as an effective sonic cue to alterations in brain waves.

3) Pulsation and Rhythmic Units: These two temporal units are the most frequently observed temporal sound units in the sample set. Pulsation, the exactly same signal-like repeating beating is considered as the main temporal layer of the entrainment that enables people to move synchronically with music because of the ease in its detection. It is also suggested that the pulsation layer forms again a vertical depth in musical time perception. Rhythmic units used in musical trance are short patterned units of mostly non-harmonic percussive sounds. Because the rhythmic patterns have

linear, moving characters in their internal structure, it is suggested that they create a short cyclic movement, as in the case of melody.

4) Texture and Musical Time: It is suggested that these units of statistical regularity merge in a dense and interlocked texture with a unique time percept in musical trance examples. The simultaneity of melody, pulsation and rhythmic patterns that are interlocked to each other, creates multi-dimensional time perception that is both perpetual and flowing. With the additive layers of filling sonic units such as short yodeling, hand clapping or very short accompaniment figures, a dense musical texture is often observed. It is suggested that since the units of this texture are already easy for auditory processing because of their repetitive and short character and how they differ from each other greatly in terms of their sound sources, this temporally complex texture doesn't cause a cognitive load in streaming. Rather, it is suggested that the textural and temporal fusion provides for a non-ordinary listening experience for the listener in which each layer of music is audible in a continuous sound mass.

While these sound specific aspects are observed in many of the examples, it is suggested that the sample set also indicates diverging means of sonic signification in relation to ASC. As it is already stated, diverging means point out the different categorical tendencies in using certain sound parameters. Tempi and communal chanting are introduced as the most important and frequently observed diverging means of musical trance.

Tempo is observed as the main determinative of the type of the ASC, low or high arousal. It is seen through the sample set that most of the examples tend to be at faster tempos in both bpm or pulsation level and divisional smaller beat level. As it is already stated in many other musical trance studies, those fast tempo examples are considered as high arousal, bodily active states. Slower tempo examples on the other hand indicate an extreme opposite rate, tending towards very slow tempi, creating an almost non-moving musical perception. It is seen that low arousal trance musics as a different category often employ sustained drones or very slowly changing constant continuum of frequencies, unlike the dense textural qualities that are observed in common means. It is suggested that though the used of statistical regularity is highly different in these two cases, the perceptual result of two sound experiences are similar in terms of the

vertical embodiment of time perception, by replacing the fast pulsation (the exact same sonic event) with a single sonic continuum without explicit change.

Communal Chanting is also considered as a diverging means that is employed in low arousal type musical trance experiences. While the chanting in general might be common for all musics in the sample set, it is suggested that communal chanting especially at unison without accompaniment, is employed specifically in low arousal type slow tempi examples as an alternative. It is proposed that because of the high intensity level and timbral complexity caused by communal chanting, the surrounding spectral body of such musics is capable of contributing to a non-ordinary musical perception.

Returning back to the initial question that drives the present inquiry, about a direct relation between the isolated sound specific aspects and trance phenomenon, neither the listed sound components, nor their statistical dominance in the sample set can prove a causality relation between sound and trance experiences in terms of inducement. However, it is also true that the presence of the listed patterns of tendencies in musical trance examples indicate a high potential for musically induced trance states. This proposition is primarily based on the parallels in between the biological principles of auditory processing and deviating neural mechanisms in brain and body during the trance experiences.

The decreased activity of the posterior cingulate cortex (PCC) in DMN which is generally associated with the meta-cognitive functioning in higher brain regions and long term memory has parallels with the preference in using short and basic sonic materials that are processed easily in the early chains of auditory processing. Pulsation and drone continuums are extremes of this type of directly detected sonic units without referencing to the long term musical memory storages. Additionally, the simple and reoccurring character of melodies in musical trance might also reduce the need of re-entrance⁸ process in higher brain regions. In comparison with musics such as Euro-genetic art compositions or popular songs, it can be said that in trance musics there is

⁸ Re-entrance or re-entry is a neural mechanism of “on going bidirectional exchange of signals” between the external continuous data and the stored codes in higher brain regions, functioning in integration of multiple brain functions (Edelman, et al., 2013).

a tendency to use sonic materials that are processed with respect to veridical perception which is the direct perception of stimuli as it exists in the given moment, unlike the schematic expectations that are result of long term memory formed by earlier exposure to music (Deutsch, 2013, p. 213).

