

The Brain, Memory, and Oral Tradition in Music

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ABSTRACT

Recent studies of the brain in various subfields have shown that memory is really a type of re-creation—piecing together many elements stored separately. Memory, creativity and their connections have been focal points in cognitive studies of music, but seldom have they been approached from the vantage point of music in *oral* tradition, which is the primary mode of transmitting music in the world.

This paper argues that the oral transmission of music provides a fertile ground for learning about memory and creativity and their connections. Traditional musicians often know hundreds of tunes and are ready to perform them at a moment's notice—but seldom in exactly the same way. Depending upon the particular oral tradition studied, greater or lesser emphasis is laid upon the 'accuracy' and the unchanging nature of a rendition vs. creative variation. After recounting some of these remarkable feats of memory and creativity, drawn from my own fieldwork, I suggest a number of ways in which this "re-creative" feature of oral transmission illuminates cognitive research.

I. INTRODUCTION

The 1990s and early 2000s have seen an explosion of research on the brain, with particular attention paid to music and the brain, since music occupies an especially interesting position *vis a vis* brain functions and brain formation in early childhood (Levitin, 2006; Schacter, 2002; Snyder, 2000; *Musicae Scientiae*, 1999; Yi, 2000).

Works on oral versus written tradition, notably those by Lord (1960), Rubin (1995), and Goody (2000), as well as Deliège and Sloboda (1996, pp. 173-180) have contrasted these two modes of transmission—oral and written—noting the different role of memory in each. Since these works focus primarily on the *verbal* side of folk music, however, it is well to remember that many more people continue to live in an "oral culture" when it comes to music than is the case with words. That is, highly literate people in the verbal sense may not read musical notation, even though they may also be very skilled musicians. Therefore *all* of their musical memory depends on aural learning. For the sake of argument here the components of memory will be broken down, just as music can be, into the basic elements of contour (melodic content), time (rhythm), and timbre (the sound color of the music). I'm aware that there is not complete agreement on the exact nature of musical memory; however, the neurological and psychological components of these elements are not the chief concern of this paper. It is instead my intent to make you aware of the specific connections between musicians of oral tradition that I have worked with and the ideas that have occurred to me in my readings of the literature on cognition.

II. MUSICIANS IN ORAL TRADITIONS

Let me introduce you to a few of the varieties of musicians who work entirely within an oral tradition, as opposed to depending upon written notation, to preserve their musical styles. I'll use those with whom I have worked personally, because this has given me an opportunity to query them about some of the mechanisms of their music-making, even though it is true in this realm, as it is with written music, that musicians are often reluctant to, or simply unable to, verbalize their thought processes very well. One of the features of my own fieldwork, however, has been to work intensively over a period of time precisely to obtain such information, whenever it is possible.

A. Skipper Nicolson: Gaelic 'Village Bard'

One of my first fieldwork experiences in Scotland, where I have traveled extensively (and taught as a Fulbright scholar in 2003), was with the singer from the Isle of Skye, Skipper Nicolson, who prided himself on continuing the bardic tradition at the village level and who composed and sang in both Gaelic and English. An exception to the rule I mentioned above, he was quite articulate about his music, and was even able to demonstrate how he fit some of his newly-made texts to tunes he already knew, especially one that he composed in both Gaelic and English: he hummed the first phrase of a known tune, started to sing his new text, then changed a few notes to accommodate the text better—in the process making a new song altogether, but one that was noticeably related to another in his repertoire (and that of other Gaelic singers). His awareness was largely of the *contour* of melodies—he even felt that certain contours of traditional melody belonged in certain places—this contour was from Mull, that one from Skye, another from Harris. (See Illustration 1)

