THE ROLE OF COGNITION IN ORAL & WRITTEN TRANSMISSION AS DEMONSTRATED IN RITUAL CHANT

by

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ABSTRACT
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This thesis examines the role of cognition in oral and written transmission. It looks at areas of music history where cognition is already used as a reference, including the development of notation, trends and changes in oral transmission, and performance practice. The thesis examines three different case studies on ritual chant in order to demonstrate how the cognitive process can be used to explain the ways learning, retention, and transmission work in oral and written transmission. The first case study is on the chant practices originating in Jerusalem. It discusses the intervallic relationships and music patterns involved in retention of chant, using pitch hierarchy and grouping structure. The second case study is on the Ethiopian Christian chant tradition. It illustrates how shared cognitive processes between oral and written traditions can help explain the ways oral and written traditions work together in preserving ritual. The last case study is on African and Afro-Cuban rituals derived from a common ancestor. It explores sound symbolism and the phonetics of language in chant, and how they work to maintain a stable ritual tradition. The study concludes that cognition plays a greater role in studying oral and written transmission than has been recognized heretofore in historical scholarship.

I would like to dedicate this thesis to my parents, Carl and Kathy Husslein, my beloved Robert, and all of my family and friends who have supported me throughout.

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Introduction

The quest for knowledge has been ongoing in the course of human history in many different fields. The quest for knowledge *is* simply that, a quest. It is a path taken to find the end point or goal. In historical scholarship, the paths vary and some are taken more often than others. This thesis will take "the road less traveled" and expand upon what has been "blazed" by scholars in musicological research, and draw upon scientific study for explanation.

In music history, scholars have sought answers to questions pertaining to oral and written transmission, including: how melodies are preserved, why they are preserved, where notation is derived from, and how oral and written transmission work together in different cultures. Whether seeking the "*urtext*," the origins of notation or attempting to trace the "ultimate link" from an oral to written tradition, many of the subjects noted above have ambiguity attached to them in historical scholarship.

The interest of this thesis is to find a method that may eventually narrow or eliminate the ambiguity behind resolving historical questions with historical logic and context alone. That method involves using scientific support pertaining to how one learns, retains, and transmits music in the oral and in the written traditions. The process of learning, retaining and transmitting material is known as the cognitive process.

Chapter one will look at areas of music history where cognition is used as a reference. The cognitive properties to be explored include memory, patterns,

sequences, recall, signs and symbols. In music history, some or all of these cognitive properties have helped address questions on the origins of notation, notational development, oral transmission as cultural shifts take place and how song or ritual chant is performed and *how* that performance practice maintains oral traditions.

The subsequent chapters (2-4) will serve as case studies in order to test how the cognitive process can be used to further explain the oral and written traditions in ritual settings from different cultures. A *case study* is defined as a "process or record of research in which detailed consideration is given to the development of a particular matter of time."

For purposes of conciseness, each case study focuses on applications in ritual chant. Ritual chant is a repeated phrase, shouted or sung in unison by an individual or a crowd. It is often performed in a ceremonial or sacred setting.[1]

Chapter two will look at Peter Jeffrey's study on the Jerusalem cantorial tradition recovered from the Georgian monks. It will discuss the intervallic relationships and musical patterns used for retention as seen from a cognitive perspective.

Chapter three will explore Kay Shelemay, Peter Jeffrey and Ingrid Monson's collective study on the Ethiopian Christian Chant tradition. Using their studies in conjunction with cognitive explanations, it will illustrate how shared cognitive processes between the oral and written traditions help explain how the oral and written traditions in the Ethiopian tradition have worked together.

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[1] "Ordinary chants." *Grove Music Online*. *Oxford Music Online*. Oxford University Press, accessed June 8, 2013, http://www.oxfordmusiconline.com/subscriber/article/grove/music/20412.

Chapter four will discuss Ivor Miller's study on the Abakuán ritual chant tradition. It will draw upon sound symbolism in order to demonstrate how the particular memory device can explain how two isolated cultures sharing the same roots, could maintain a common oral ritual after years of separated development.

Chapter 1

Tracing the Cognitive Applications in Oral & Written Transmission

"Why do people make music? To communicate.
What do they communicate? A discipline.
How do they communicate? By play."[2]

Music is a means of communication. For centuries, people have played and sung music using language and melody to send messages. In our own historical narrative, there is an emphasis on how and why we communicate in the ways we do. Another way to talk about communication is how we "transmit" music.[3] Whether played or sung, the two types of transmission we use are *oral* and *written*. Oral transmission uses auditory cues and does not rely on documentation, whereas written transmission relies on visual cues and stimuli in the learning process. Since information is being passed from one individual or group to the next, each of them is a learned means of communication. Cognition is the mental process of acquiring knowledge and understanding ideas from experience. The result of acquiring knowledge is called perception.[4] One can use cognition to measure how easy or difficult something is to learn and retain. Looking at the scholarship on oral and written transmission of music, one can trace how cognitive applications—such as memory, perception and recall—were used to explain how oral and written transmission worked. This chapter demonstrates where musical and scientific subjects overlap and how fundamental this overlap is to understanding the

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[2] Charles Seeger, "Music as a Tradition of Communication, Discipline and Play," *Ethnomusicology* 6 (1982): 156.
[3] Diana Deutsch, et al. "Psychology of music §II: Perception & Cognition" *Grove Music Online*. *Oxford Music Online*. Oxford University Press, accessed May 28, 2013, http://www.oxfordmusiconline.com/subscriber/article/grove/music/42574pg2.
[4] Diana Deutsch, et al. "Psychology of music §II: Perception & Cognition"

direct link that bridges the change from oral to written transmissions.

Memory & Recall

Memory and recall have been used to bridge the gap between oral performance practice and the origins of written notation. In order to define memory in all its complexity, it is important to define it on several levels. Memory is often confused with the process of memorization. In lingual terms, memory is a "grammar" that [seeks] to "formulate a theory of human behavior in terms of systems of competences."[5] Memorization is a process of learning a piece or pattern to the extent that the original source is no longer needed for recollection. Memorization relies on the process of habituation.[6] In music, there are arpeggios, scales, and other patterns that are used to "train" the brain to memorize longer and more complex melodies.[7] According to Jonathan Dunsby, four types of memory exist: recollection, recall, recognition and relearning. Memory is directly related to recall. Recall is when past events or subjects are brought to the present without being in physical form. Recalling something often uses cues; recall is a whole encompassing act. Recognition is the ability to connect something currently perceived to that which was previously perceived.[8] Relearning

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[5] Michael Imberty, "Music, Linguistics, and Cognition," in *Music and the Mind: Essays in Honour of John Sloboda,* ed. Irène Deliège and Jane W. Davidson. (Oxford, Oxford University Press, 2011), 4-5.

[6] Jonathan Dunsby. "Memory, memorizing." *Grove Music Online*. *Oxford Music Online*. Oxford University Press, accessed May 28, 2013, http://www.oxfordmusiconline.com/subscriber/article/grove/music/42568.

[7] Jonathan Dunsby. "Memory, memorizing."

[8] Diana Deutsch, et al. "Psychology of music §II: Perception & Cognition."

builds on familiarity by reapplying previously learned concepts.[9] Each time one relearns a process, another layer is applied to the existing memory.

Applying memory and recall to tonal music, memory is a structural system as grammar is in language:

1) In order to memorize and understand a musical phrase, the listener identifies the most important elements of the structure, reducing the musical "surface" to an economical and strongly hierarchical schema.
2) [The] performer reconstructs complexity based on memorized and simplified schema, producing different musical phrases of the same type by reactivating the structure[10]

The above statement from Lerdahl and Jackendoff shows how memory is associated with structure and patterns. In oral transmission, structure and patterns create reference points that can be used and reused in performance.[11]

There are three terms used in psychology that help explain memory: remembering, perceiving, and imaging. The terms explain how the brain "learns" and "remembers" topics that may or may not have been learned through visual stimuli: perception, imaging, and remembering.[12] *Perception* (perceiving) is the direct response to some group, or combination of sensory stimuli that is immediately presented.[13] Perception is when the sound wave impulses reach the eardrum, setting in motion a series of mechanical, chemical and neural events in the cochlea, brain stem, midbrain

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[9] Jonathan Dunsby, "Memory, memorizing."
[10] Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music* (USA: MIT Press, 1996), 8-9.
[11] Michael Imberty, "Music, Linguistics, and Cognition,", 4-5.
[12] *Subjects* in this case are any object or process that is implemented, or where are neural synapse has been created. The subjects may include patterns, sequences, signs and symbols.
[13] Frederic C. Bartlett, *Remembering: Experiments in Sociology and Psychology* (Cambridge: Cambridge University Press, 1997), 7.

nuclei and cortex.[14] One experiences this reaction to stimuli when listening or watching a band play. *Imaging* is the most fluid and ambiguous of the three terms. Upon perceiving, the brain creates images of the event, drawing details from multiple sources that vary or change based on their characteristics. Some details recombine, forming structures that do not necessarily correspond with anything that has been present in a concrete, sensory nature to the observer.[15] The way the images combine determines how the image is later recalled. *Remembering* is when previously experienced events are activated and viewed. Recalling is the ability to visualize and re-perceive one or more parts of a song—such as melodic shape, the words, and the performance medium (instrumental, vocal, etc.)—without repeating the original event.

In order to comprehend how and what one remembers, it is important to understand how the brain perceives, given that the information remembered will not be identical to how the brain initially perceived it.

There are various models that define memory in different applications. According to early models, such as those from Plato (c.427-348 BC), Quintilian (c.35-100), St. Augustine (c.354-430) and Martianus Capella (c.350-460), only visual signs or cues stimulated retention and retrieval. "Iteration" or rote repetition was not considered part of memory or "memorial recollection," because iteration was used to learn in the oral medium. According to Augustine, reminiscence is a rational discovery of things already set aside, and recollection is a conscious process using association to

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[14] Isabelle Peretz and Robert Zatorre, "Brain Organization for Music Processing," *Annual Review Psychology,* 56 (2005): 90.
[15] Peretz and Zatorre, "Brain Organization for Music Processing,"14.

"find" memories. Since rote repetition is not "discovered," it was not considered part of memory.[16] Rote repetition relies on an aural stimulus, and Augustine's theory only applies to visual stimuli, such as pictures or words. His model suggests that learning sounds required a visual stimulus, such as a picture or text. Later models, including Albertus Magnus (c.1200-1280), used multiple types of memory that were categorized according to what stimulated perception.[17] For example, instead of one "memory" that strictly applies to visual stimuli, there are four types that include: "auditory memory" (sound), "tactile memory" (touch), "visual memory," and "pictorial memory" (visual).[18] "Visual memory" is any type of memory triggered by using sight. Visual memory can include pictures, text, symbols, etc. "Pictorial memory" specifically refers to pictures. The line between these terms is rather ambiguous, but, for the purpose of the argument, while pictorial is a type of visual memory, not all visual memory has to be pictorial. These models generate questions regarding:

- The origin of the information entering the brain
- How that information is encoded
- Whether it is in a form that physiologically affects the brain tissue
- How recollection is best stimulated and secured[19]

Memory "stores, sets and retrieves material through the use of mental images."[20] It is a process similar to reading written characters, which departs from the notion that

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[16] Mary Carruthers, *Book of Memory* (Cambridge: Cambridge University Press, 1990), 23-24.
[17] Carruthers, *Book of Memory,* 26.
[18] Carruthers, *Book of Memory*, 20-21.
[19] Carruthers, *Book of Memory*, 20.
[20] Carruthers, *Book of Memory*, 19.

memory is reserved for oral study.[21]

Learning processes and tricks relating to memory have been used to help explain medieval performance and the origins of notation in the transmission of chant. Musicologists, such as Leo Treitler incorporate these learning processes in their research. Treitler draws upon examples of how plainchant and poetry from epics and stories were transmitted in order to develop a plausible representation of the way chants may have been developed. He uses the cognitive process to explain the learning methods involved in both medieval performance practice and the transition from the oral tradition to written manuscripts and notational development. He cites examples from psychologists Frederic Charles (F.C.) Bartlett, Daniel Schacter, David Rubin and Max Haas. Whether using improvisational techniques or performing chants from memory, Treitler found that the compositional techniques used in the oral tradition, were more similar to each other than previous musicological study had proposed.[22]

In one part of his article, Treitler uses the cognitive process to explain the role of memory in oral traditions, as well as how medieval writing on memory continues to be investigated. According to Treitler, Bartlett plays an important role in how one thinks about transmission:

> [Bartlett] led the fundamental change in thinking about memory from a simple and commonplace notion that experiences or poems or songs or images are fully recorded and stored in a fixed state in a memory bank and later retrieved in that state on demand in remembering, towards the general idea that remembering is

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[21] Carruthers, *Book of Memory*, 21.

