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Music and language acquisition, although complex entities in and of themselves, settle their structural roots in a similar subterranean source. That is, they share some fundamental characteristics that can be comparatively drawn within a cognitivist framework. The most obvious, if not most important, quality that binds these pursuits together is their intrinsic social component. Proponents of socioculturalism go so far as to say that language learning *is* social learning (Ortega, 2013). Meanwhile, prominent musicologists often echo this frame of mind claiming music to be, "socially constructed, socially embedded," and inextricably linked to human activity (Bowman, 1998, p. 304). Taken from this point of view, both music and language are ubiquitous, spanning various cultures and time periods. For instance, in several African countries the use of percussive instruments is a regular source of entertainment and interaction among its native tribes. Similarly in Southeast Asian countries, it is quite normal to find their people groups receiving social enjoyment from playing the sitar or tabla just as they would enjoy a conversation in their native tongue (Farrell, 1997). Both images described here conjure up a distinct yet similarly motivated snapshot of social activity. However, many—if not most—cultures derive more than just social pleasure from such activity. They derive identity. That is why countries have national anthems. That is why nations have their own pledges. The illustration of the African percussionist or the Indian sitarist may seem at the onset quite commonplace; however, after looking at its larger social ramifications, it goes to show just how influential music and language can be in the grand scheme of humanity.

Since society is so inherently conjoined to the effects both music and language can have on a cultural identity, it is particularly interesting to note both of their psychological underpinnings, which will serve the thrust of this comparative study. Many who are inclined to the artistic nature of language and music would say breaking either down into their respective developmental stages is dehumanizing or in the very least, disparaging. However, after observing these studies in their most elemental forms, there will hopefully arise a consensus that the implications made in this study are, in fact, quite valuable to the overall approach to music and language learning. In turn, the purpose of this analysis is not to depreciate the artistic worth that lies behind either area but rather to reinforce it. Within this psychological framework, skill acquisition theory will make its considerable contribution to the overall stance that this comparative study plans to convey. That being said, the following statement will serve as the primary rationale for this analysis: music and language acquisition undergo a series of developmental stages in which a foundational level of understanding is established through explicit rules and forms (i.e. symbols, notation) that later get assimilated into patterns based on regularity which finally get reconstructed into novel, elaborated configurations (i.e. schemas) so as to be invoked for later use in newer, more complicated constructions.

In order to form an explicit rule-based system, language-learners and musicians must first learn the symbolic structures, which constitute the system. This elementary stage of information processing often seems tedious or even pointless for those who are more auditory inclined; however, it is critical that one establish an initial understanding of basic form so that more complex structures can be built up from these essential parts and form meaningful constructions in the mind (DeKeyser, 1998). Without this preliminary groundwork in place, it will be much more difficult to encode new information to memory—the ultimate goal to any type of acquisition. To begin, a quick look at how visual stimuli are perceived is in order.

When an image falls into one's visual field, many interconnected processes at the cellular level are going on at rapid speed. It starts with light passing through layers of the eye—the lens, vitreous humor, and finally, the retina. The image, which falls on the retina, is both flipped upside down and backwards; and it takes multiple neural messages moving through the optic nerve and to the brain before it becomes the image one actually "sees" (Daw, 2012). Each one of these intricate stages goes on without purposed intention, which is what makes visual perception an "automatic" process (Towell & Hawkins, 1994). In other words, visual perception spends a relatively small amount of cognitive resources. Transferring the stimulus to memory, however, does take some conscious, cognitive effort.

It should be noted firsthand that perceived stimuli do not pass immediately from the sensory organ (i.e. visual stimuli via eyes, auditory stimuli via ears, etc.) to long-term memory in the brain. That is, of course, common knowledge; however, the insight into the number of "gates" information/stimuli must go through before reaching the long-term memory box is not so common. For instance, any type of sensory information must first go through sensory memory (Moghaddam & Araghi, 2013). That sounds fairly self-explanatory, however, it is much more complicated. Going back to the example of visual perception, once the stimulus has left its position on the visual field, the image can only hold in sensory memory for 50-70 milliseconds. Thus, in order for this picture to retain its meaningful impression in the mind for longer than a few milliseconds, it must move on into short-term memory, also called working memory (Daw, 2012).