The extreme use of statistical regularity in trance musics and the vertical time perception that it creates might be related to the increased activity of the prefrontal cortex (PFC) functions in integration of input data and attention during the trance states. It is true that non-progressive musics have more potential in directing the attention to the very moment of the musical flow, rather than the linear movement. The predominant use of short static sonic events over the linearly patterned ones, might be contributing to a more focused, moment to moment musical experience of the sound stimuli.

Another deviation in the brain regions observed during altered states of consciousness is the decoupling of Medial Temporal Lobe with DMN system and it is proposed that it might distort the perception of clock time, which also contributes to the sense of self. Similarly, it is observed that most of the sound specific aspects are related with the temporal qualities in musics. As it is indicated there is a tendency to use non-harmonic sounds caused by predominant use of percussive sounds, rather than the harmonic pitch patterns. This directly leads the attentional focus to time related aspects, such as the pulse, rhythms, tempi and flow, which can be considerable as more effective in altering the time perception.

As it has already been clarified, the alteration of brain waves in DMN regions cause deviations from ordinary awaking conscious states. However, ASC studies in laboratories indicate a specific alternation from alpha to theta waves in trance-like experiences. The sound correlates of brain waves are primarily considered in respect to tempi and bpm levels where 240 to 420 are considered as theta waves, corresponding to 4 to 7 Cps. As it is discussed before these bpm ranges should be considered as the beating rate of the reoccurring smallest time duration in music, *the hypo-beats*, rather than the regular points in time that groups divisional beats in the metric level as in the mainstream meaning of tempo. This is because researchers use sound stimuli that have only a single line of fast tempo, drum beating, unlike ordinary

musical compositions. When the tempo levels are examined with these double-step measuring system (bpm and hypo beat levels), two important statements are given;

1) Even though the bpm ranges vary greatly, the vast majority of the examples tend to be perceived as very fast because of the pre-dominancy of hypo-beats in the divisional level.

2) The examination of only hypo-beats indicate a tendency to use 240-270 hypo-bpm and its multiples, corresponding to theta wave ranges at 4 – 4,5 Cps.

3) Categorically the low arousal type of musical trance examples indicate an opposite position in tempi scaling, by being at extremely slow tempi without any hypo-beat indication, at 20 to 50 bpm corresponding to delta waves (0,5 to 4 Cps).

It is true that these observed tempi cannot be proposed as the direct correlates of brainwave movements, since they are not measured using Electroencephalography (EEG), but by timing the sound stimuli. Nevertheless, it is still convincing that there is a clear tendency to use extreme tempi at the fastest and the slowest ranges in musical trance. This preference of extreme tempi rates has parallels with the alterations in brainwaves and it might be effective in interrupting the ordinary clock time perception.

These sound-specific tendencies observed in the sample set are proposed as the psycho-acoustic correspondences of the musical trance experiences. The pre-dominancy of temporal parameters in the featured tendencies provides a compatible ground between sound and the brain/body mechanisms of ASC phenomenon with music in terms of perceptual qualities. While they are not suggested as the main inducers of the trance states, they are considered as the sonic cues that have a high potential in altering the conscious state, because of their psycho-acoustic foundations. Nevertheless, it is also true that certain socio-cultural codes and specificities of contextual meanings related to the trance rituals are also observed not only in variety of ritual settings, but also in music specific aspects, such as the verbal and motivic associations of melodies with the intentions behind the ritual, or the use of specific timbres to indicate the specific ritual.