[22] This is from the vantage point of the modern conception of memorization.
Leo Treitler, "Homer and Gregory: The Transmission of Epic Poetry and Plainchant," *With Voice and Pen: Coming to Know Medieval Song and How it was Made* (Oxford: Oxford University Press, 2007), 134.

> an active process of construction or reconstruction on the basis or formal schemes, salient details, and cues."[23]

Bartlett's thought that memory is not a fixed idea suggests that melodies are not frozen in either the oral or written traditions, that they continue to change and transform, whether in the oral tradition or written tradition.

To explain how this is possible, Treitler discusses how one retrieved the melodies from epic poetry and plainchant.[24] He uses Daniel Schacter's theory of memory to explain how the brain does not operate like a camera or copying machine.[25] Only pieces of incoming data are represented in memory. Incoming parts provide the basis or foundation for reconstructing a past event (such as reconstructing a dinosaur from bones).[26] The act of remembering and "memory" in and of itself are not the same thing.[27] Remembering is a process, whereas memory is the result of remembering. Stored fragments (memories) contribute to remembering or recalling events or sequences. The concepts of memory and recall help explain how plainchant was transmitted orally from one culture to another.

Treitler demonstrates how the system of organization associated with memory applies to performing medieval melodies. He found that oral transmission is not the same process as verbatim recall of fixed texts by literate readers. Remembering a piece in an oral tradition does not require the ability to recall the text exactly; recalling the

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[23] Treitler, "Homer and Gregory: The Transmission of Epic Poetry and Plainchant," 134.
[24] Daniel Schacter, *Searching for Memory: The Brain, the Mind, and the Past* (New York, 1996)
[25] This comes from David Rubin's book, *Memory in Oral Traditions: The Cognitive Psychology of Epic Ballads, and Counting out Rhythms.*
[26] Ulric Neisser, *Cognitive Psychology* (New York, 1967), 285, in Daniel Schacter, *Searching for Memory: The Brain, the Mind, and the Past,* 40.
[27] Schacter, *Searching for Memory: The Brain, the Mind, and the Past,* 135.

overall meaning and outline of the form is enough.[28] For example, when performing a piece of music, the melody or shape may not match pitch for pitch (tone for tone), but the contour and direction will be similar. Treitler explains how plainchant and other orally transmitted songs were maintained, using rules, redundancies, and other constraints associated with memory to decrease change. One of the rules or redundancies developed concerned cues. Cues could be found throughout a piece and helped distinguish the different fixed points found in musical lines or phrase.[29]

Treitler also sees memorization as an independent act, where the events memorized relate more to each other than each event connects to the whole result.[30] Memory depends on the sense that the elements relate to each other in the context of the whole. In this modern view of memorization, contents in storage would imply a capacity of finite (or fixed) proportions. The way material in the oral tradition was grasped contributed to how it spread. The gradual use of writing did not abandon the mnemotechnical apparatus.[31] A mnemotechnical device can be a pattern of letters, ideas, or associations that assist in remembering. Memorizing a melody within the oral tradition relies on the fact that melodies are stable before they are written down; however, stability does not mean a melody is identical every time it is sung. The notion that written transcription is stable, and oral performance is not, led to the misconception that every performance of a melody must be essentially identical in

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[28] David Rubin, *Memory in Oral Traditions: The Cognitive Psychology of Epic, Ballads, and Counting out Rhythms* (Oxford, 1985), 6; in Leo Treitler, "Homer and Gregory" 135.
[29] Treitler, "Homer and Gregory: The Transmission of Epic Poetry and Plainchant," 135.
[30] Treitler, "Homer and Gregory: The Transmission of Epic Poetry and Plainchant," 136.
[31] Treitler, "Homer and Gregory: The Transmission of Epic Poetry and Plainchant," 137.

order for them to be considered the same.[32] Since melodies do not remain fixed in memory, they are not recalled identically. Treitler argues that melodies performed were not the same according to what is often defined as "the same."[33] When looking at the performance practice before neumes were introduced to Gregorian orality, Treitler compared the neumes associated with melodies both before and after concrete systems of notation were in place. He concludes that melodies are only "frozen" in writing.[34]

Treitler notes that the vocabulary pertaining to oral and written transmission forms a black and white perspective on their applications:[35]

- literate
- oral
- composed
- improvised
- memory
- memorized
- variable
- stable[36]

Literate has been affiliated with the ability to read. *Oral* has been affiliated with learning without written documents. To be *composed* has been affiliated with a premeditated act and is often used in context with writing text and melodies. *Improvised* has been affiliated with the act of changing an idea each time it is performed and has been used in oral transmission. To be in one's *memory* has come to mean that

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[32] Treitler, "Homer and Gregory: The Transmission of Epic Poetry and Plainchant," 138.
[33] See reference on page 15 on "sameness," below.
[34] Treitler, "Homer and Gregory: The Transmission of Epic Poetry and Plainchant," 138.
[35] Leo Treitler, "The 'Unwritten' and 'Written Transmission' of Medieval Chant and the Start-Up of Musical Notation," *The Journal of Musicology* 10 (1992): 134.
[36] Leo Treitler, "Written Music and Oral Music: Improvisation in Medieval Performance," in *With Voice and Pen*, ed. Leo Treitler. (Oxford: Oxford University Press, 2007): 39.

no written document is needed to perform the music. *Memorized*, however, has come to imply that a text or written document was learned and then later recalled without the document. Memory and memorized tend to be interchanged depending on how they are used in context. *Variable* and *stable* have also been interchangeable terms, affiliated with oral and written transmission stability and consistency.

The terms above are often juxtaposed as binary opposites:[37]

- oral vs. literate
- composed vs. improvised
- memory vs. memorized
- variable vs. stable[38]

The pairing of these terms an "antonymic" relationship, where one term is assumed to be associated with oral transmission and the other with written transmission. *Composed vs. Improvised* refers to how a piece of music is created or formed – whether through writing it out (composed) or thought of "in the moment" (improvised). To have something in one's *memory* can imply learning it strictly through the oral (but does not have to); to have something *memorized* often implies learning a piece that is written (but can also be learned through oral transmission). *Variable* and *Stable* are often associated with the transmission of a melody or text. If a melody is written then it is *stable,* and the orally transmitted melody is *variable.* However, as scholars, including Treitler and Ruth Steiner, have shown, the opposite associations are also true—where a melody can be more stable when transmitted orally and more variable (less stable) when written. Assumed associations ultimately result in misconceptions. As noted

[37] Treitler, "Written Music and Oral Music: Improvisation in Medieval Performance", 39.
[38] Treitler, "Written Music and Oral Music: Improvisation in Medieval Performance", 39.

above, Treitler recognized and understood the cognitive processes behind melodic transmission. This background may have provided insight for deciphering the above terms' ambiguities and double meanings.

Patterns & Sequences

A pattern is a repeated mechanism often used as a learning tool. A sequence is the order in which experienced events or things take place such as A-B-C-D-E in the alphabet and 1-2-3-4 in the standard counting system. In music, sequences frequently function as patterns. Research shows that learning a sequence or pattern is more difficult than identifying one. For example, in Frederic C. Bartlett's experiments with sequencing, individuals were able to identify what the objects were but not always the order they were in. His results determined that one acknowledges the object's existence, identifies what it is, but often forgets where it is relative to other objects.[39] With a melody, this means that one more readily understands the overall shape and its direction, but is more likely to fail to remember all of the individual notes in their original order.

Pitch and melody are learned, retained, and performed using patterns and sequences. Knowing how patterns and sequences work as memory devices helps one understand how and why melodies change over time, and why certain melodies outlast others. How they are processed is fundamental to understanding how they work as memory devices. The brain processes pitch-based (melodic) and time-based (temporal)

[39] Bartlett, *Remembering: Experiments in Sociology and Psychology,* 19.

properties separately in the brain.[40] Melodic properties are associated with a sustained frequency, such as pitch, tone and melody. Temporal properties are associated with properties such as tempo, duration, meter and beat. A musical scale is a subset of pitches in a given piece, or a sequence.[41]

Scales are theoretical constructs that are determined by extracting the pitch content of melodies and reorganizing them. The central tone was derived from this construct, or pattern of pitches. Having a central tone suggests that certain pitches in a scale are easier to remember than others due to contributing physical properties. The idea of pitch hierarchy comes from this notion.

The concept of pitch hierarchy comes from the physics of sound and the brain's reaction to organizing the information in order to comprehend it. The central tone is considered the most stable because it forms stronger neurological links than other pitches in the scale.[42] The importance or "hierarchy" of the other pitches stems from their intervallic relationships to the central tone. The hierarchy created around these tones (pitches) creates a pattern and stability in the melody.[43] Looking at how this relates to the cognitive process, scientists have described the relationships between pitches as either consonant (heard as pleasant and stable) or dissonant, (heard as

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[40] Peretz and Zatorre, "Brain Organization for Music Processing," 90.
[41] Peretz and Zatorre, "Brain Organization for Music Processing," 90.
[42] Note that frequencies used in this context are referring to the number of physical vibrations created per second in order to produce the sound. References using frequencies associated with reciting tones refers to the number of times that particular pitch or tone appears in a melody. It does not directly correspond to the physical properties of the pitch or tone produced.
[43] Peretz and Zatorre, "Brain Organization for Music Processing," 92.

unpleasant and unstable).[44] Studies by Gavin Bidelman and others showed that brain activity is highly sensitive to pitch relationships found in music that are enhanced when processing intervals. This suggests that the preference for consonant (pleasant) relationships may be rooted in fundamental neural processing and limits of the auditory system.[45] Pitch hierarchy plays an important role in the analysis of oral and written melodies when determining how some are more stable than others.[46]

Understanding pitch hierarchy and grouping structure has helped to explain trends in transmission – how music was transmitted and why. Ruth Steiner proposes that chants must have clear structure in order to be transmitted successfully.[47] While this is not new, her means of analysis exhibits the use of a cognitive process to explain a melodic principle—understanding how patterns work and why they are cognitively significant. Steiner applies a system of organization in her own study. In her system, she expanded upon Edward Nowacki's work on Old Roman chant and created a database of chants from different sources. The designated fields of the database included incipit titles, identifying numbers, and the sources of the text. She used the information to compare antiphons from Old Roman and Gregorian sources. In one particular example, she compares is the *Veni sponsa Christi* melody that she found in a variety of sources

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[44] Gavin Bidelman and Ananthanarayan Krishnan, "Neural Correlates of Consonance, Dissonance, and the Hierarchy of Musical Pitch in the Human Brainstem" *The Journal of Neuroscience* 21 (2009), 13165.

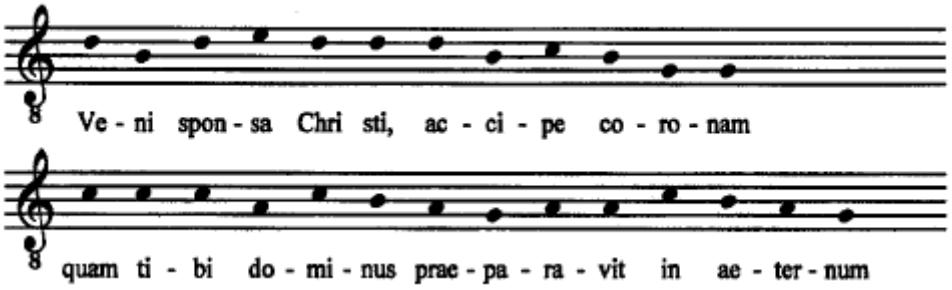
[45] Bidelman and Krishnan, "Neural Correlates of Consonance, Dissonance, and the Hierarchy of Musical Pitch in the Human Brainstem," 13165.

