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AN ANALYTICAL APPROACH ON THE RELATIONSHIP BETWEEN MUSIC AND LANGUAGE

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SUMMARY. This paper is the result of a research aimed at finding new ways of approaching a musical text, to release the music embedded in a musical score and reveal its deeper meanings. The close connection between music and language makes it difficult to define borders. According to scholarly hypotheses, the earliest communication form was a sound system, a musical protolanguage, as Darwin and Bernstein defined it. The study conducted herein aims to identify and analyse possible structural convergences between music and language. Therefore this relationship was investigated based on recent research in bio linguistics, language acquisition, and sonorous linguistic systems.

Keywords: music, language, structural convergence, structural linguistics, bio linguistics.

1. Introduction

With regards to the musical phenomenon there is no greater disservice that can be done to music than analyse it in a sterile, abstract, and impersonal manner. Music is a universe which remains a mystery to many people; uncovering its secrets requires God's grace and scholarly knowledge. A comparison between musical language and verbal language provides a new perspective not only on music but also on natural language. A study on language in a broader sense will bring about deeper knowledge on human beings, the ways they think and express themselves.

In contrast with many opinions in favour of an exclusively empirical manner for studying music, there is a "science of music", a structural perspective on musical text, built on a higher order organizing system. This assertion is confirmed from the perspective of musical linguistics.

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As music and language are viewed by many scholars as closely related phenomena the boundaries between these appear rather fuzzy and are therefore difficult to identify or define. Their main common field consists in their purpose: communication.

"Music is a universal language" is a commonly encountered cliché which seems to render pointless any scientific approach or quest for evidence. However, if we consider the existence of a protolanguage which, according to the Bible, was split into several languages after building the Tower of Babel, we might as well uncover the proto-cells of musical language.

2. Congruencies between music and language

The numerous elaborate studies that have been conducted in both music and linguistics fields have opened new perspectives allowing an insight on cultural systems, on how people think and communicate. The linguist Noam Chomsky describes this very appropriately:

> *"When we study human language, we are approaching what some might call the "human essence", the distinctive qualities of mind that are, so far as we know, unique to man…".* (Chomsky, 2006)

The parallel between music and language has been a scholarly preoccupation since the 18th century when Jean Jacques Rousseau and his contemporaries were studying the origins of the two languages.

The subject has been approached in various ways depending on each researcher's field of interest. Charles Darwin approached this subject from the perspective of his theory of evolution (in 1871) claiming that the initial form of the present-day language originated in a musical protolanguage; the linguist Otto Jespersen (1922) and John Blacking investigated this through the prism of ethnomusicology in the book "How Musical is Man" (1973). In his six lectures ***"The Unanswered Question"*** held at Harvard in 1973, *Leonard Bernstein* analyses the connection between the two languages based on common fields such as: grammar, syntax, semantics, language genesis, poetry etc.

Linguists and musicologists Ray Jackendoff and Fred Lerdahl contributed significantly in this field with papers like "*A deep parallel between language and music*" (1980) and "*A Generative Theory of Tonal Music*"(1983). In 1985, John Sloboda introduces cognitive psychology into the study of music in his book "The Musical Mind" (1985) wherein he presents the cognitive processes that are responsible for the perception, interpretation, and creation of music (Bannan, 2012).

The growing interest in investigating the connection between music and language is also due to the significant progress made in the field of cognitive neuroscience of music relating with a deeper understanding of human development and evolution. This opened the way for a new interpretation of the relationship between music and language, which is regarded as mutually inter-conditioned.

Both music and language are human-specific communication competences based on the way sounds are perceived and produced. The area of the brain responsible for the perception of sensory stimuli and their conversion into neuronal representations thus allowing the understanding of meanings is known as Wernicke's area which is shared by both languages. Broca's area, which is complementary to the former, is a brain region where neuronal representations are converted into articulated sequences in order to be expressed in form of spoken language.

Syntax represents another solid argument that underlies the close relationship between music and language. The human brain has a built-in logical system for language analysis. The American linguist Noam Chomsky proved that all languages have a common grammar which he calls "universal grammar" (see Syntactic Structures – 1957, Aspects of the Theory of Syntax – 1965, Topics in the Theory of Generative Grammar – 1966). The notion of universal grammar refers not only to the totality of the common properties of the different languages but also to the initial state of language faculty (Isac & Reiss, 2013, p. 237).

The concept of "language faculty" appears to be consistent with Darwin's hypothesis as regards a musical protolanguage previous to the verbal language. In the early stages of evolution, humans used phonemes (single sounds) to express their needs and emotional states which they later organized as morphemes (words) and after uncovering the rules of syntax, created higher-order linguistic structures. Over time, the role of music outdistanced itself from that of natural language due to its aesthetic qualities. Music ceased to be a simple means of expressing basic needs (hunger, mating, defence), and became an aesthetic object, the embodiment of the beautiful.

The comparative study of music and language systems opens new perspectives not only in the field of theory but also in the field of methodology. The congruencies between these systems could be regarded as a starting point in innovating musical pedagogy.

2.1. Bio linguistic Congruencies – born to communicate

Bio linguistics is a relatively new field of science which explores the basic properties of human language and investigates the way the language

evolved, how it works in practice, both in the process of thinking as well as in the process of communication, which are the brain circuits responsible for language processing and transmission (Samuels, 2011).