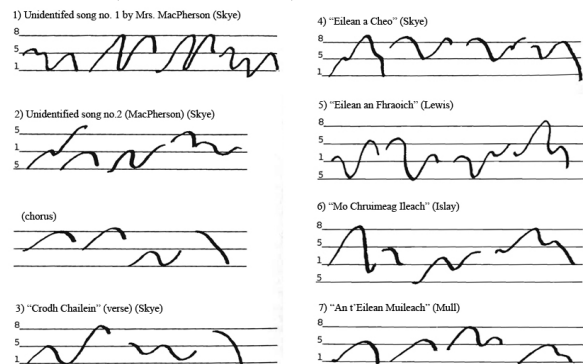


Illustration 1: Regional Contours Proposed by Skipper Nicolson¹

¹ Taken from article by Anne Dhu Shapiro [McLucas], "Regional Song Styles: The Scottish Connection" in Anne Dhu Shapiro (ed.) *Music and*

As shown in the work of Edworthy (1985), Sloboda and Parker (1985), and others, it is one of the hallmarks of aural memory that the contour of a tune will be retained in memory, even when individual notes are changed. And infant research has shown that infants can imitate the contours of the spoken and sung utterances of their parents at an early age (Malloch, 1999). The ability to discern general direction and approximate pitch is seemingly inborn, whether because of genetic predisposition or prenatal influence, since infants exposed in the womb to certain melodies, are shown to recognize them after birth (Fifer and Moon, 1995). Experiments have shown that contour information is immediately available to the listener regardless of the novelty of the melody or its familiarity, and whether it has been transposed or not (Edworthy, 1985, p. 172). The fact that this contour retention occurs primarily in the right hemisphere, which also is the dominant hemisphere for human emotion may also help us understand the role of contour in generating emotions in music. As Pöppel states: "It is thus plausible that it is the modulation in pitch that lends music its particular emotional effect" (Pöppel, 1989, p. 86). The combination of emotion with perception, would, of course, also enhance the memorability of a particular contour, and that memorability in turn leads to stability over time.

My own work with melodic contour shows how many ways a single tune can be varied without losing the basic identity of its contour (Shapiro, 1975; Wells and McLucas, 1999). The Skipper's way of working with basic contour to fashion new tunes shows how memory and creativity can work together in an oral tradition. (See Figure 1 for a comparison of his new song with its older Gaelic model.)

1. The news we've heard from Wa-ter-nish has e-choed through the High-lands;
1. Mo chail- eug mhin- gheal mheal- teach, A dh'has gu far- ian fua- gail,
That the No- ble Dutch-man has bought part of our is- land.
Gur from mo cheum o'n dhe- laich sinn, Aig Cla- chan Ghlinn- da- ruadh- all

2. His name is Jon- ny Heh- lin- ga His fame has gone be- fore him,
2 'Chu suamh- neas oidich' air leu- baidh albonh, Ciaid fha- cinn ann am bhu- a- zar
From all that I have seen and heard Both young and old ex- tot him.
'Sam Bio- buil- fein cha laimh- sich mi, Gun t'om- haigh ghraidh gam bhua- readh.

Figure 1: "The Noble Dutchman" compared with Nicolson's version of "Clachan Ghlinn-da Ruaidhail"²

Context: *Essays for John Milton Ward* (Cambridge, Mass: Harvard University Music Dept., 1985), pp. 416-17.

²Ibid., p. 412.

The Skipper did not pride himself on his voice; he would often express puzzlement as to why I was interested in his singing. But he did prize the songs he made up, considering them part of the long tradition of the Gaelic bards.

B. Willeto Antonio, Apache Singer and Healer

Another of my field-work experiences in quite a different tradition persuades me that structure and timing are crucial to maintaining accurate aural memory for great quantities of music. Willeto Antonio is an Apache singer and healer, who at a very early age under the tutelage of his grandfather, learned the ceremonial songs for the girls' puberty rite for the Mescalero Apache tribe. These amount to several hundred songs, almost all of which share a particular structure and a similar length, which helps in their memorability. By structure I mean here the format and repetition scheme of a whole tune, as it is sung.