[46] This will be explored in Chapter 2 when discussing Peter Jeffrey's study on the Jerusalem cantorial tradition.

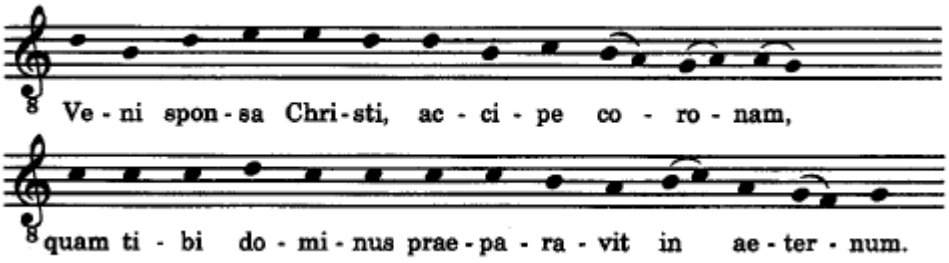
[47] Ruth Steiner, "The Transmission of Antiphons in Two Oral Chant Cultures," in *Dies est Ieticie: Essays on Chant in Honour of Janka Szendrei*, ed. David Hiley, (Ottawa: Institue of Medieval Music, 2008), 489.

including the Old Roman and Gregorian manuscripts.

Example 1: The Antiphon *Veni sponsa Christi* as it appears in the Sarum Antiphoner[48]



Example 2: The Antiphone *Veni sponsa Christi* as it appears in the Old Roman Antiphoner[49]



In her analysis, Steiner notes that the melody in Example 1 appears in 51 different manuscripts; Example 2 appears in 69. Though the melodies found in all 51 or 69 manuscripts are not identical note for note, the similarity in contour is enough to call it "the same."[50] She concludes that shared melodies had similar patterns in contour and direction because even though some notes varied, each melody shared common

[48] Steiner, “The Transmission of Antiphons in Two Oral Chant Cultures,” 487.
[49] Steiner, “The Transmission of Antiphons in Two Oral Chant Cultures,” 487
[50] For a chant melody to be considered "the same," did not necessarily mean that each note must be identical. Shared high and low points and general contour define as melody as "similar" or "different" to another melody.

direction and starting notes.[51] Ruth Steiner used the patterns in melodies as a means of comparison. Steiner concluded that the process of direct transmission involved only a part of the total repertory of chant antiphons. In some cases, a melody was transmitted with a relatively small number of texts containing a certain characterization: it was written in a way so that other texts could use it if they were long enough and had the right phrasing.[52]

Other than physical properties of interval, pitch direction and scale, performance tricks, including cues or patterns within a melody, help performers learn orally. For example, a pattern found in several Gregorian chant melodies was the use of frequently occurring tones, known as *reciting tones*. A *reciting tone* is a repeated musical pitch. Other pitches of the chant gravitate around the reciting tone(s). In Gregorian chant the reciting tone is usually the Dominant of the mode and provides an opposite pole to the final, the actual central pitch. Within a melody, the reciting tone creates tension and propels the melody forward. Because it has a consistent role within the melody, it serves as a means to learn a melody orally.

There are two properties that are fundamental to temporal organization: beat and rhythm. *Beat* is pulse. *Meter* organizes beats into mensural (measured) units. It is a repeating sequence of stressed and unstressed beats. *Rhythm* is the combination of the duration of the notes. The metrical organization creates the perception of the alternation of strong and weak beats.[53]

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[51] Steiner, "The Transmission of Antiphons in Two Oral Chant Cultures," 497.
[52] Steiner, "The Transmission of Antiphons in Two Oral Chant Cultures," 497.
[53] Steiner, "The Transmission of Antiphons in Two Oral Chant Cultures," 494.

The brain uses patterns and sequences in order to remember larger units of material. Within music cognition, there are four levels of cognitive structure, or organization. From Lerdahl and Jackendoff's musical theory, the *Grouping Structure* is the process of translating segmented pieces or sequences into separable and distinguishable units when listening to a piece of music or analyzing a score. The Metrical Structure consists of the regular rhythmic pulse, where the smallest unit alternates between the strong and weak beats.

Patterns and sequences can also be used to study performance practice. Theodore Karp proposes that the awareness of tonal order and tonal centricity came about gradually. He found that many early chants had elements of tonal centricity; however, only some of them were starting to adapt tonality.[54] He determined that there was a "hazy" period when several categories of chant were classified as being "stylistically individual."[55] Karp examines the Cistercian chant manuscripts and found that they most often contain examples of melodic reworking. One pattern he notes is the "crossing" principle. "Crossing" is the mixing of songs in performance, a process most often seen in oral composition. In oral composition, each performance may result in a different "version" of the original melody. One singer will start with the right melody, and once they reach a point that is similar to another song, they will shift to that new song without realizing the mistake. It results in singers mixing songs, passing

[54] Theodore Karp, "Interrelationships Among Gregorian Chants: An Alternative View of Creativity in Early Chant" *Oral and Written Transmission in Chant* (2009): 422.
[55] Karp, "Interrelationships Among Gregorian Chants: An Alternate View of Creativity in Early Chant," 421.

one song pattern from one voice to another at points where each pattern coincides.[56] Concerning the cognitive process, Karp explains how it is important to find the same or similar melodic materials in different categories of chant in order to understand the melodies on a broader scale –by looking at the patterns seen in exclusively in performance.

Beatriz Ilari and Jonathan C. Rappaport emphasize this idea in their study on brain processing and music storage. According to Ilari, "research in the development of music cognition is often based on tests of an auditory-perceptual nature."[57] Research involves tests that normally include listening, followed by observing children's and adults' responses to the music. Results indicate how children and adults respond to and reproduce rhythmic and melodic patterns according to the representations assigned. Ilari found that when melody was added to a phrase of text, the melodic contour took greater priority over the rhythm.[58] They concluded that any type of musical training or involvement with music affects the ability to interpret and follow invented representations or systems.[59]

Patterns and sequences thus function as memory devices. The cognitive processes the singers employed explain why some melodies have lasted in recognizable form and some have not.

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[56] Karp, "Interrelationships Among Gregorian Chants: An Alternative View of Creativity in Early Chant," 410.
[57] Beatriz Ilari, "Invented Representations of a Song as Measures of Music Cognition," *Applications of Research in Music Education* 20 (2002): 12.
[58] Ilari, "Invented Representations of a Song as Measures of Music Cognition," 13.
[59] Ilari, "Invented Representations of a Song as Measures of Music Cognition,"14.

Signs & Symbols

A sign is a visual cue, while a symbol can be visual or auditory and has a meaning associated with it. Both cues are visual modes of representation. How symbols function affects how one learns them. In psychology, there are two modes of visual representation relative to music cognition: iconic and indexical modes.[60] *Iconic mode* is when a sign bears resemblance to the object it represents.[61] In notation, the iconic or visual aspects facilitate reading. They explain the potential for systems of notation to remain stable over time.[62] Indexical mode is when a sign displays a sequential link between the sign itself and what it represents. For example, smoke indicates the presence of fire, because fire generates smoke. They are both objects unto themselves, one a result of the other. In music, cues are indexical signs. A cue is a hint, or sensory signal used to identify experiences, facilitate memory or organize responses. Used in musical applications, one often equates a particular cue with what it indicates to the performer.

Studies in developmental psychology have brought Jerome Bruner and other researchers to the conclusion that there are three stages of cognitive development: *enactive*, *iconic*, and *symbolic*. The *enactive* is when one perceives reality without using imagination or words.[63] In the enactive stage, one uses strictly motor responses to represent past events, including simple actions like tying a knot or driving a car. The

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[60] Atkin, Albert, "Pierce's Theory of Signs." Accessed March 15, 2013. http://plato.stanford.edu/entries/peirce-semiotics/
[61] Treitler, "The Early History of Music Writing in the West," 240.
[62] Jerome S. Bruner, "The Course of Cognitive Growth" *American Psychologist* 19 (1964): 3, Chapter 7 in *The Course of Cognitive Growth*, 69.
[63] Bruner, "The Course of Cognitive Growth," 69.

iconic is when one perceives events with "internal imagery"; internal imagery depends on what the visual events are associated with. In this stage, the ability to process images is apparent, also known as "visual learning." The iconic stage involves transforming perceptions into meaning.[64] The *symbolic* is the ability to process abstract, subtle and flexible thought. It allows for creative plasticity and reflective thinking; it is the most flexible and complex of the three learning processes and applications, taking several ideas and combining them into to one.[65] In the symbolic stage, one can process numbers, symbols and more complex language in general.

Signs and symbols are important educational tools. Systems such as the Kodaly Approach use signs and symbols to teach various skill sets, like sight-reading, pitch identification, and meter. The Kodály Approach is an educational pedagogical system that was originally developed to improve the quality of music educational techniques, starting with children. The Kodály Approach includes rhythmic symbols, where note values (or pitches) are assigned unique syllables to indicate duration. One example is the quarter note syllable equivalent – *ta*. This system also uses a moveable *do* technique in solfege, which aids in reading music (sight-singing). Studies have shown that the Kodály Approach improves intonation, rhythm and the ability to remember songs.[66] In some cases, notation provides specifics such as note location and intervallic relationships once music has been learned by rote. This way the entire piece can be

[64] Bruner, "The Course of Cognitive Growth," 69.
[65] Bruner, "The Course of Cognitive Growth," 70.
[66] Peter DeVries, "Reevaluating Common Kodaly Practices," *Music Educators Journal* 88 (2001): 24.

learned without repeating each phrase.[67] There are various types of teaching methods in the Kodaly approach, including:

- Teaching a Song through Motions
- Teaching a Song Through Analysis
- Teaching a Song through the Song's Game
- Teaching a Song through Call and Response, etc.

When *Teaching a Song through Motions*, the teacher sings a song while using physical gestures to convey the beat. As the song progresses, the rhythms change to represent different parts of the song. When *Teaching a Song through Analysis*, the teacher sings a song and asks a series of questions after the song is sung each time. Since it usually requires repetition, children are forced to listen to the song more carefully. When *Teaching a Song through the Song's Game,* children follow the directions provided by the song itself. The teacher drops out eventually and the children continue the song. When *Teaching a Song through Call and Response*, the teacher calls out a phrase of the song and the children repeat it. As the song progresses, a phrase is added until children learn the whole song through repetition. The Kodály Approach also incorporates methods for reading musical notation:

- Teaching a Song Through Rhythmic Reading
- Teaching a Song through Reading Rhythm and Melody using Standard Notation

[67] Jonathan C. Rappaport, "Techniques for Teaching New Songs: A Kodály Approach: Part I-Rote Learning of Songs," 2001.

When *Teaching a Song through Rhythmic Reading*, students first identify the form of the rhythm of each line using shapes, letters or other representations the teacher chooses. Students then use physical gestures to indicate what is going on in the score (i.e. the rise or fall of pitch, the rhythms, etc.). In *Teaching a Song through Reading Rhythm and Melody with Standard Notation,* students learn to identify function (pitch, rhythm) using the symbols on the staff. In each method, signs and symbols serve as a learning device. They illustrate that the way signs and symbols are used affects how they are retained. The Kodaly System represents an example of how signs and symbols are used as memory devices to teach melodies orally and through writing.

Notation serves as graphical representations or signs that indicate certain directions to the reader. For example, one might see signs to indicate voice direction, pauses, word emphasis, and the syllabic character of the text.[68] Voice direction relates directly to the up-down or sustaining motion of the voice in order to enunciate the language.

Scholarship on written and oral transmission discusses the importance of signs and symbols and their roles in understanding the function of early notation. They use paleography and semiotics to explain how early notation might have been transmitted and its historical function. Both paleography and semiology are the study of signs. Paleography is the study of signs in ancient writing. Semiology is the study of signs and

[68] Leo Treitler, "Reading and Singing: On the Genesis of Occidental Music Writing" *Early Music History* 4 (1984): 151.

symbols and uses historical context.[69] Semiology looks at the functional relationships between signs and their meanings.