As it is introduced at the first place, this simultaneity of the biological/psycho-acoustic and socio-cultural aspects in association with musical trance, raises an argument between the parties of each perspective, which tend to exclude the other side. The

present paper is intended to bring out the core ideas of each perspective and fill the gap by acknowledging these diverse, yet complementary factors that take place in musical trance phenomena. This inclusive standpoint that I am taking in this study is also represented in the choice of the title; *sonic signification*, that is used to define the sound-aspects discussed in association with the subject topic. One might question the precision of the term signification, since it is often considered as including meaning and interpretation, rather than the direct quick cognitive responses that have biological foundations and functions that we might not be aware of consciously at the time. While such a distinction in the levels of perception is beneficial in understanding the differential factors of any given phenomenon, it is also true that they are not independent from each other in terms of the individuals's conceptualization of the entire experience in the given moment.

This problem of separating the biological foundations from the meaning-making processes, and limiting the meaning to the socio-cultural verbal contexts is criticized in Thibault's unified theory of *Eco-Social Semiotics*. According to Thibault, along with the social phenomenon, such as linguistic models or cultural notions, meaning-making also includes the cognitive states, bodily experiences and all types of percepts. Therefore meaning-making is an integrated activity that happens in an eco-social system that is formed by three factors; the individual mental processing, the material environment, and the linguistic models of the socio-cultural domain that the individual is situated in it. Thibault suggests that even though the language base meanings on the cultural level are essential parts of the entire system, "they have a secondary and derived status with respect to the activities in which they are made and in which they participate" (Thibault, 2004, p. 4). Yet the meaning emerges as composite in the individual mind who is in the focal point of this eco-social model.

With a similar perspective, the discussed qualities regarding the musics accompanying trance rituals, are considered as integrated parts of sonic significations that have both psycho-acoustic and socio-cultural traces. Both of them function in the experience and the meaning-making process of sounds that are played and heard during trance rituals. They are signified by the people (human cognition) who are in the focal of this eco-social model. While psycho-acoustic tendencies and socio-cultural codes are different in terms of the ways that they involve in the emergence of the overall signification

(former is bottom-up, the latter is top-down), the sonic signification is an amalgam derived from the interactions of human mind with both means.

In that context, the present study should be considered as an effort to bring out the observable patterns in this entire signification process with respect to both sides. Though the psycho-acoustic mechanisms and related sonic qualities are at the center of interest, this is to balance the general understanding of musical trance in which only the specificities of socio-cultural factors are taken into consideration. Essentially, I think that what makes music so unique in association with the altered states experiences, is its capacity to hold a variety of experiences and phenomena within a unity and carry them simultaneously into the very moment of perception.

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APPENDICES

APPENDIX A: Discography of collected examples in numerical order.

- 1 Bernez, D. [Performer]. (2000). Na Go De. [Liner notes and recordings by Scott Kiehl]. On *Akom: Art of Possession*, Track Number 19 [CD]. Village Pulse VPU-1009.
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- 4 The Bata Repertoire for Shango in Sakété: Oba Koso. (1996). [Liner notes and recordings by Carol Hardy, compilation by Marcos Branda-Lacerda]. On *The World's Musical Traditions, Vol. 8: Yoruba Drums from Benin, West Africa*, Track Number 7 [CD]. Smithsonian Folkways Recordings 40440
- 5 Matsuhira Yuji. [Screen name]. (2013, Jan 20). *Bira Dance at Great Zimbabwe* [Video file]. Retrieved from <https://www.youtube.com/watch?v=Pbs80p4-nGM>
- 6 La Cérémonie Du Bobé. (1991). [Produced by Caroline Bourguine]. On *Congo: Cérémonie du Bobé*, Track Number 2 [CD]. OCORA W 560010
- 7 Le Bobé S'est Rapproché. (1991). [Produced by Caroline Bourguine]. On *Congo: Cérémonie du Bobé*, Track Number 3 [CD]. OCORA W 560010
- 8 Musique de Divination Diye. (2002). [Liner notes and recordings by Arom, Simha]. On *Anthologie de la musique des Pygmées Aka = Musical anthology of the Aka Pygmies*, Disc 2, Track Number 9 [CD]. Ocora C 560171/72
- 9 Foundation for Hausa Performing Arts. (2012, Jan 8). Dodorido Koroso Dance Drama Segment 2 Bori Adept [Video file]. Retrieved from https://www.youtube.com/watch?v=hpjrw_VRW1Y