Working memory, as the name suggests, *works* to access or retrieve past stimuli that has already passed through sensory memory. Novel L2 forms or musical notations each go through this phase if they are to eventually become encoded in long-term memory. Since sensory input can be lost to memory forever if it does not move on into the next stage (i.e. working memory), the next question one must answer is *how* that information is transferred. The answer is simply, attention. Attention is the decisive role-player when it comes to whether or not new information gets placed into working memory. Baars (1997, p. 60) even heightens the importance of attention calling it, “the sovereign remedy for learning anything, applicable to many very different kinds of information. It is the universal solvent of the mind”. It is implicitly noted in Baars’s statement that attention unlocks the doors to a plethora of possibilities in long-term memory because it is this stage—working memory—that the fundamental rubrics to any skill are laid down.

Now the crux of the issue reveals itself: attention requires a large sum of conscious, controlled effort; and for this reason, it is quite limited in its capacity (Skehan, 1998). This, in turn, is where the Limited Capacity Model for information processing derives itself. The model importantly recognizes the fact that performance drawn from controlled processes (whether musical or linguistic) is more easily affected by “stressors” than performance that has been automated (Ortega, 2013). For this reason, the following processes in memory transference are crucial to enabling the efficient skill acquisition of music or a second language.

Once the visual stimulus—or whatever type of stimulus—has been attended to in working memory, a primary encoding of the new information takes place. This process is often referred to as the *procedural stage* because forms must be repeatedly rehearsed or practiced for them to stay in working memory. As these forms and rules become more regularly attended to, access to such is met with faster returns and fewer expenses on cognitive resources. This is due to the effects of “chunking.” Chunking is a colloquial expression adopted by linguists and musicologists alike (and all other cognitivists, for that matter) to explain the qualitative change that takes place in information as it begins its journey from working memory to long-term memory. This can be seen practically in the way musicians learn to sight-read or the way language learners acquire intake from L2 input.

For example, a novice sight-reader typically reads a new piece one note at a time. This method may work well for short, simple works, but it will only become increasingly ineffective for larger, much more complicated works. That is why musicians who want to become competent at sight-reading must learn to "chunk" or associate longer note segments. It should be noted, however, that musicians who want to do this must draw from previously stored information (Lehmann, Sloboda, & Woody, 2007). For instance, if a composition work transposes up to the next key in the fifth bar, a competent sight-reader would need to pull from implicit memory what notes now need to be made sharp or flat. If this does not happen implicitly, then chunking of the following measures will not occur, and the sight-reader will most likely need to pause in order to reassess what transition to make in order to play (or sing) the correct notes. This is similar to how an L2 learner processes input from an interlocutor (Anderson, 1985). When someone is still in his or her early stages of L2 development, they may only pick out one or two forms during L2 input. However, when someone has acquired a more extensive understanding of how the grammar system works in the L2 or what syntactic boundaries guide L2 expressions, then they are more capable of picking out novel L2 forms and reconstructing them into larger, more comprehensible parts (i.e. chunks).

This brings about another important notion about working memory. Unless there is already some source of explicit form stored in long-term memory, working memory cannot continue to encode and construct new mental representations. In other words, information in working memory can only be processed later for long-term memory so far as previously stored knowledge can shed light on these working forms. This is why having an initial explicit stage for acquiring new information is so crucial for future processing (DeKeyser, 1998). Another example of short-term memory at work during the procedural stage for musicians, in particular, is the development of aural skills. This can be most practically observed during a procedure musicians often call “playing by ear.” Ear playing, as the word suggests, occurs when a musician listens to a few bars of a piece (typically not heard before said session) and is then asked to repeat what he just heard. Musicians who have not had enough exposure to musical concepts like harmonic structure, rhythm sequences, or chord progressions, will most likely not be able to bind these sounds into manageable chunks in working memory, and as a result, have difficulty performing past a particular threshold of musical complexity (Lehmann et al., 2007).