Unlike the Skipper's tradition, which prizes individual creativity, the ceremonial songs of the Apache are not supposed to change and must be sung accurately in order to achieve their effects, which are often medicinal or at least psychological. Like the Skipper, Willeto was able to talk about his songs to a certain extent once he and I had established a working vocabulary. This vocabulary had largely to do with structure, since the pattern of making the songs is all-important in both their memorization and their reception. Structure is not the same as contour, since songs of many shapes can be fit into a single structure. Instead, structure is more like a mental template that accommodates many different melodic and rhythmic patterns. In the case of the Apache tipi songs, as they are called because the girl going through the ceremony dances in a tipi, the verse-refrain structure always fits into a pattern of five refrains framing four verses, thus mirroring the structure of the ceremony itself, which commences at dawn on the first day, ends at dawn on the fifth day, and encompasses four nights of sacred singing and dancing. Timing in this ceremony is largely done through the songs and their predictable lengths. Typically, a single phrase of the refrain will last about 3-5 seconds. This correlates with the time limits of short-term memory, and is about the amount of time that forms most people's sense of "now"—the subjective present. These songs repeat such phrases multiple times; each refrain is repeated five times; and each group of four songs uses a similar tune and refrain as well. Psychological research has shown that elements in short-term memory may be "rehearsed" to keep them active in memory. Repetition within the groupings, therefore, makes the patterns easier to remember. With the repetition over multiple songs, the refrains in the short-term memory become part of long-term memory as well. The refrain, at least, is made indelible by its timing and repetition, and one often sees women who have had their ceremonies years before quietly singing along.

On the final night of the ceremony, the girl dances all night long in the tipi, and each group of four songs is marked with a stick driven in a circle around the fire, which marks the long night of songs as they go by. (See Illustration 2:)



Illustration 2: Girl dancing in tipi on last night

While there is no set number of songs, it is important that the songs actually last through the whole night. At approximately six minutes in length, with short pauses between each and a longer pause after each group of four, it requires a great many songs to get through the night, but the predictability of the structure and the very length of the songs aids the singer, his helpers, and the girl dancing to get through the experience. Just before the coming of dawn, the girl ceases dancing to go get her hair ritually washed and to rest a bit before the end of the ceremony at dawn. It is just after she comes back to the tipi that the following song is sung to greet the dawn. This is a singular song in that it is *not* heard in a group of four, and thus stands alone. This very fact means that the song stands out and becomes memorable for its very difference. The template for the song, however, is the same as for the others—the five-fold repetition of a refrain framing four verses. Notice how the text also reflects this structure, since each of the four verses contains similar text, except for the change in the names of the directions. (See Figure 2) [Sound Example 2]

Although initially I learned the song aurally, as Willetto required, many years later, he recorded it for me. In the context of the actual ceremony the sounds of the fawn-hoof rattle would be heard marking the pulse and the voices of assistants would be heard singing on the refrains, emphasizing still further the architecture of the song.

Refrain (sung at beginning and end and after each verse—a total of five times):

You are going, you are going, you know which way to go; you are the one who has been chosen to stand for everything; raised above, you are the one, you are the one, you are the one.

Verse 1: From the East, the sunlight coming at you from that place, like a mirage, pushing out to a new generation, emerging to a better side, the God, the Creator, within the twelve tipi poles, be in it.

Refrain: You are going, you are going, you know which way to go, *etc.*

Verse 2: From the South, where the sun is traveling, pushing out to a new generation, emerging to a better side, the God, the Creator, within the twelve tipi poles, be in it.

Refrain: You are going, you are going, you know which way to go, *etc.*

Verse 3: From the West, where the sun goes, white, pushing out to a new generation, emerging to a better side, the God, the Creator, within the twelve tipi poles, be in it.

Refrain: You are going, you are going, you know which way to go, *etc.*

Verse 4: From the North, where the earth spins, yellow, pushing out to a new generation, emerging to a better side, the God, the Creator, *?Isdzanat!?eesh* within the twelve tipi poles, be in it.