- 10 Music for the Buma Dance. (1977). [Liner notes and recordings by Simha Arom & Patrick Renaud]. On *Cameroon: Baka Pygmy Music*, Disc 1, Track Number 1, 10[CD]. Smithsonian Folkways Recordings (2015) /UNESCO. Retrieved October 17, 2016, from Music Online: Smithsonian Global Sound for Libraries.
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- 12 Oryx (Go'e Tzi). (1997). [Liner notes by Emmanuelle Olivier]. On *Namibia: Songs of the Ju'hoansi Bushmen*, Track Number 19 [CD]. Ocora 560117
- 13 Mtendeni Maulid Ensemble. (2012). Dahala 3: Marihaba / Hua Maulana / Salat / Jalla Jalaluh / Khamsa Arkan / Man A'ala / Leo Mambo. [Liner notes by Aïsha Schmitt]. On *Zanzibara, Vol. 6 - A Sufi Performance from Zanzibar*, Track Number 3 [CD]. Buda Musique 860219
- 14 Hadra song: "Al hamdou lillahAlgeria". (1975). [Liner notes and recordings by Pierre Augier]. On *Algeria: Sahara - Music of Gourara* Disc 1, Track Number 3[CD]. Smithsonian Folkways Recordings/UNESCO. Retrieved October 17, 2016, from Music Online: Smithsonian Global Sound for Libraries.
- 15 Jinele : chant de divination . (1994). [Liner notes by Jean L. Jenkins, Ralph Harrisson and Ragnar Johnson]. On *Ethiopie : musiques vocales et instrumentales*, Disc 2, Track Number 10 [CD]. Ocora C 580055/56
- 16 Būderbāla / Būḥāla. (1997). On *The Music Of Islām - Volume Six: Al-Maghrib, Gnāwa Music, Marrakesh, Morocco*, Track Number 4 [CD]. Celestial Harmonies 13146-2
- 17 Matsuhira Yuji. [Screen name]. (2012, May 18). *The Mbira Ceremony* [Video file]. Retrieved from <https://www.youtube.com/watch?v=OXBQbn6wZeQ>
- 18 Molimo Song of Devotion to the Forest. (1997). [Liner notes and recordings by Colin Turnbull and Francis S. Chapman]. On *Mbuti Pygmies of the Ituri Rainforest*, Track Number 26 [CD]. Smithsonian Folkways Recordings 40401
- 19 Molimo song: Darkness is good. (1997). [Liner notes and recordings by Colin Turnbull and Francis S. Chapman]. On *Mbuti Pygmies of the Ituri Rainforest*, Track Number 25 [CD]. Smithsonian Folkways Recordings 40401