Using paleographic methods, Leo Treitler explains the purpose of the invention of early systems of notation, why the systems developed, how the symbols functioned within those systems, and the roles the symbols played in performance.[70] He also defines notation and melody in semiotic terms. For example, placing notes on the staff creates representations of pitch and time in a two-dimensional field. One often interprets melodic line or melody as a single, continuous thing. When one reads the notational representation of the melody as a graph or picture of a melody, our mind's eye or ear connects the dots.[71] A "melodic line" is a sequence of positions (notes on a staff) "conceived or sounding in succession;" it is more than a mere succession of pitches.

In a study of the emergence of notation in the Frankish chant tradition during the Carolingian period, Susan Boynton showed that early Western notation was a result of the interaction between oral transmission and written transmission.[72] She found that the style and extent to which notation was used depended on type of hymn or chant as well as when the source emerged. For example, medieval hymnals often contained a melody with an indication that it was used with several texts sharing a liturgical position

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[69] Kenneth Levy, "On the Origin of Neumes" *Early Music History* 7 (1987): 72-73.
[70] Treitler, "Homer and Gregory: The Transmission of Epic Poetry and Plainchant," 134.
[71] Treitler, "The Early History of Music Writing in the West," 239-240.
[72] Susan Boynton, "Orality, Literacy and the Early Notation of the Office Hymns" *The Journal of the American Musicological Society* 56 (2003): 100.

or meter.[73] In her analysis, she looks at the role of the hymns in monastic education.[74] In some cases, she found that the Office hymns used for prayer and lessons contained larger script, while antiphons and responsories utilized smaller scripts.[75] The notation from prayers and hymns had larger text and notes so that everyone could read and understand them. The difference in size served as a visual indicator, allowing one to learn different styles of ritual texts more easily. Aside from the size, another difference in the roles of notation was the extent of use. Boynton notes three different levels of notation use: Full Notation, Partial Notation and Marginal Notation.

Full notation is when all parts of a text have corresponding neumes written out completely. Cantors primarily used full notation as a reference tool and reminded them of what to emphasize when teaching hymns to others in the church. *Partial Notation* is when only parts of a text contained corresponding notation. Partial notation functioned as a reference tool for sections of music (text) that needed more attention or assistance to learn.[76] Partial notation also provided directions on performance practice. *Marginal notation* showed the shape and intervals of pitches of a melody, but separated it radically from the text.[77] Melodies using Marginal notation were likely performed more frequently, and therefore needed less reiteration for future use.

There are different studies that have sought to explain the origins of notation and its function. For example, the Alexandrian Accent theory defines notation with

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[73] Boynton, "Orality, Literacy and the Early Notation of the Office Hymns," 105.
[74] Boynton, "Orality, Literacy and the Early Notation of the Office Hymns," 119.
[75] Boynton, "Orality, Literacy and the Early Notation of the Office Hymns," 105.
[76] Boynton, "Orality, Literacy and the Early Notation of the Office Hymns," 124.
[77] Boynton, "Orality, Literacy and the Early Notation of the Office Hymns," 132.

three elements: the acute, grave, and circumflex symbols. Acute indicates movement upward; Grave indicates movement downward. A circumflex indicates movement upward then downward. Additional signs, including the quilisma, oriscus, and liquescences indicated performance details outside of pitch.[78]

Jan van Biezen and Kees Vellekoop show how cognitive properties can be used to understand the role of notation found in documents and manuscripts. Using examples from the Gruuthuse manuscript, they seek to explain why preference was given to stroke notation, a relatively rudimentary system of notation with strokes, at a time when mensural notation was well developed.[79] The Gruuthuse manuscript dates back to the 14th century and contains the largest number of melodies using stroke notation.[80] Stroke notation is pre-mensural notation that contains no clef, has five (or in select cases – six) staves, rarely contains notation written under the melodic line. Each stroke represents an imperfect semibreve and the rhythm is imperfect. Van Biezen and Vellekoop found that sources containing stroke notation rarely contained melodies aligned directly with text. They also found that the staff lines separated melodic phrases.[81] Even though this early notation had different properties than later developments, they concluded that stroke notation worked as well as it did because it

[78] Kenneth Levy, "On the Origin of Neumes" *Early Music History* 7 (1987): 62.
[79] Jan Van Biezen and Kees Vellekoop, "Aspects of Stroke Notation in the Gruuthuse Manuscript and Other Sources," *Tijdschrift van de Vereniging voor Nederlandse Muziekgeschiedenis,* 34 (1984): 5.
[80] Van Biezen and Vellekoop, "Aspects of Stroke Notation in the Gruuthuse Manuscript and Other Sources," 5.
[81] Van Biezen and K. Vellekoop, "Aspects of Stroke Notation in the Gruuthuse Manuscript and Other Sources," 8.

could be read easily by musicians, who were not familiar with the more complex mensural notation.[82]

The examples above illustrated cognitive processes have been applied when studying different systems of notation.

Conclusion

It is important to understand how the cognitive process has been used in previous scholarship on oral and written transmission. Upon defining the terms, each section illustrated topics discussed in oral and written transmission and examples where the cognitive process was involved directly or indirectly in the explanation of the study. Memory, patterns, sequences, signs, and symbols are all terms that have cognitive implications. The evidence shows that 1) Scholars have an understanding of the cognitive processes and how they relate to oral and written transmission; 2) Patterns, sequences, signs and symbols are theoretical constructs from the basic understanding of how one learns and retains information in one's memory; 3) Using cognition and the cognitive process to help explain issues in oral and written transmission provides an objective means of explaining topics that can be ambiguous and highly debated.

In order to justify these differences, one must verify that cognition continues to be relevant for studying transmission. The subsequent chapters elucidate how cognition can be used to objectively analyze oral and written transmission. Each chapter looks at studies of cultures that use oral and/or written transmission in their ritual ceremonies. Because both oral and written transmission use cognitive processes

[82] Van Biezen and K. Vellekoop, "Aspects of Stroke Notation in the Gruuthuse Manuscript and Other Sources," 19.

in the learning process, each chapter will illustrate how using the cognitive process can provide physiological explanations to musicological ambiguities, especially in notational development.

Chapter 2

The Role of Mode & Pitch Hierarchy in Ritual Chant Transmission
Case Study I: "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant" by Peter Jeffery

This chapter reviews Peter Jeffery's findings on the Jerusalem chant tradition. His study is an excellent application for using the cognitive process as an interpretive tool, as it explores a culture with living evidence from the oral and written traditions.[83] It uses cognitive process to illustrate how hierarchical relationships among pitches and intervals help explain how and why several sources contained similar melodies despite different languages and geographic locations. Jerusalem has been a central location for ritual melody and practice since the 10th century B.C.E.[84] Jerusalem is a foundational center in the history and development of ritual practices in Christianity, and traditions of the Jerusalem chant exercised their influence on Christian worship outside of the holy city.[85] Jeffery focuses on the Jerusalem cantorial tradition, recovered through the translations and transcriptions of chant repertories by Georgian monk scholars. These chants had the same or similar functions as those found in several liturgies. Jeffery concentrates primarily on the Stational Liturgy.[86] After comparing chant melodies in several sources, Jeffery finds that the melodies share the same shape and mode.

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[83] Peter Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant" *Journal of the American Musicological Society* 47 (1994): 1.
[84] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant,"1.
[85] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 1.
[86] The Stational Liturgy took place in different churches as part of a rotation. A large part of the urban population worshipped under the direction of the diocesan clergy and the bishop. On

Jeffery was one of the first to study the Jerusalem chant tradition using musical resources. Previous scholarship used mainly nonmusical sources, such as biblical readings, sermons, liturgical calendars and prayers.[87] Since his initial studies, scholars have recovered the entire textual library/collection of Jerusalem chant including information on the melodies. Some scholars have traced the chant history from the fourth through twelfth centuries and have determined the modes and neumes used in these chants.[88]

Because various cultures co-existed in Jerusalem using the same chant melodies—including the Greeks, Syrians, Byzantine and Lebanese—Jeffery found it difficult to locate a source containing the original language. Having the rituals in various languages created textual and melodic variations. Each culture brought their own language to the rituals. As cultures moved and divided, their services gradually adapted their own styles, using their own languages.[89] Four traditions evolved that used the Syrian language, Byzantine, Maronite, "Jacobite" and Melchites.[90] Each tradition

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select observances, the pope or one of his representatives leads the assembly in worship. At this mass, the clergy and assembly celebrate through short prayers and sung antiphons, psalms and a litany to the church, relative to the worship day.
Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 2.

[87] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 5.

[88] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 8.

[89] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 5.

[90] Syrian is a Semitic language related to the vernacular Aramaic that was native to the tongue of Jesus. Many cultures who spoke this language came from the eastern border of the Roman Empire (Syria, Israel, Jordan) or the Persian Empire (Iraq)
Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 3.

merged and transformed over time. Other Syrians followed the "Jacobite" tradition, which maintained the original Greek texts from the Jerusalem rites.[91] The Armenians, who lived in another area of Jerusalem, had their own tradition that they wished to maintain; however, they also incorporated native Armenian hymns into their liturgies.[92]

Jeffery examines several Georgian sources where the Jerusalem chants were recovered: the Armenian Lectionary, the Georgian Lectionary, the Georgian Chantbook and the Georgian and Greek *Heirmologia*.[93] The Georgian monks were the only living representatives of a language that could be used to translate from the original chants. He found that the old chant repertory did not disappear entirely; instead, most of the repertory was absorbed into standard Byzantine books. The Georgian Chantbook is believed to be the only one that contains the chants in the original Latin.[94] It includes texts from the complete liturgy, including prayers, readings and chants in the order of the mass. Jeffery found that the spread, influence, and the assimilation of Jerusalem chant into other cultures offers instructive parallels to the processes by which the Roman chant was adopted, adapted and hybridized throughout Europe.[95]

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[91] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 5.
[92] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 6
[93] The Georgian Chantbook developed alongside the Jerusalem Lectionary. It includes the complete texts of chants written in the Georgian translation.
Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 13.
[94] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 6.
[95] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 9.

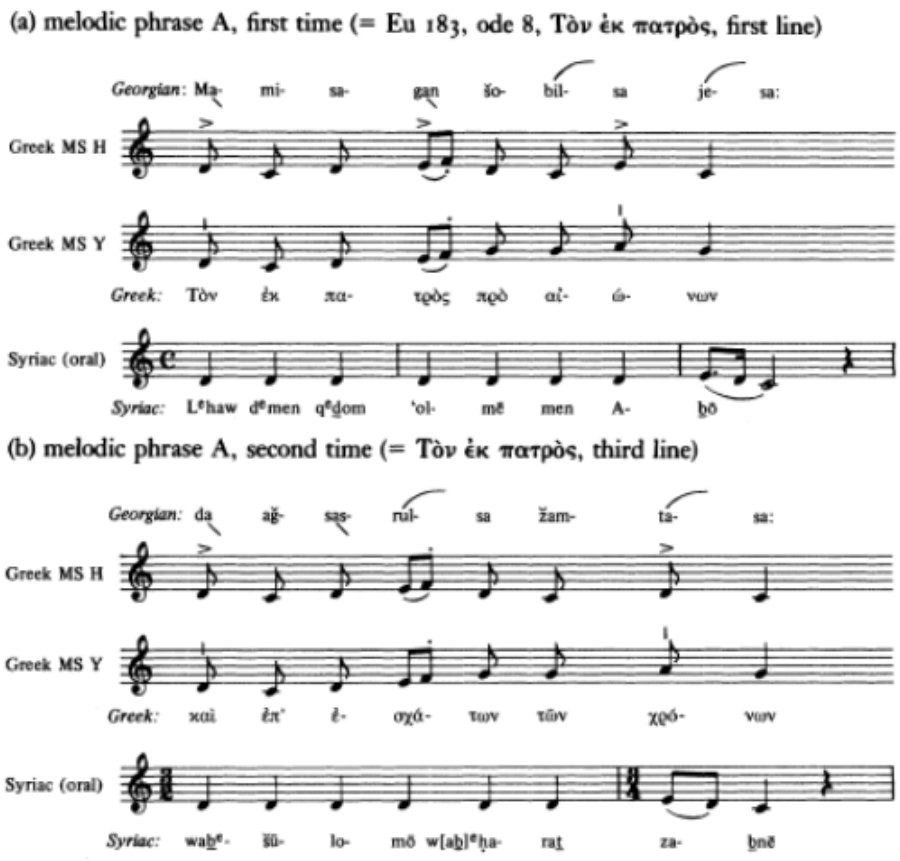
Jeffery uncovers several common features in the melodies found in the Latin and Greek sources. Despite the differences in language, he found that the Latin and Greek chants shared melodic shape and pattern and were transcribed in modes that were similar among the multiple sources. Therefore, even though the cultures grew apart and ceremonies no longer shared a common language, the ritual chants maintained common musical characteristics.