Refrain: You are going, you are going, you know which way to go, *etc.*

Figure 2: Dawn Song Translation

C. Pegee13, Beat Producer

Our third element, timbre, is one of the most important features of the aural memory, as can be seen in the very way most ordinary humans react to the sound of music they like or dislike within a few seconds of hearing it. Timbre, as very generally defined by some, (Levitin, 2006, p. 18) is everything that is *not* loudness or pitch. More colloquially, it is the *color* of the sound. Humans from an early age are attuned to timbre—probably as a matter of survival, since being able to distinguish the voice of the principal caregivers is crucial. Timbre is among the most complex variables of any sound, yet the youngest infant can distinguish any female voice from that of his or her mother. This sensitivity to timbre and its connection with identity builds up in human cultures to the point where every social group and stratum of society has a preferred “sound” and the sounds of another group or stratum may feel strange or unwelcome. Composers of music for television ads (as well as for movies) know this well—they craft the style of music, especially its timbre, to appeal to the social group they wish to attract; e.g. a woodwind or string ensemble for

a luxury car; a bluegrass ensemble for a rough and ready truck (McLucas, 2005). As Levitin writes:

Timbral discrimination is so acute in humans that most of us can recognize hundreds of different voices. We can even tell whether someone close to us—our mother, our spouse—is happy or sad, healthy or coming down with a cold, based on the timbre of that voice. (Levitin 2006, p. 43)

Because timbre is approached mainly as a side-effect of instrumentation, most Western-trained musicians do not have much of a vocabulary for talking about timbre, nor do we have specific signs in our notational systems that effectively capture the nuances of timbre.³ It is an area that has been largely left to oral tradition, even in the realm of art music, and yet it has enormous impact on how music is received. But especially in the late twentieth and early twenty-first centuries, the role of timbre in both popular and art music has become the main element to be manipulated, and skillfully so. And it is chiefly in the popular music world that we will find effective vocabulary for describing sound that goes beyond the terminology for timbre that art music has achieved.

My third case-study musician, then, is one such popular music composer, from the realm of hip-hop and the production of so-called ‘beats,’ meaning here not the underlying metrical pattern usually provided by drums, but instead the repeated melodic and rhythmic figures—ostinati—that underlie all of rapping and many other examples of pop music these days. One of these beat producers, who goes by the name Pegee13, has described the timbre of one of his beats, “Giuseppe” (as well as how he produced it) in the following way:

I started that one with a drum loop from a Latino record because I'd always liked that sound but never really used anything like that. I added a supplemental kick drum because I do normally make hip hop and the bass in the loop seemed insufficient. Then I found the accordion loop (I believe it was from the Butch Cassidy and the Sundance Kid soundtrack) and matched it up with the drums. From there I just added a few transitional samples (the flute, and various others that would be triggered at the beginning or the end of the loop). From there I took a sustaining trumpet sample and looped it infinitely. Then I could play the notes on the 16 pads on my sampler (Akai MPC 2000xl). I arranged them into chords so as to make sort of a hook and added a shaker sample to give it more of a hooky sample. Then I added a crash cymbal and

³ Composers and orchestrators know that certain instrumental effects will produce certain sounds, and to that extent there is a vocabulary, but it is opaque to the ordinary listener or person reading about music.

wood block and added them to parts by trial and error. Finally, I played my glockenspiel into my Pro Tools rig and edited it accordingly, adding effects and equalization. (Pegee13 e-mail communication, January 2009)

This is a combination of technical and metaphorical descriptors, along with naming the sound sources used, and it effectively pins down a complex timbre which otherwise remains elusive, but definitely evocative of mood. [Sound example 3]

Here memory works together with creativity: Pegee13 has an array of sounds that he has mentally archived from which he draws, sometimes literally rehearsing them from his library of vinyl records, but often just re-creating them from his memory, in the process coming up with a new concoction.