- 20 Gnawalux Brussels. [Screen name]. (2008, Aug 27). *Stambali 1 - Gnawa Tunisie* [Video file]. Retrieved from <https://www.youtube.com/watch?v=wK-UasuUtdo>
- 21 Tazenkharet. (1960). [Liner notes and recordings by Finola Holiday & Geoffrey Holiday]. On *Tuareg Music of the Southern Sahar*, Disc 1, Track Number 13[CD]. Ethnic Folkways Library FE 4470.
- 22 Timgui. (1999). [Liner notes and recordings by Charles Duvelle]. On *Bariba – Bénin*, Track Number 5 [CD]. Philips Music Group France 538721-2
- 23 Mwizenge Tembo. [Screen name]. (2008, July 20). *Vimbuza Dance Ritual Ceremony* [Video file]. Retrieved from <https://www.youtube.com/watch?v=6wpsNQp1ci4>
- 24 Alto Bung'o Horn (Kenya). (2002). [Compiled by Stephen Innocenzi]. On *Africa, Music From The Nonesuch Explorer Series*, Track Number 1 [CD]. Nonesuch Records 7559-79793-2
- 25 Ivo Biegman. [Screen name]. (2011, May 19). *Zar ritual in Egypt* [Video file]. Retrieved from <https://www.youtube.com/watch?v=YNiUc4W5Kzo&list=RDYNiUc4W5Kzo#t=517>
- 26 Zar Omdurman. (2005). [Liner notes and compilation by Peter Verney]. On *Rough Guide To Sudan*, Track Number 7 [CD]. World Music Network – RGNET 1152
- 27 Danse, Bozok Semahi. (1998). [Liner notes by Jean During and Jerome Cler]. On *Turquie: Ceremonie du Djem Alevi (Turkey: Djem Alevi Ceremony)*, Track Number 12 [CD]. Ocora 560125
- 28 kabultransit. [Screen name].(2007, Nov 7). *Kabul Transit - Zikr* [Video file]. Retrieved from https://www.youtube.com/watch?v=_BvSLgJSBBY
- 29 Zikr. (1994). [Liner notes by Jean During]. On *Kurdistan: Zikr et chants soufis*, Disc 2, Track Number 2 [CD]. Ocora C 560071/72
- 30 Iraqi Maqam. [Screen name]. (2009, Jan 1). *Dhikr Ceremony in Iraq* [Video file]. Retrieved from <https://www.youtube.com/watch?v=yyrK-oAo3DM&list=PL5B186F663D6F3052&index=2>
- 31 Iraqi Maqam. [Screen name]. (2008, Dec 8). *Qadiri Dhikr - God is Eternal* [Video file]. Retrieved from <https://www.youtube.com/watch?v=IV52djNFcKk&index=1&list=PL5B186F663D6F3052>

- 32 Zikr/ Du'a / Tekbir. (1974). [Liner notes and recordings by Bernard Mauguin]. On *Islamic Ritual from Kosovo*, Track Number 2 [CD]. Smithsonian Folkways Recordings (2014) / UNESCO-UNES08055
- 33 Islamic Ritual Zikr. (1975). [Liner notes by Christian Poché, recordings by Jochen Wenzel]. On *Syria: Islamic Ritual Zikr in Aleppo*, Track Number 2 [CD]. Smithsonian Folkways Recordings (2014) / UNESCO-UNES08013
- 34 Zikr. (1987). [Liner notes by David Stevens]. On *Turquie: Musique Soufi*, Track Number 1 [CD]. Ocora C559017
- 35 Zikr-e Allah et percussions. (1994). [Liner notes by Jean During]. On *Kurdistan: Zikr et chants soufis*, Disc 2, Track Number 1 [CD]. Ocora C 560071/72
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- 39 Yâr Mohammad [Performer]. (1997). Qalandari Tune (Khorasani). [Liner notes by Peter Pannke]. On *Sufi Soul (Echos Du Paradis)*, Disc 2, Track Number 10 [CD]. Germany: Network Medien – 26.982