Jeffery demonstrated that mode and melody are important factors in transmitting and stabilizing Jerusalem chant. In order to determine how and why some melodies shared similar shape and mode, the following section shows how pitch hierarchy plays a role in learning melodic and modal patterns. It draws upon Jeffery's observations on the Introit in the Easter Vigil Mass. According to the Georgian sources from the Library of Ecclesiastical and Historical Sources in Brookline, Massachusetts, the text for the stanza in Example 3 was sung in D-plagal mode.[96] This melody has been reused in different liturgical traditions and survives with few modifications; however, it has been better preserved in Ambrosian chant manuscripts than any of the other known cultures that carried it. Though they have limited information, the Byzantine manuscripts confirm that both the Byzantine and Ambrosian modal assignments were D

[96] Modes vary "in their succession of tones. They did not […] have major and minor scales, but differed from us in having one to suffice for both."[96] In other words, they did not have defined "tonality" as we see in the Western tradition today. These Greek modes differed in their tone succession, since concepts of major and minor tonalities were not defined as such in pre-Christian times.
Louis S. Davis, "Spirit of Jewish Music." from *Studies in Musical History.* (New York: G.P. Putnam's Sons, 1887), printed in *The Value of Sacred Music*¸ ed. J. Friedmann, (Jefferson: McFarland and Company, 2009), 26.

plagal.[97] Jeffery concludes that the Ambrosian and Byzantine melodies were not identical note for note; however, they shared the following features: 1) same general range, classified in the D plagal mode; 2) relatively syllabic text setting style; 3) similar melodic shape: the ascending leap from D to G, a relatively stationary sequence on this higher pitch, followed by a descent.[98] See example 1 below[99]:

Example 1: Greek MS H, Greek MS Y, and Syriac (oral) Melodic Phrases[100]



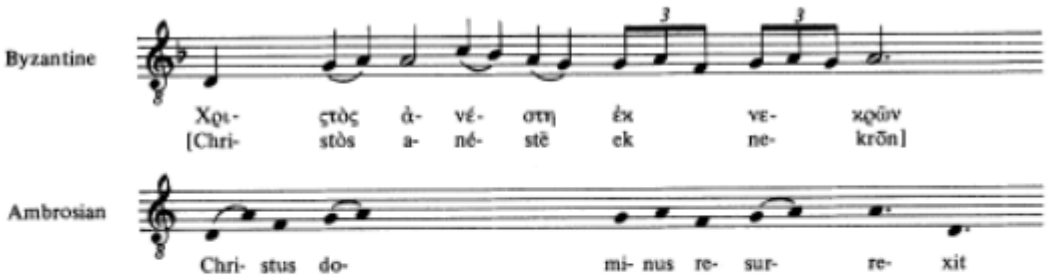
[97] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 19.
[98] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 20.
[99] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 30.
[100] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 30.

In example 1a, melodies in each source share common ascending, descending, and sustaining patterns. The only difference between examples 1a and 1b is in the Greek MS H line, which has a D instead of the former E on the penultimate syllable. In both examples 1a and 1b, the "D" is prominent throughout the line.

In the next example, he observes similar characteristics:

Example 2: Introit of Easter Vigil Mass – Modern Byzantine and Ambrosian Melodies[101]

The introit of the Easter Vigil Mass at Jerusalem: modern Byzantine and Ambrosian melodies



Sources: Byzantine melody. Transcription from the recording identified as "'Byzantine Hymns of the Epitaphios and Easter' (Simon Karas), Society for the Dissemination of National Music 112," in Reinhold Schlötterer, "Geschichtliche und musikalische Fragen zur Ison-Praxis," in *XVI. internationaler Byzantinistenkongress, Wien, 4.–9. Oktober 1981: Akten* 2/7: *Symposion für Musikologie: Byzantinische Musik 1453–1832 als Quelle musikalischer Praxis und Theorie vor 1453*, ed. Jørgen Raasted, Jahrbuch der österreichischen Byzantinistik 32/7 (Vienna: Verlag der österreichischen Akademie der Wissenschaften, 1982), 20.

Ambrosian melody. *Antiphonale missarum juxta ritum sanctae ecclesiae mediolanensis*, [ed. Gregorio M. Sunyol], (Rome: Desclée, 1935), 202.

Both melodies fit in the D plagal modal range of D to D.[102] The introit melody begins with an ascent D to G, then alternates between G and "a" pitches, leaps up to "c" and

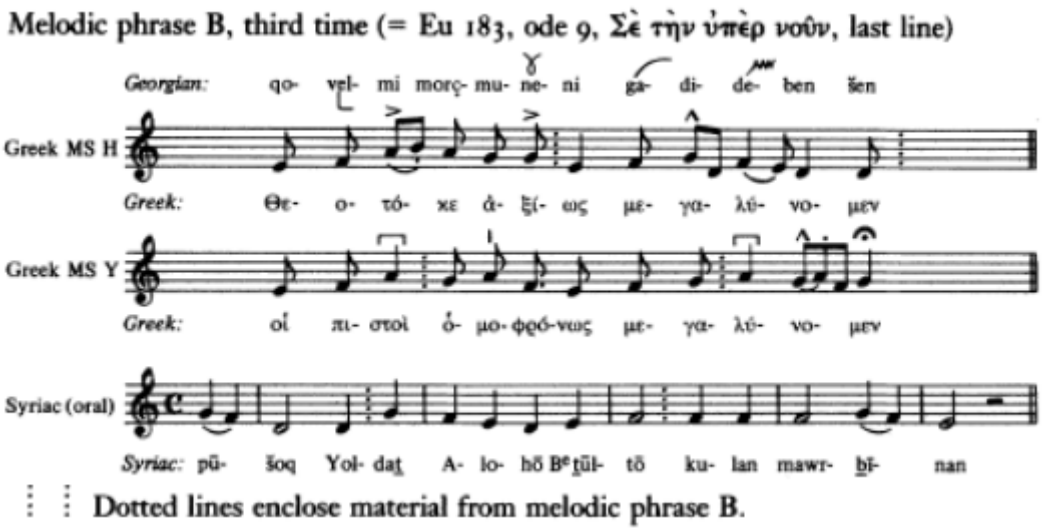
[101] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 20.

[102] Jeffery acknowledges that the Greek melody could be considered authentic instead of plagal; however, he concludes that this melody probably used plagal mode. The Ambrosian melody is considered plagal because its limited range covered the final to the dominant in this section. Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 21.

ends with a descent to an "a."[103] Even though the compared melodies differ, they both preserved the most basic features shared by their medieval antecedents.[104] Jeffery concludes that the surviving melodies outside of Jerusalem use the same mode, contain similarities in the rise and fall, and share similar overall contour and text settings.[105] Comparing similar melodies reveals how cognitive patterns influence what makes one melody "similar" to another as will be seen shortly.

Using similar parameters, he compares the melodies in several examples. In this third example, he compares the Greek and Syrian melodies.

Example 3: Greek MS H, Greek MS Y, Syriac Melodic Phrases[106]



[103] The Greek melody also includes a single descent to F before descending. The descending tones vary in the melodies; the Greek remains on the 'a', whereas the Latin descends further to the original D. Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 21.

[104] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 21.

[105] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 22.

[106] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 32.

Both the Syrian and Greek sources assign the melodies to D-plagal mode. He accounts for differences in notation; however, he arrives at the same conclusion. Even though "we cannot reconstruct the actual pitch succession of the original Jerusalem melody, […] we can know the mode of the Jerusalem chant, and various features of its melody, such as the succession of phrases or formulas, the degree of melismaticism and [sometimes] the general melodic outline."[107]

Jeffery found that some melodies were more easily learned and therefore, more readily transmitted and stabilized in the Jerusalem tradition. Using cognitive process in analysis, one can illustrate that the hierarchical relationships within a scale help explain why some modes are easier to learn than others. Lerdahl and Jackendoff proposed that in order to memorize and understand a musical phrase, the listener identifies the most important elements of the structure, reducing the 'surface' to an economical and strongly hierarchical schema.[108] They suggested that the brain carries out mental operations of simplification in order to understand the piece's complexity. From their results they generated the Generative Theory of Tonal Music (GTTM). According to the GTTM, any piece of music can be analyzed in any of the four hierarchically structured levels. At the *grouping structure* level, the brain groups sections of a piece or sequence of pitches into larger segments when listening to or reading a melody.[109] The segmentation that takes place supports Jeffery's proposal. Here, Jeffery suggests that

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[107] Jeffery, "The Earliest Christian Chant Repertory Recovered: The Georgian Witnesses to Jerusalem Chant," 32.
[108] Michael Imberty, "Music, Linguistics, and Cognition," in *Music and the Mind: Essays in Honour of John Sloboda* ed. Irène Deliège and Jane W. Davidson, (Oxford:Oxford University Press, 2011), 4-5.
[109] Imberty, "Music, Linguistics and Cognition," 5.

the rise, maintenance and descent in pitches are "groups" that the brain can process over the particular pitch identity. When learning the chants, performers identified the important elements first before recalling the details. The important elements included but were not limited to certain intervals of pitches, directions of pitch, and dynamics.

Jeffery also observed that the D-plagal mode was used the most when comparing melodies from the Byzantine and Greek sources. In order to understand why melodies mentioned above circulated in the D-plagal mode, one must define scale, pitch, and intervals. In modern western notation, a scale is the use of a small subset of pitches (typically between five and seven) in a given piece. The scale tones do not have equal weight and are organized around a central tone.[110] From neurological experiments, studies show that pitch hierarchy exists in the brain on a primal level. This hierarchical structure affects how melodies are perceived, retained, and recalled.[111]

Looking at structures, pitch hierarchy in music cognition directly relates to memory:

> It is suggested that the "tonal hierarchy" is established in the long-term memory of a listener through long-term exposure to music that exhibits consistent and systematic features of pitch usage that conform to principles of Western tonality […] the importance of any particular pitch within the even hierarchy is determined by factors such as its frequency of occurrence or total sounding duration, and the salience accorded to it by its occurrence on metrically strong beats or at phrase boundaries.[112]

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[110] Since Jeffery works with the concept of scale prior to western tonality, we can use this term generally, as defining scale as a structural concept, or a means of organization.

[111] Isabelle Peretz and R. Zatorre, "Brain Organization for Music Processing," *Annual Review Psychology,* 56 (2005): 92.

[112] Diana Deutsch, et al. "Psychology of music, §II: Perception and Cognition" *Grove Music Online*. *Oxford Music Online*. Oxford University Press, accessed June 8, 2013, http://www.oxfordmusiconline.com/subscriber/article/grove/music/42574pg2.

Pitch hierarchy supports how reciting tones were a tool for learning and retention. Reciting tones serve as markers for retention and recall.[113] According to Leo Treitler, reciting tones provide a means for the brain to organize melodies into formulas.[114] "Formulas" serve as directional tools for performers. Since modes encompass both melodies and scales, one can look at how they function and then how they are learned using sequencing techniques.

A sequence is an order, without regard necessarily to a hierarchy or organization. In chant, a sequence is an order of pitches or tones. How one remembers a sequence is important. *Remembering* is how multiple stimuli are combined and rearranged. Even though the observer knows that the original events are not currently present to any of his or her senses, they used to be present.[115] When recalling one or more parts of a song, the brain creates an image for how it sounds, the words (if present), and/or the medium of performance (instrumental, vocal, etc.) without physically experiencing the original event. When asked to recall the sequence of objects placed before them, individuals identified the objects but not always the order. The behavior suggests that one can "remember *that* it is, often *what* it is, but may forget *where* it is."[116] One can argue that oral and written transmissions are both stable; in either case, the brain may remember the pitches themselves, but does not remember the proper sequence. Knowing how the brain processes sequence and the given the variance in performance

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[113] Diana Deutsch, et al. "Psychology of music, §II: Perception and Cognition"
[114] Leo Treitler, "Reading and Singing: On the Genesis of Occidental Music-Writing," *Early Music History* 4 (1984): 202.
[115] Frederic C. Bartlett, *Remembering: A Study in Experimental and Social Psychology,* (Cambridge: Cambridge University Press, 1932), 14.
[116] Bartlett, *Remembering: A Study in Experimental and Social Psychology,* 19.

practice shows why Jeffery observed differences in pitch order but not in overall structure. The idea that pieces or fragments of previously experienced events can be brought forward or realized without having to experience it at that moment in time explains how the general shapes among these melodies were consistent and not necessarily the order of the pitches.