Automatization, the final step in information processing, is the neurological mechanism by which new information can constantly flow. By means of this process, there is no limit to the amount of information the human brain can handle. Automaticity, as the name suggests, is an information change characterized by quicker access, relatively few to no strains on cognitive sources, and considerably lower error rates (Taie, 2014). An L2 learner is normally said to be “fluent” when they have reached this stage in the acquisition process. Musicians too are fluent or rather “proficient” when they have grasped enough musical knowledge to play a piece by ear, sight-read complex passages, or for some, compose. Each expert displays a sort of “technical finesse” that enables either skilled personnel to recall, produce, and create within their own respective art form. The key to achieving this stage is the construction of mental representations in long-term memory.

First, in order for these information chunks to get configured into larger schemas, they must be rehearsed multiple times in working memory. That way each time a form is accessed, its connection to meaning is subsequently strengthened (Ortega, 2013). This connection does not just happen psychologically. Electrochemical synapses in particular regions of the brain have been captured on brain-imaging software to be actively adjusting how their neurons fire across neural pathways so as to create a faster, more productive retrieval method for increasingly elaborated information structures (Anderson, 1985). Consequently, information becomes more grounded in long-term memory, and in turn, elaborated into unique constructions commonly called "mental maps." Mental maps then derive from a hierarchical structure, and since both music and language are inherently structural, they both can be acquired under this mental map paradigm.

For instance, most languages have their own syntactic system wherein symbols come together to form words, words come together to form phrases, and phrases come together to form sentences. Although languages abound in how they establish rules like subject placement, noun-verb agreement, genitive case marker, and any other number of various grammatical issues, there is a certain predictability about language that makes acquiring it a simple task of accumulation. This by no means is to say that language is simple, but rather it is a system that is approachable by means of natural order and categorization. For example, an L1 English speaker trying to acquire Spanish typically encodes first the basic verb conjugation forms for past tense before conceptualizing the imperfect and preterite aspects of the past tense. This follows a natural order of learning, and it is for this reason that educators of Spanish recognize this sequence of learning, and in turn, do not expect students to grasp aspectual differences at the same time they learn their respective conjugations (Herschensohn & Young-Scholten, 2013). To become fully knowledgeable of the aspectual verb construct within Spanish will take further reconstruction of past L2 knowledge so that it can become conceptualized in the mind and form relevant new schemas.

Also with music, there is a redundancy intrinsically entwined to its structure that makes it deducible to regulation of form and pattern. Melodic sequences, for instance, follow similar tonal patterns that can often be predicted by any proficient instrumentalist. This predictability is what allows musicians to take a score and in real-time manipulate its parts so as to create a new interpretation that naturally flows from the notation of its original composition (Lehmann et al., 2007). The ability to improvise a musical work while recreating its significance in a fresh, novel way is a true sign of musical proficiency as well as a sense of highly elaborated musical maps in long-term memory.

Music and language are often said to be some of the most distinct wonders of the human intellect. Without denying the validity of that statement, it is also true to say that both areas can be subsequently broken down into smaller, more manageable parts. Although even the most basic constituent of either language or music is respectively complex, it is to our advantage that the human mind can master the acquisition of both. Whether it be learning Swahili for the first time or studying six-eight time pieces, both can be approached by following the general tenets of Skill Acquisition Theory, the essential proposition of which claims that with enough controlled practice, anything can become implicit (i.e. automatic) (Ellis, 2005). Even the more rare case of a musical savant like Beethoven or J.S. Bach—although still profound in his own right—can be explained by a reasonable amount of skill acquisition (Ericsson, Krampe, & Tesch-Römer, 1993). That being said, this is a very short overview of the psychological processes, which underlie the skill acquisition of music and language. Both contain within their own respective constructs a great deal of structural complexity that linguists and musicologists alike still do not understand. However, the aim of this study was not to be comprehensive, but rather to be comparative of what common psychological stages underlie the development of either skill. Moreover, music and language are important to the human experience, and it is under this overarching framework that the comparisons made in this study work to synthesize a uniquely integrated approach.

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