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- 42 Ozman Khaled. [Screen name]. (2016, Apr 18). *ZAAR ceremony at Qeshm* [Video file]. Retrieved from <https://www.youtube.com/watch?v=gifUSI1RFCQ>
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- 44 Aznash Ensemble [Performer]. Konya Mystic Music Festival [Screen name]. (2013, Aug 5). *Aznash Ensemble* [Video file]. Retrieved from <https://www.youtube.com/watch?v=TiPqB4GNzT0&list=RDtx6dwa4u8Lg&index=11>
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- 49 Shod-i Uforash and Ufor-i Tezash: Dilbaram Shumo. (1991). [Liner notes and recordings by Ted Levin]. On *Bukhara: Musical Crossroads of Asia*, Track Number 1[CD]. Smithsonian Folkways Recordings SFW40050
- 50 Cérémonie De Propitiation De Nag-Zhig. (1993). [Liner notes and recording by Ricardo Canzio]. On *Tibet: Traditions Rituelles Des Bonpos*, Track Number 2[CD]. Ocora – C 580016
- 51 Shamanic Bear Session. (1995). [Liner notes and recording by Henry Lecomte]. On *Siberia, Vol. 1- Shamanic & Narrative Songs of Siberian Arctic* Track Number 12[CD]. Paris: Buda Musique - 925642
- 52 Njavan, O. A. [Performer]. (1998). Song, Kkas Drum and Jampa Jingle Belt, Imitation of Kamlanie [Liner notes and recording by Henry Lecomte]. On *Siberia, Vol. 6: Sakhalin- Vocal & Instrumental Music, Nivkh Ujl'ta*, Track Number 8[CD]. Paris: Buda Musique - 927212
- 53 Chant Chamanique. (1997). [Liner notes and recording by Henry Lecomte]. On *Siberia, Vol. 5- Shamanic & Daily Songs from the Amur Basin*, Track Number 8[CD]. Paris: Buda Musique - 926712
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- 55 Pei-tou Liturgy (Great Bear Liturgy). (2004). [Produced by John Levy].
On *Chinese Buddhist Music*, Track Number 6 [CD]. US: Lyrichord –
LLST 7222
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Kagura [Liner notes by Iyori Takei]. On *Japan: O-Suwa-Daiko Drums*,
Track Number 3 [CD]. Smithsonian Folkways Recordings (2014)
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- 62 Yokoyama, K. [Performer]. (1994). Ko-ku (Vacuity). [Liner notes by
Akira Tamba]. On *Japon, Kinshi Turata - Katsuya Yokoyama*, Track
Number 2[CD]. Paris: Ocora – C 558518
- 63 Anastasija, V. G.[Performer]. (1994). Vocals and Jajar Frame Drum: A
Song for the Khololo Celebration. [Liner notes and recording by Henry
Lecomte]. On *Siberia, Vol. 4 Kamtchatka: Dance Drums from Siberian
Far East*, Track Number 15[CD]. Paris: Buda Musique - 925982
- 64 Tus. (1980). [Liner notes and recording by Jean-Jacques Nattiez and
Kazuyuki Tanimoto]. On *Japan: Ainu Songs*, Track Number 10[CD].
Smithsonian Folkways Recordings (2015) /UNESCO - UNES08047
- 65 Upopo. (1980). [Liner notes and recording by Jean-Jacques Nattiez and
Kazuyuki Tanimoto]. On *Japan: Ainu Songs*, Track Number 2[CD].
Smithsonian Folkways Recordings (2015) /UNESCO - UNES08047