Both hierarchical relationships and sequences share a common memory trick, the signpost. Even though sequences do not have to have any rhyme or reason, in cases like chant melodies, they have signposts that make the phrases easier to recall. Bartlett mentions "signposts" or "cues" in several parts of his theory. For example, he notes how *perceiving* is active reorganization – suggesting that how one recalls a melody or order is not always the same as originally learned. He also notes how one draws out certain features automatically when perceiving. Those certain features serve as signposts for later recollection of the event. Those signposts are central for remembering. Remembering is an active process of stringing together details around the signposts the brain recalls first; therefore, one constructs a melody and does not "reproduce."[117]

Jeffery identified the common shape or trend in pitch order; however, as previously demonstrated, the melodic sequence note-for-note does not have to be exact in order to be remembered. Looking at the first example again (see above page 34), the frequently occurring "D" may have served as a signpost, a memory device for learning the melody. The fact that each source has a similar line, suggests that the

[117] Treitler, "Homer & Gregory: The Transmission of Epic Poetry and Plainchant," 345. (137 in *With Voice and Pen*)

shared notes and similar shape were easier to learn and therefore, more readily stabilized in the tradition.

Noting how the brain learns certain intervals and modes illustrates how the Jerusalem chants maintained stability through both modal and melodic construction. The ability to "learn" certain intervals and modes more easily than others goes back to the brain's natural tendency to group a series of notes and form patterns for long-term memory. In oral composition, every time a piece is performed, it is "re-composed" by the user.[118] Because the brain does not always remember sequences exactly as heard, over time the melodies—though similar in shape and mode—have differing details. These details will also tend to alter with variations in text and the number of syllables. In example 1b, the Greek MS Y and Greek MS H lines both share two notes on the fourth syllable, even though the MS Y line has 2 syllables and the MS H line only has 1. The top line uses the Georgian translation and the bottom line uses Greek text. This shows that language can greatly affect the changes in the details of a melody, but do not affect the overall shape and modality.

Jeffery's study outlines historical context and describes the chant sources that contain Jerusalem derived melodies. He makes several comparisons between the chants melodies from different manuscripts. He concludes that even though these melodies differed in pitch, they shared the D-plagal mode and had a common melodic shape. Applying cognitive patterns to Jeffery's study, such as pitch hierarchy and intervallic relationships, explains the fundamental reason why melodies shared the

[118] Diana Deutsch, et al. "Psychology of music, §II: Perception and Cognition"

same melodic shape and mode, despite their geographical and lingual differences. Further, one can rationalize what qualifies melodies as being “different” or “similar.” It also helps justify how an oral tradition can spread and yet remain relatively consistent over time.

Chapter 3
Shared Cognitive Processes Between the Learning Methods of the Oral & Written Tradition:
Case Study 2: "Oral and Written Transmission in Ethiopian Christian Chant" by Kay Shelemay, Peter Jeffery and Ingrid Monson

Kay Shelemay, in collaboration with Peter Jeffery and Ingrid Monson, examines the oral and written traditions of Ethiopian Christian chant. Their results show how the two learning methods have worked together to maintain a stable ritual tradition. This case study uses Shelemay's results to illustrate how shared cognitive processes between the oral and written traditions help explain how oral and written transmission work together.

Purpose & Methods

Shelemay interviewed a member of the Ethiopian community, ɛleqa Berhanu, the facilitating musician for church music activity and the accreditation of church musicians. In the interviews, she recorded his performances of selections of Ethiopian chants. Shelemay and Berhanu then identified the signs in the modern printed edition of the chant book. ɛleqa Berhanu provided a complete list of notational signs and sang the melodies associated with each sign. Berhanu's text also contained information on the Ethiopian modal system, liturgical sources and additional notational signs that were not performed.[119] Shelemay then compared the entry from the Dəggwa chant book

[119] Kay Shelemay, Peter Jeffery, and Ingrid Monson, "Oral and Written Transmission in Ethiopian Christian Chant" *Early Music History* 12 (1993): 62.

with Berhanu's realization of the signs from performances of complete chant melodies. The Dəggwa chant book is the official chant book in the Ethiopian culture.[120]

Using Berhanu's list created some issues. The first issue was the relationship between the individual's knowledge of tradition and dimensions of musical system at large.[121] Shelemay was concerned that the scope of the terms listed was too limited; however, she chose to rely on this list anyway because it was the only accessible source to sketch the boundaries of an oral tradition that varies in performance from one individual to another. Her study traces the parameters of the normative Ethiopian Christian chant tradition through the late twentieth century.[122] The second issue Shelemay addresses is the complexity of the Ethiopian Christian notational system. The system comprises 558 notational signs and has three categories of mode. The third issue they considered was the sheer volume of the material from Berhanu. He provided over a thousand liturgical chants from major service books. In addition, the service books included historical information on the chants in the Dəggwa.

In order to define parameters of the modes, Shelemay collaborated with Ingrid Monson to study their function and meaning. Within the Ethiopian tradition, there are three types of mode: səlt, zema, and ɛraray. The səlt mode applies to the smallest structural unit of notation defined by the Ethiopian notational tradition, the mələkkət

[120] Chants from the Dəggwa chant book were performed before Mass on Sundays and holidays throughout the liturgical calendar.
[121] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 62.
[122] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 62.

signs. The modes can be classified in two musical categories, pitch and dynamics.[123] The zema means "sacred chant." There is a metaphor operative in Ethiopian chant that associates the three modes with the Holy Trinity: The ɛraray means "holy spirit"; the gð' ðz mode represents "God the Father"; 'ðzl represents "God the son." Each of the three distinguishes itself from the other using a different pitch set.[124] There is no particular classification of pitch within the melodies; however, there are differences in pitch sets among the modes. Monson outlined four observations on notation and mode:

> 1) The Ethiopian musician makes many of their own decisions in the course of realizing the smaller structural unit
>
> 2) Conventional signs are most important for textual placement and indicate important melodic cadences
>
> 3) Musical structure follows textual structure closely
>
> 4) The *bet* may play an important role in musical continuity of sections, which use them.[125] The *bet* is a type of sign in the margin of the notation. It indicates a specific melodic sequence.[126]

Monson's observations of notation and mode explain the role of notation within the Ethiopian Christian musical system. Each pitch set is labeled according to its function. The labeled modes provide direction for the singer including the movement (up or down

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[123] The məlðkkðt is the smallest structural unit defined by the Ethiopian tradition. The məlðkkðt will be discussed further later in this chapter.
[124] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 99.
[125] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 110.
[126] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 107.

in pitch), dynamics and the timbre. In the transcriptions, there are sometimes discrepancies between the length of the grouped text and the sign itself. This means that the length of the melody does not always match up with the associated text. However, Monson notes that this is not a critical issue in the learning process.[127] Since whole melodies learned orally use notation as a supplement to learning additional melodies, the notation does not necessarily reflect an accurate representation of the performance.

With an understanding of mode and pitch sets used in the Ethiopian system, Shelemay then analyzed 18 samples of notational signs, which included: a cross-section of feasts, a representative sampling of melodies with examples from three modal categories, and additional chants melodies with possible concordances in other Ethiopian and Eastern Christian traditions[128]

Shelemay compares three regional styles – Bethlehem, Qoma and Achaber in order to study how melodies were learned.[129] She observed various interpretations and performances sung by ɛleqa Berhanu and saw variation among each singing example.[130]

In the next part of the investigation, Peter Jeffery looked at the origins of notation using several sources for reference. One source, Dδggwa, the Ethiopian chant book, contains antiphons, so called because they are similar to the texts and content of

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[127] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 113.
[128] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 65.
[129] Bethlehem, Qoma and Alchaber are three singing styles in the Ethiopian liturgical tradition.
[130] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 113.

Gregorian antiphons. When looking at the earliest manuscripts of Ethiopian chant, he observed that the chants were organized either by melodic group or liturgical order.[131]

Jeffery defines two types of chants. "Type I" melodies are classified according to their group or family. Each melody has a section of notation written at the top to indicate location and association. The sections of notation are singled out to represent the entire group. The groups – or units of melodic sequences are sorted by common characteristics and applications such as the place in the liturgical calendar. "Type II" contains melodies that are categorized further, according to how they were performed.

Shelemay's method differs from other musicological methods that analyze oral and written transmission. Previous studies of oral transmission approached analysis by examining fixed and/or repeated musical or textual phrases, called "formulas."[132] Leo Treitler, Ruth Steiner and Kenneth Levy discuss this "formulaic" method in their analyses. Treitler looked at formulas in oral performance. A formula operates in the same way every time it is used. A recitation tone operates in this way.[133] A recitation tone is a repeated tone that serves as a "center" for all other pitches in the melody. Thinking about it as a phrase or selection of melody creates a visual emphasis on them as seen in manuscripts or sheet music. Ruth Steiner collected formulas from a written repertory, the incipits from Old-Roman antiphons. She then created a database that

[131] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 77.
[132] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 59.
[133] Leo Treitler. "The 'Unwritten' and 'Written Transmission' of Medieval Chant and the Start-Up of Musical Notation," *The Journal of Musicology* 10 (1992): 140.

sorts and identifies them.[134] Shelemay studies the smallest structural unit defined by the Ethiopian tradition, similar to a formula, but smaller in size.

Shelemay also works her study backward – examining the oral tradition first and following it with the manuscript sources. This is because Shelemay examines the two methods of transmission according to how students learn them, first the oral, then the written. Shelemay's, Monson's and Jeffery's study defines the role of oral transmission in Ethiopian liturgical culture, the function of notation, and how the system continues to work today. Their study reveals that reading the notation is impossible without prior knowledge of the oral tradition. Shelemay concludes that the oral tradition works in conjunction with the written tradition for teaching chant.[135]

Results

Based on her findings Shelemay derived the following: each mode contains melodies associated with specific signs and the smallest musical units. Modality has its own pitch range, ornamentation, vocal style, and melodic contour varying from one set of melodies to another.[136] Shelemay gained an overview of the practice while learning about how the notation system worked and developed. She numbered all the notational signs and transcribed each from the dictionary of signs provided by ɛleqa Berhanu. Shelemay noted a close melodic relationship between the dictionary entries

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[134] Ruth Steiner, "The Transmission of Antiphons in Two Oral Chant Cultures," in *Dies est leticie: Essays on chant in honour of Janka Szendrei*, ed. David Hiley (Ottawa: Institute of Medieval Music, 2008), 489.

[135] The Bethlehem technique is a vocal style that was prevalent in the modern church. The term for the style is associated with the northern Ethiopian monastery
Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 64.

[136] Ethiopia uses a pentatonic scale, or system of pitches.

for different signs used on the same words in their respective "units." From the analysis of the written material, Jeffery and Shelemay demonstrated that the minimal structural unit, mɔlɔkkɔt, previously existed in the mind of the Ethiopian musician.[137] Berhanu's performances suggested that an older melodic tradition persisted despite the changes in notation.

Using Shelemay's results along with cognitive theory, one can explain how the Ethiopian learning system utilizes their oral and written tradition for maintaining their ritual tradition. Shelemay finds that the melodies associated with the signs are the building blocks of three modes and small musical units.[138] According to Shelemay, the existing pedagogical system works for musicians as they continue to perform a stable body of chants, whose melodic content is identifiable and reproducible.[139] The melodies remain stable because the learning tradition established in Ethiopian culture is stable. Children start by learning whole melodies by rote, or a similar technique, so that they come to have a collection of whole melodies committed to memory. Children then begin study of the notation system.