As Warner (2003, p. 19) writes, “pop musicians tend to work directly with sound rather than any form of notations or other mediating system.” And because they work directly with sound, they are more able to explore elements such as timbre, which are not even represented in notation. To some extent, this has always been true of popular music, even in the pre-recording era, since so often popular music was transmitted orally and what was crucial in differentiating versions was the sound produced by the performer, who often achieved his or her popularity by means of a unique sound (think of a Piaf, Sinatra, Streisand, or Dylan). The introduction of electronic instruments, computer programs for composing, and the proliferation of home studios has intensified the process of creating of exploring and creating new sounds in popular music. And with these new sounds it is often their timbre that helps to create the intense emotions drawing in listeners and communicating at the level of feeling—and belonging.

D. Ordinary People, Creative Listeners

My final “case-study,” if it can be called that, involves interviews with students, all of them without formal training in music, to find out from them what they could hear in their brains—what they can “play back” and how accurately they remember their music, and in what forms. Even when they are not active music-makers, ordinary people have a large passive repertoire of songs, many of them with personal meanings attached. Interviewing some fairly typical eighteen to twenty-year-old students at the University of Oregon, for instance, I have found it possible to ascertain a repertoire of from 100 to over 1000 songs, and it is likely that in many cases the reported number was low since it is particularly difficult to elicit songs that are held deep in the memory.

Not only can students recognize the songs in their memories, reproducing a large part of the song for themselves, but they also are often able to reproduce the opening pitches, timbre, and volume, of their favorite recordings of them, as is also reported by Levitin (2006, p. 147). In eliciting descriptions of their favorite songs, the vocal timbre and mood were the musical qualities most mentioned, often combined in one phrase. As one student

described the lead singer's voice on one of her favorite songs "Over My Head" by The Fray: "soothing, strong, but not loud, tenor range; clear and pleasant" Another student describes the same song—also her favorite—as: "Dynamic, good range, peppy and continuous, powerful, not flat." These are clearly different perceptions of the same singer, but both, as it happens, relevant to the song in question. It is the combination of repeated playing, along with its enhancement of particular life events, that often triggers a meaningful association with a particular song. And sometimes this results in live participation, as we can hear during the third chorus of this live bootleg recording. [Sound example 4]

Which aspects of music as processed by the brain give it meaning? Because language is so explicitly meaningful, it is easy to give credit to lyrics, when they exist—but a surprising number of people when interviewed say that they pay no attention to the lyrics, don't remember all of them, and are sometimes surprised when becoming aware of them, especially when the words are not congruent with the emotions they were deriving from the song.

Most often these songs are remembered in the voice of the person whose recording they own or have heard repeatedly, and when asked if they can alter that sound image—mentally speed it up or slow it down, for instance—most cannot; it is heard as a fixed recording in the mind. Tapping into another layer of memory those interviewed could also mentally reproduce songs from much earlier—often from as early as nursery school, certainly from grade school, from summer camps, etc.—and these were not so tied to a specific performance (although often they were part of a ritual occasion such as church, a birthday, a holiday, or a patriotic celebration). These melodies tend to be retained in a more malleable way in their memories, although the triggers for remembering them were often quite specific. These were remembered in any key, with any timbre, and at any tempo. Perhaps the most ubiquitous and frequently used of these tunes is that for "Happy Birthday," which of necessity is usually started at a different pitch each time it is sung, depending upon who starts it (although again, as Halpern (1989) reports, when asked to sing "Happy Birthday," most people will choose the same pitch for themselves even on different occasions). There is more variability shown in designating whose voice they hear singing this: females tend to hear female voices, variously identified as their own, their mother's, or that of a group of friends. Males report a male voice or voices singing, most often their own. All of them can, at will, imagine the performance sped up or slowed down, unlike their memory of the popular tunes, which most often are stuck at the tempo of the recorded performances.