- 66 Smaon. (1993). [Liner notes by John Schaefer and recording by David Parsons]. On *The Music Of Cambodia (Royal Court Music)*, Track Number 19 [CD]. Germany: Celestial Harmonies – 13075-2
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- 76 Gondang "Pangelek-elek Ni Jujungan Ro". (1995). [Liner notes by Artur Simon]. On *Sumatra: Musiques Des Batak Karo, Toba, Simalungun*, Track Number 5 [CD]. France: Inedit – W 260061
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APPENDIX B: Map of collected examples

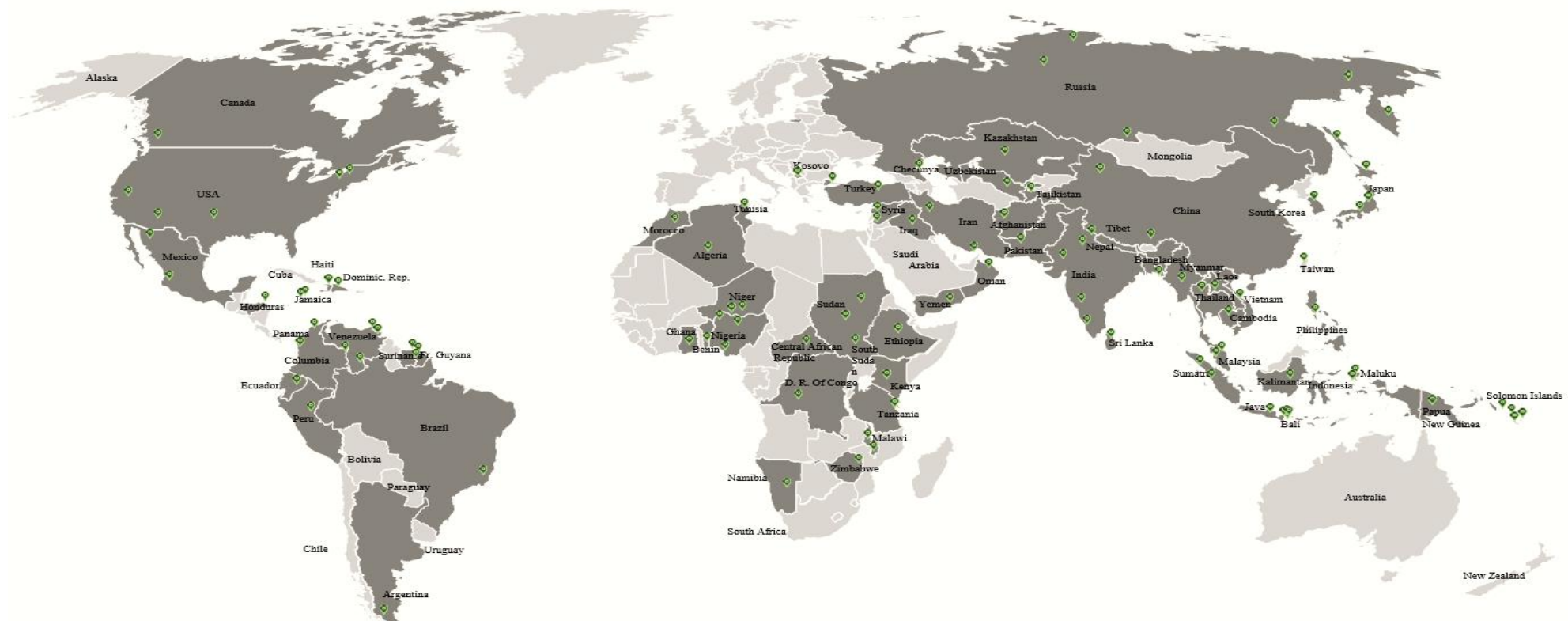


Figure A.1: Map of collected examples ⁹

⁹ Samples are collected from darker color countries. The green markers represent the specific places that the samples are collected.

APPENDIX C: Tempi measurements

Table A.1: Observed tempi at Bpm, Hypo-Bpm and Cps

Bpm (Beats per Minute)	Hypo- Bpm (Smallest Periodic Time Duration per Minute)	Cps (Cycles per Second)									
		Infra Low / Delta			Theata				Alpha		
		<2	2	3	4	5	6	7	8	9	10+
20-50	-	7									
20-50	120-150		1								
20-50	150-180		1								
20-50	360-390						1				
50-80	120-150		2								
50-80	240-270				2						
50-80	270-300				1						
50-80	300-330					5					
50-80	360-390						1				
50-80	420-450							1			
50-80	450-480							1			
80-120	-	1									
80-120	150-180		3								
80-120	180-210			3							
80-120	210-240			1							
80-120	240-270			1							
80-120	270-300				1						
80-120	300-330					4					
80-120	330-360					5					
80-120	360-390						4				
80-120	390-420						3				
80-120	420-450							2			
80-120	450-480							2			
80-120	480-510								1		
80-120	540-570									1	
80-120	600+										1
120-150	240-270				6						
120-150	390-420						4				
120-150	420-450							1			
120-150	480-510								4		
120-150	510-540								2		
120-150	540-570									6	
120-150	570-600									1	
120-150	600+										2
150-180	300-330					1					
150-180	360-390						1				
150-180	480-510								3		
150-180	600+										1
180-210	360-390						1				
180-210	390-420						3				
180-210	570-600									1	
180-210	600+										2
210-240	210-240		2								
210-240	240-270				1						
210-240	420-450							1			
210-240	450-480							1			
240+	240-270				2						
240+	270-300				1						