In Ethiopian culture, the oral tradition effectively reinforces the notation.[140] Learning "whole" melodies orally allows musicians to have the whole chants in their memory. Using this learning method draws on the brain's ability to learn larger groups more readily than smaller details. The brain "chunks" or groups several smaller details

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[137] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 62.
[138] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 63.
[139] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 114.
[140] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 69.

into a pattern or larger product of smaller details that is more easily identifiable. A group may have a trigger or cue that allows the individual to recollect and remember the group later on.[141] The grouping method explains how melodies could be learned and passed on over long periods of time with little change. It is critical to storing melodies in both short and long term memory, but it is more useful for converting melodies from Short Term Memory to Long Term Memory.[142]

Applying cognitive principles to Shelemay, Jeffery and Monson's results helps explain how the oral tradition coincides with the role of notation within the Ethiopian tradition. Learning orally is not the same as verbatim recall of the fixed written texts. Remembering a piece from an oral tradition does not require one to recall the exact words; recall of the general meaning of the form is sufficient.[143] Learning a whole melody orally through rote repetition provides a general outline that Ethiopian students need to remember before they learn the notation.

While using a rote technique works in Ethiopian culture, learning melodies with rote or repetition can have several "built-in" problems. One could argue that it is difficult to have a sense of the tension or dynamic of one phrase. The song is not presented as an artistic entity. It is broken up, therefore becoming more difficult to sing all the way through without the repetition of each phrase. However, melodic and rhythmic patterns successfully establish themselves in the child's memory and inner

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[141] Gabe Scelta, "Ethiopian Christian Liturgical Chant & Historical Context" *School of Oriental and African Studies* (2011): 5.
[142] Scelta, "Ethiopian Christian Liturgical Chant & Historical Context," 5.
[143] David C. Rubin, *Memory in Oral Traditions: The Cognitive Psychology of Epic, Ballads, and County out Rhythms* (Oxford: Oxford University Press, 1985), 6.

hearing.[144] As explained in chapter one, patterns and repetition relate to the idea of a "musical grammar." In order to memorize and understand a musical phrase, the listener identifies the most important elements of the structure, reducing the musical 'surface' to an organized system, or hierarchical schema.[145] Within this hierarchical schema are two structures: grouping and metrical.[146] Grouping segments long phrases into smaller units. Each unit contains small sequences. The theory of grouping structure states that certain types of groupings have more importance over others. Metrical structure is the ability to divide and group units associated with time or duration. It gives hierarchical order to rhythmic and tonal accents. The smallest unit is the alteration of strong and weak beats.[147] Of course, Ethopian chant is loosely rhythmic and uses this idea only to a certain extent.

When learning notation, children first learn abbreviations for each melody associated with the mələ́kkə́t unit and ten additional notation signs that have a conventional purpose respective to the associated melody.[148] The subunit, mələ́kə́t, is the most stable unit among the chant melodies. The musician must understand which mələ́kkə́t units resemble each other, which repeat, when to sing the beginning or end of

[144] Jonathan Rappaport, "Techniques for Teaching New Songs: A Kodaly Approach Part I: Rote Learning of Songs" *Classroom Connections* 2 (2011): 25.
[145] Michael Imberty, "Music, Linguistics, and Cognition," in *Music and the Mind: Essays in Honour of John Sloboda* ed. Irène Deliège and Jane W. Davidson, (Oxford:Oxford University Press, 2011), 4-5.
[146] Metrical structure is a type of grouping structure; therefore, it is not equivalent to grouping structure.
[147] Imberty, "Music, Linguistics, and Cognition," 5.
[148] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 98.

the unit, how to interpret the signs, how to place the text, and when melismatic extensions of the 500 mɔlɔkkɔt units are appropriate.[149]

The Ethiopian system is complex and functions differently from Western notation. Let us examine the notational signs, modes and their functions. There are five hundred and fifty-eight mɔlɔkkɔt signs. As noted earlier in this chapter, these notational signs are divided into the three modes: sɔlt, zema, and ɛraray. The mɔlɔkkɔt is the smallest or minimal melodic unit of notation and represents small segments of music learned orally. The mɔlɔkkɔt is a written sign; however the melody it represents is learned orally. Each mɔlɔkkɔt is comprised of one or more fidɛl, or "syllables" in the Ethiopian list of syllables. There are also one hundred and fourteen symbols, called *bet* symbols, that indicate the "family" of the melody within the mode. Ten signs called the *yɛfidɛl gɔrs* appear as "interlinear signs" found throughout the texts between other signs.[150] The *yɛfidɛl gɔrs* describe elements of articulation, attack, decay, or placement of the pitches or melodic patterns. The mɔgdɔm is a number placed in the margin of the melody that tells the performer when to repeat the portion of the text with instruments and dance. Ethiopian notation serves as a roadmap for navigating through existing fragments of memory already learned in the oral tradition. Within this system, a section of the verse to be sung (from the dɔggwa) is assigned a mɔlɔkkɔt above the text.[151] The sections are then pieced together to form one organized pattern of compound

[149] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 114.
[150] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 63.
[151] Scelta, "Ethiopian Christian Liturgical Chant & Historical Context," 2.

melodies. Because of how the system was formed and how it is used, the Ethiopian Christian chant notation was never intended to replace oral transmission.[152]

Learning these structural units enables one to remember and recall several melodies when applying a new text. Both oral and written traditions value recomposition because in both cases, new text can be paired with melodies – whose encompassing units can also vary for each performance. The mələkkət are used to reconstruct complex repertory by serving as memory tools. They coincide with the "semantic" or "schematic" memory type. "Semantic" or "schematic" memory consists of stored information about features that define concepts and processes that allow an individual to recall and retrieve the information.[153] It allows the brain to reconstruct melodies in a way that may apply to many phrases or pieces of music.[154] Therefore, even though notation serves as a secondary tool in Ethiopian culture, the units that make it up are also useful in retaining and reconstructing their chant repertory.

Because musicians learn the notation after having learned melodies orally, their notation does not function independently from the oral tradition. Instead, notation serves as a tool for isolating structures within the melodies that the singer applies as they learn more complex repertory. It provides a critical link between oral and written transmission, as the unit is both an oral melody and a written sign. The units came from

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[152] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant." 98
[153] Alex Martin and L. Chao, "Semantic Memory and the Brain: Structure and Process" *Current Opinion in Neurobiology* (2001): 194.
[154] Diana Deutsch, et al. "Psychology of music, §II: Perception and Cognition" *Grove Music Online*. *Oxford Music Online*. Oxford University Press accessed May 26, 2013. http://www.oxfordmusiconline.com/subscriber/article/grove/music/42574pg2.

oral practice but are used as written notation.[155] The Ethiopian notational system thus serves as a supplement or a tool. Ethiopian notation incorporates symbols that provide direction within a particular unit. Leo Treitler observes a similar trend in his study of medieval chant. He finds that a singer can memorize the chant from beginning to end and reproduce it from memory.[156] In the notation, however, signs did not necessarily outline pitch sequence; instead, they implied musical function, such as *inflection, direction*, and *dynamic*.[157] Kenneth Levy also shows how notational groups or units like those in Ethiopian notation were useful in demonstrating a larger concept. For example, notation may have symbolized more than one concept (such as pitch).[158] In neumatic notation, there were strokes, or markings that indicated an isolated pitch; however, there were other markings that indicated direction, inflection, etc. They were a roadmap for performing and not a written score as would be seen today in modern Western notation.[159] Similarly, Ethiopian units of notation are patterns that serve as tools of reconstruction. Because the text-based character of the principal Ethiopian notation provides no visual indication of melodic direction, the melodies must still be carried in the performer's memory.[160]

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[155] Shelemay, Jeffery, Monson, "Oral and Written Transmission in Ethiopian Christian Chant," 59.
[156] Treitler, "The 'Unwritten' and 'Written Transmission' of Medieval Chant and the Start-Up of Musical Notation," 146.
[157] Leo Treitler, "The Early History of Music Writing in the West," *Journal of the American Musicological Society* 35 (1982): 248.
[158] Kenneth Levy, "On the Origin of Neumes" *Early Music History* 7 (1987): 72-73.
[159] Levy, "On the Origin of Neumes," 75.
[160] Treitler, "The 'Unwritten' and 'Written Transmission' of Medieval Chant and the Start-Up of Musical Notation," 114.

Conclusion

The chants learned in the Ethiopian culture have remained stable and consistent for several generations, by using both the oral and written forms of transmission. Applying cognitive process to Kay Shelemay's study, this chapter illustrated how the oral and written traditions coincide in a culture that uses both to teach their chant melodies. The evidence shows that the oral and written traditions use pattern recognition, semantic memory and repetition in the learning process. Knowing how the cognitive process works in each mode of transmission makes it easier to study where the written tradition came from and/or how it works with the oral tradition. This application demonstrated that using cognitive theory could provide an objective way for studying other cultures that use or have used both types of transmission in their ritual practice.

Chapter 4

The Role of the Phonetics of Language in Oral Transmission
Case Study 3: "Cuban Abakuá Chants: Examining the New Linguistic and Historical Evidence for the African Diaspora" *by Ivor Miller*

Ivor Miller examines the process by which West African Èpkè members were able to understand contemporary Cuban Abakuá chants. His results show that the two cultures may have shared a common origin. This case study examines how the cognitive process in sound symbolism helps explain how an oral tradition prevailed after years of isolated development.

The Tradition

The Abakuá is a multiethnic secret society that was founded in Havana in the 1830s by slaves captured from the Calabar area of the western coast of Africa, between the Cross and Niger rivers. Over the next 170 years, the society grew in size and influence, and their culture and music became a distinguishing feature of the Cuban cultural identity.[161] The Cross River Èkpè society is a secret society native to the Èfik, an African region in Nigeria sharing geographical origins with the Abakuáns. These two cultures, though isolated from one another, shared a distinct ritualistic ceremony, focused on the ethnic lineages and genealogical ancestry of the people.[162]

[161] Ivor Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora" *African Studies Review* 48 (2005): 23.
[162] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 34.

The ritual includes dance, drums, and chant.[163] The ceremonies are places of competition to earn reputations for quality performance styles and knowledge of the ceremonial history. While chanting takes place, dancers and drummers communicate through gestures and rhythms. Several performers participate in the Abakuá ceremonies: the de puya, makagua, makagua, payadores, and the gallos. The *de puya, makagua* and *Managua* are solo singers. While performing, they alternated chanting each line of the poems. The *payadores* performed improvised musical dialogues and led counterpoint or "challenge" chants. The *gallos* were soloists that sang with the chorus.[164] The lead singer performed *enkame*, long chants in the Cuban Èfik language.[165] *Enkama* means "to call people to attention, to begin, to declare."[166] Of the different performance elements, their chant was the point of interest for Miller.

The Abakuán chant is solely performed orally. Performers use a technique called *controversia*, similar to the Western form of "signifying" in North America and other regions in the African Diaspora. "Signifying" as used in this study includes the musical variants of call and response interactions that take place throughout the ceremony.[167]

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[163] Ed. Dale Olson, "Cuba in Garland Encyclopedia of World Music Volume 2: South America, Mexico, Central America," *Garland Encyclopedia of World Music* (1998)
[164] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 32.
[165] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 23
[166] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 23.
[167] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 31.

The Èpkè and Abakuá speak different languages; however, many Abakuán words are variations of some still used in the Calabar region of Nigeria. Miller found that language linked the cultures together.

Miller worked with the leaders of the Abakuán and Ékpè tribes for ten years, learning about their history and traditions.[168] He recorded incantations from the performances and translated them into Spanish.[169] When translating, Miller found that the chants were difficult to transcribe from whole phrases into small pieces because the text did not have defined areas of separation. To help determine where to place word breaks, he used the tradition of the elders and the published Abakuán vocabularies as a supplementary reference.[170] Their chants are also highly poetic and metaphorical, so in the process of translation, more than one meaning was generated for each word. He was not always permitted to translate the entire chant because certain parts held secret cultural information.[171] Each culture's language had certain built-in "codes" for secrecy, as well as vocal cues. Miller found that some of the ritual cues in the ceremony overlapped each other.