I would liken the memory of the recorded rendition to that of a memorized written document, meant to be learned verbatim. The other sort of malleable memory is more like that of an aurally learned language in which the elements are worked and re-worked.

II. CONCLUSIONS

Several kinds of models have been proposed for how memory works in the human mind, but almost all of them posit a putting together of pieces of what has been taken apart when sound is first taken in by the brain. Specifically, the notion of two different memory systems—implicit and explicit—both within long-term memory (or at least two different *processes* within one system) has been studied rather intensively. It has great relevance to the subject of oral tradition, because so much that is passed on orally is not learned consciously. This is particularly true of the *melodies* passed on by singers, since their explicit memory efforts are usually aimed at the words, and even here, as Rubin and Wallace (1991, p. 200) have discussed, somewhat automatic reactions to remembering in a time-constrained performance must also rely to some extent on implicit memory.

A central factor of sound and therefore of oral tradition is that, as Rubin and others have put it, "evanescence is its essence," (Rubin, 1996, pp. 65-66), that is, sound disappears the moment it is uttered, though it lingers in echoic memory for a few seconds. This fact, at least until the advent of recorded sound, required that human memory retain the sound to the best of its ability, but in fact what is available at any time is only what is present in the moment, what is remembered of the past, and expectations for the future.

It is, then, according to Rubin and other theorists of cognitive psychology, the combination of several factors overlapping that helps people remember, and it is the interaction of these cues and constraints that leads to the stability that is inherent in oral transmission. Put in terms of the cognitive sciences, it is the activation of the connections between neurons that constitutes memory; anything activating one of the associated memories in a neural connection may also activate the other memory. For instance, the effect of the combination of rhythm and melody, rather than just the reliance on one factor at a time, will lead to a better retrieval of memory for a particular song, since both the rhythm and the melody of a particular song will be cued.

Rubin (1989, pp. 95-99) likens this to a "systems theory" of memory. Because multiple constraints decrease the number of choices, they increase the number of cues that point to one solution, and therefore the stability in memory of a particular piece. Recall in oral tradition may therefore involve much less conscious thought process and much more pattern-recognition, clearly a necessity if one is to "fill in" the memory blanks during a performance. (Rubin, 1989, p. 120) It is this pattern-recognition that can, over time, become part of the implicit semantic memory, able to be called on even without conscious effort.

While this is somewhat true of the folk texts studied by Rubin, it is even truer of tunes, in which the choices are even more constrained (since theoretically for these diatonic tunes only five to eight pitches are available at any given moment, and in practice many fewer than that are logical choices). In addition to limitation of choice, the repetition of a tune in multiple stanzas or occasions makes pattern recognition and reproduction an even more inevitable factor. In addition, as pointed out by Huron, "all

other things being equal, predictability, by itself, will be experienced as pleasant. The easiest path to predictability is through repetition. In this regard, music amply fits the bill.” (Huron, 2006, p. 141) At the same time, creativity enters into the process since whatever is not remembered accurately will be filled in to fit the demands of the musical template being used.

Memory, then, is not simply a matter of having a “recording” in the brain. Instead, each memorized item—whether song, story, or recollected event—is *re-created* out of the various strands of sound as they have come into the brain and been stored in various ways. Contour, rhythm, timbre—all serve as memory aids when stored in long-term memory. Only by bringing these back together—and perhaps adding other elements also stored and then cued (the text and the human context, for example) —does one “remember.” In that way, one could say our memories are always “tainted,” or, in a more flattering light, our memories are always enriched by what we already carry in our previously stored memories, which will be added to the new creation. In oral tradition, at least, we could say that memory and creation are part of the same process. Because of the basic features of oral traditions—their flexibility, their variability, their persistence, and their creativity—and the way in which in them memory and creativity interact, they make ideal models for exploring how both musical memory and musical creativity work. I hope through hearing these examples, you have an idea of the richness of the repertoire of oral traditions and the many interesting questions that they raise.

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