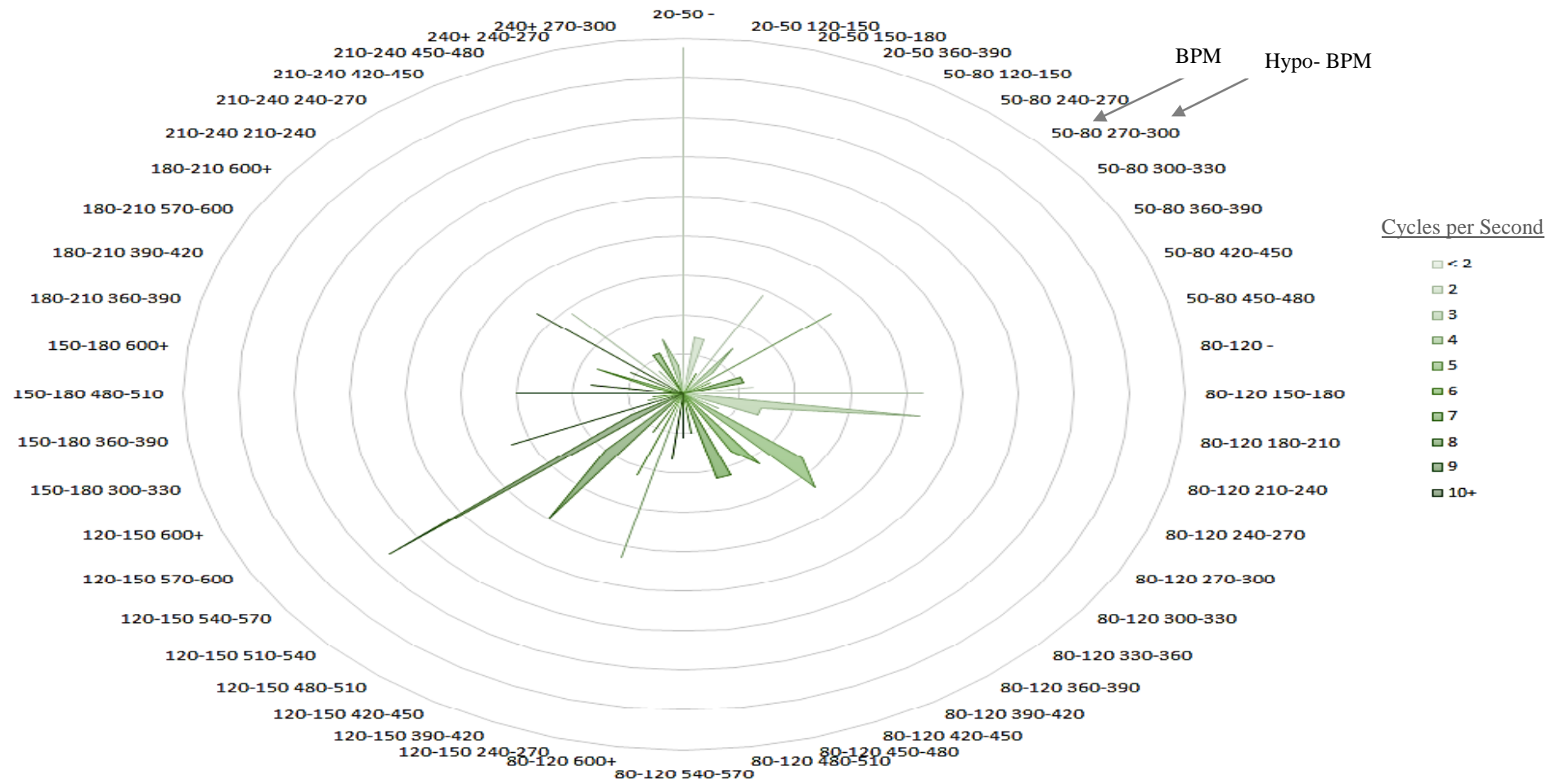


Figure A.2: Integrated bpm and hypo-bpm measurements

CURRICULUM VITAE

Name Surname: Dilara Turan

Place and Date of Birth: Ankara - Turkey, February 14, 1989

Address: Ömer Rüştü Paşa Sokak, 42 / 2. Beşiktaş – Istanbul.

E-Mail: dilarapal@gmail.com

Bachelor of Arts: Bilkent University, Faculty of Music and Performing Arts, Major in Violin (2013).