Many of the overlapping cues come from the language itself. The phonetics of language plays an important part in African ritual and verbal art. Abakuán chant is a type of verbal art seen commonly in the West-African tradition. *Verbal Art* is the

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[168] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 26.
[169] Miller translates passages in Spanish because it is directly part of the Cuban roots.
[170] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 26.
[171] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 27.

process of taking ordinary language and transforming it into extraordinary language that appeals to the senses and emotions.[172] Verbal art takes many forms depending on the styles used for enhancing or changing the stresses and timbre. *Vocal modification* is one of these forms. One can modify a word using the extremes of pitch or loudness, muffling or masking, or replacing the voice with an instrument. Phonological style markers also create verbal art out of plain language.[173] *Vocal transformation* is the process that creates verbal art, using enhancers in the process. These "enhancers" utilize the cognitive process of sound substitution and sound symbolism.

Sound substitution is the process of palatalizing alveolar and velar consonants.[174] Examples are highlighted below[175]:

Original	**Substitution**
[y]	[r], [l]
[s]	[sh]
[t], [k]	[ch]

[172] Linda Hunter, "Transformation in African Verbal Art: Voice, Speech, Language" *The Journal of American Folklore* 109 (1996): 178.
[173] Hunter, "Transformation in African Verbal Art: Voice, Speech, Language," 178.
[174] "Palatalization" is pronouncing a consonant with the tongue against the palate, such as [j]. "Alveolar" and "Velar" refer to consonant types. "Alveolar" are sounds made by the articulation of the tip of the tongue towards the ridge of cartilage behind the teeth, such as [t], [d], [s]. "Velar" sounds are made by the articulation of the body of the tongue towards the velum, such as [k] and [g]. from "Varieties of English" accessed on May 24, 2013. http://www.ic.arizona.edu/~lsp/Phonetics/ConsonantsI/Phonetics2c.html
[175] Hunter, "Transformation in African Verbal Art: Voice, Speech, Language," 179.

Vocal substitutions can symbolize sounds emulated by "spirits," "creatures" and other roles in a folk or ritual custom. There are sounds that reflect, or symbolize properties that are meaningful beyond the physical entity. Other types of vocal transformation include creating a lisp, buzzing, and maintaining or changing duration and volume in performance. These physical adaptations, once developed, stimulate a cognitive response to a memory associated with the sound, suggesting an understood relationship between sounds and their meanings in a language.[176]

There are four types of sound symbolism: corporeal, imitative, synesthetic, and conventional.[177] *Corporeal* sound symbolism includes hiccupping, coughing, cries of pain, and changes in vocal quality. *Imitative* sound symbolism incorporates onomatopoeic words and phrases that include representations of bird and animal sounds.[178] *Synesthetic* sound symbolism occurs when certain sounds tend to represent particular physical properties such as size or shape. For example, the [i] in "teeny," usually indicates a smaller size, while the [u] typically indicates a larger size such as in "humungous." *Conventional* sound symbolism is analogous to the association of certain sounds with meanings. For example, the [gl] sound is often associated with synonyms to light such as "glow", "gleam", "glimmer", and "glare." Conventional sound symbolism was used in Imberty's research on memory's association with structure and pattern: "The performer reconstructs complexity based on memorized and simplified schema, producing different musical phrases of the same type by reactivating the

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[176] Hunter, "Transformation in African Verbal Art: Voice, Speech, Language," 180.
[177] Hunter, "Transformation in African Verbal Art: Voice, Speech, Language," 180.
[178] Onomatopoeic comes from *onomatopoeia,* which is the naming of a thing or action by a vocal imitation of the sound associated with it—such as a buzz or hiss.

structure." The "structures" are meanings associated with vocalizations. Although he is speaking about tonal music, the use of *sounds* has similar cognitive forbearance to non-tonal music.[179]

Sound symbolism is a form of perception as seen in vocal enhancers, like visual signs or patterns. The use of a sound device gives meaning to an object or idea through the creation of a percept. In the brain, this is when the sound wave impulses reach the eardrum, setting in motion a "complex cascade of mechanical, chemical and neural events in the cochlea, brain stem, midbrain nuclei and cortex."[180] Sounds also serve as signs. Phonetic symbolism refers to the relationship between sound and meaning. This relationship implies that the "mere sound of a word, apart from its actual definition, conveys meaning."[181] Because of the way African musicians perceive chant as a single object (language and melody combined), the phonetic sounds produced in the language can stabilize the melody.

Miller transcribed chants used by Abakuá leaders to express their cultural history. For each line, he translated the Spanish phrases into English. He then translated the documents into Èfik. He used graphical devices to identify terms in the text that corresponded to West African terms. He also described the historical context

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[179] Michael Imberty, "Music, Linguistics, and Cognition," *Music and the Mind: Essays in Honour of John Sloboda* ed. Irène Deliège and Jane W. Davidson (Oxford:Oxford University Press, 2011), 4-5.
[180] Isabelle Peretz and Robert Zatorre, "Brian Organization for Music Processing," *Annual Review Psychology,* 56 (2005): 90.
[181] L.J. Shrum et al., "Sound Symbolism Effects Across Languages: Implications for Global Brand Names," *University of Texas at San Antonio, Dept. of Marketing* (2012): 5.

and its relationship to the other lines.[182] The chant below is believed to contain the names of Èfik founders of the society in Cuba:

Second Chant[183]

Line 1: <Ékue [asanga] abiá [epó]> nípó.
Ékue came to the land of the whites,
or
Ékpè that walks around in the land of the ghosts,
("Walking is used in a boastful context" [O. Edem, personal communication, 2001]),
or
Ékpè walks in the village of ghosts.
[asanga] ásáñà = walking (in Ibibio) (Essien 1990:147)
[asanga] I'-sañ = a walk; a journey; a trip; a voyage" (Goldie 1964:135)
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[asanga] asaña = to move, in whatever manner (Goldie 1964:264)
(Each of these translations coincides with the interpretation by many Abakuá elders of asánga as walking [see Cabrera 1958:55]).
[epó] Ékpó = ghost, spirit" (Aye 1991:32)
<abia> = village, town (if one interprets this word as obio in Èfik)
Line 2: Endafia awereké [Abasí] <[obon]> Efí.
We give thanks to God and to the Èfik rulers.
[Abasí] A-bas'-i = the Supreme Being, God" (Goldie 1964:2)
[obon] Ä-bo.ñ' = a chief; one having authority; a principal ruler; a king (Goldie 1964:3)
<obon> obong = king in Èfik (O. Edem, personal communication, 2001)
Line 3: <Afotán konomí Ékue Enyemilla>.
I am from the land of Enyemiyá.
<Afotán konomí Ékue Enyemilla> Afotang okonomi Ékpè enye mi da = A boastful phrase identifying the source of the speaker's particular kind of Ékpè" (O. Edem personal communication, 2001).
Line 4: Jura [Natakuá].
I was consecrated in the land of Natakuá.
[Natakuá] A-tak'-pa = Duke Town, the largest town in Calabar (Goldie 1964:355)

[182] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 50.
[183] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 32-33.

Miller found that many Abakuá words were slightly modified versions of words still used in the Calabar (Èpkè). He also found that even though members in the Abakuá group "Apapa Umoni" did not know the heritage and identities of their Èfik ancestors, the two groups maintained a ritual-kinship with others sharing their lineage. They maintain this lineage today and recreate it in their ceremonies through music, dance and chanting, performed in commemoration of the transmission of Ėkpe.[184] Miller relied on context and meaning of the translated text to trace the ritual kinship between the Èpkè and Abakuá cultures. What his study mentions but does not expand upon is the language itself and how the common phonetics might illustrate how the two cultures maintained a common ritual despite geographic separation and isolated development.

Miller's analysis reveals a common phonetic pattern. The example below was drawn from Miller's translation and analysis of an Abakuá chant:

Line 2: Endafia awereké [Abasí] <[obon]> Efí.
We give thanks to God and to the Èfik rulers.
[**Abasí**] A-bas'-i = the Supreme Being, God" (Goldie 1964:2)
[obon] Ä-bo.ñ' = a chief; one having authority; a principal ruler; a king (Goldie 1964:3)
<obon> obong = king in Èfik (O. Edem, personal communication, 2001)

Each of the bolded terms has a common English translation: a king, chief, or supreme being. They also share the common [ab] sound at the start of the word. A similar pattern can be seen in line 3:

[184] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 36.

Line 3: <**Afotán konomí** Ékue Enyemilla>.
I am from the land of Enyemiyá.
<**Afotán konomí** Ékue Enyemilla> **Afotang okonomi** Ékpè enye mi da = A boastful phrase identifying the source of the speaker's particular kind of Ékpè" (O. Edem personal communication, 2001).[185]

Each of the bolded terms shares a common phonetic pattern. [Afotan] and [konomi]. This shared characteristic between the different languages serves as a means for preserving meaning over a long period of time.

In order to maintain the captured information, phonal stimuli--like visual stimuli—use patterns to retain a phrase or dialogue. Because of the hierarchical system, the brain has developed forms of organization including rules, redundancies, and constraints used to decrease changes that human memory (human experiences) imposes on transmission of verbal material.[186] When learning a phrase, the brain simplifies whatever sounds or components make up the whole. Sounds and words have patterns that can be retained and repeated.[187] Miller's analysis used translations and historical context to trace the chants' common origin; however, when applying the cognitive process used in verbal art, the language itself served as a pattern for retaining the information.

Conclusion

It is important to understand how the brain processes language in a ritualistic setting, such as chant. The brain forms connections through sounds in language, giving

[185] Miller, "Cuban Abakuá Chants: Examining New Linguistic and Historical Evidence for the African Diaspora," 32-33.
[186] David Rubin, *Memory in Oral Traditions: The Cognitive Psychology of Epics, Ballads, and Counting out Rhythms* (Oxford: Oxford University Press, 1985), 135.
[187] Rubin, 135.

them meaning. The stabilization of this process can provide insight into how different languages can share similar words for the same meaning. The evidence shows that the cognitive process is reflective of the basic principles in the phonetics of language. Understanding how the brain characterizes sounds as symbols within the phonetics language can provide a means to analyze and trace a ritual strictly performed orally. As demonstrated by the previous case studies, the application of cognitive process provides an objective and scientific means to analyze historical data.

Concluding Statement

Cognition can play a greater role in studying oral and written transmission than is recognized in historical scholarship. The case studies demonstrated how the cognitive process deepens the understanding of the ways oral and written transmission work within and apart from historical context.

In oral transmission, there are several "built-in" memory tools that the brain uses to learn, retain, and transmit melodies. These memory devices enhance the brain's natural instinct to group and organize musical elements systems that are both understood and transmittable. Therefore, when applying a cognitive explanation to questions of oral transmission, one can understand how melodies are maintained and transmitted on a physiological as well as psychological level.

In written transmission, signs and symbols provide different levels of cognitive significance for learning music. Not all symbols or signs are alike, and there may not be a one-to-one relationship between symbols and what they signify. Visual signs or cues are fluid, and the ways they are enacted, can vary from one performance to another. Just because melodies look "different" in written form does not mean that they are not derived from the same cognitive process. Therefore, when applying a cognitive explanation to questions of written transmission, one realizes how "unstable" and unreliable written melodies can be.

Cognitive explanation provides an objective foundation that bridges the gap from the oral to the written. It helps to eliminate the separation between them by recognizing their shared properties. For example, Leo Treitler recognizes the falseness of

the dichotomies constructed in previous historical study. Cognitive explanation reinforces his conclusions on a physiological basis. What are commonly defined as stable and variable were often incorrectly juxtaposed due to the polarized nature of the way the terms were applied.

Cognitive processes do not discriminate between Western and non-Western cultures as demonstrated in each of the three case studies. Each study drew different conclusions about how ritual chant is learned, transmitted and retained using fundamental theories and concepts of the cognitive process. Therefore, not only does scientific evidence draw more information from initial historical evidence, it also can be applied to different cultural traditions. Using the cognitive process could unveil common characteristics shared between their oral and written practices.

Applying cognitive explanation to musicological scholarship could expand upon previous studies of oral and written transmission. Future case studies might look at Western Roman chant in terms of how different notational systems developed out of oral culture. Historical context provides the *why*; cognitive explanation provides the *how*. Together, they can be used to unravel the mysteries surrounding oral and written traditions from the past, the present and into the future.

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