The first linguist who brought up the idea that human beings are born with a "language faculty" was Noam Chomsky (Chomsky, 1957). His idea was substantiated by the German linguist Erich Heinz Lenneberg in his book "Biological Foundations of Language" (1967) where he examines the biological structure of language.

From the perspective of bio linguistics, language faculty is an "organ of the human body" among the other cognitive systems. Language faculty includes human capacities for creative imagination, language and symbolism in general, mathematics, event interpretation and memorization in general, social practices, etc. (Chomsky, 2005). Chomsky also developed the theory of *universal grammar* which he presents in the following terms:

> "*the set of innate biological structures and mechanisms, characteristics of the homo sapiens species, that are capable to explain, starting from the information provided by the linguistic environment, the achievement of that competency described by the special grammars of the different natural languages*" (Flonta 1994, p.115).

Music perception is achieved within a complex neuronal network. A number of studies in the field of music neurophysiology showed that the analysis of each sound component is carried out rather independently. Semantic processing requires the activation of the anterior portion of the left hemisphere, timbre is evaluated in the right hemisphere, while rhythm is processed in the regions near Broca's area (Platel et al, 1997).

The basic quality of a sound is pitch which is determined by its frequency. The higher the frequency, the higher the pitch of a sound. Sounds are analysed inside the cochlea. The sensory cells of the cochlea convert the sound into a code of nervous impulses. These travel across the auditory nerve which sends the information to the brain (Moller, 2006, p.41). Music perception is a multidimensional phenomenon. For instance, pitches that are separated by an octave (frequency doubling) are perceived as very similar and are designated identically (e.g. the sound "C" on a keyboard). They form a pitch class or "chroma". (Patel, 2008, p.13) An element shared by both verbal language and musical language are pitch contrasts. Are language pitch contrasts and music pitch contrasts comparable? To answer this question we have to provide a presentation on how pitch is used in verbal language. Although humans are capable of speaking without altering pitch, the frequency of the sound, this rarely occurs. In fact, vocal inflexions are determined by sound pitch alteration, the most important physical element being the fundamental frequency of the uttered sound.

A general view on tonal languages reveals that it is rather uncommon for a language to use a single tonal level. Therefore, languages with multiple tonal levels are adequate for a comparison between music and language due to the contrasts occurring in both speech and music (Chanan, 1994, p.39). There are over 7000 different languages worldwide. Some of these are spoken by small populations but the most widespread is Mandarin Chinese which has the most speakers in the world. Mandarin has four tones: the 1st tone represents the level of steady heights while tones 2 – 4 are contour tones with intonational inflections.

This inflection or modulation is a very special one; it is richly structured and collects a variety of linguistic, attitudinal, and emotional information. For instance, happiness is associated with a high frequency, while sadness is illustrated by a low frequency revealing the level of affective excitement. Consequently, the height of sounds is the result of an emotional state, which is valid for both verbal language and music.

2.2. Sonorous Linguistic Systems

The study of sonorous linguistic systems encompasses two sections: phonetics and phonology.

1. *Phonetics* deals with spoken sounds including the study of the acoustic structure of language and the mechanisms which underlie the production and perception of speech.
2. *Phonology* deals with the sonorous patterns of language including the way spoken sounds are organized in higher units, such as syllables and words, the context-dependent variation of sounds, and the way the knowledge of sonorous models of language is represented in the mind of a speaker or a receiver (Patel, 2008, p.37).

Phonemes are fundamental concepts in the study of sonorous linguistic systems (Hayes, 2009, p.20). A phoneme is the smallest unit of speech which differentiates between two words of a language. Several organized phonemes form a *morpheme*. Musical sounds could be equated with phonemes and organized sound groups with morphemes.

Another basic concept of linguistics regards the hierarchical organized sonorous structure of spoken language wherein the phoneme represents one single level.

Phonological systems constitute the infrastructure of language. Each language is based on a phonological system which comprises a limited

number of elements. These elements have no intrinsic value except for the degree to which they oppose each other. Phonological systems are systems of oppositional relationships, organized by a particular hierarchy. In a functional system the mutual differentiations among the composing elements must be constant (Teodorescu-Ciocănea, 2005). There are however significant differences between musical and language systems. The most important one refers to what Martinet called "the double articulation of language", a concept that can be considered an additional resource which enhances the expressive power of a language. By contrast, no such resource could be identified in musical systems. Table 1 presents a correspondence of the different sound characteristics of language and music.

Structural linguistics proposes the theory of double articulation in order to explain the way in which verbal language is created from secondary units, called phonemes, which have no intrinsic value, yet contribute to word formation. Words consist of primary units called morphemes. Morphemes and syllables are not completely identical units although a word consists of one or several morphemes. The latter consist of phonemes which are not identical with letters of the alphabet.

Table 1

Parallel presentation of the sonorous correspondences between music and language

		System	
		MUSIC	**LANGUAGE**
sound	pitch	tonality	intonation
	duration	metre	rhythm
resource	articulation		phonemics

Source: Paul Mc Kevitt, Seán Ó Nualláin, Conn Mulvihill, John Benjamins, 2002

According to linguists' definition phonemes are the smallest language units, which originate in the psychological construction of the sonorous emission system (mouth, throat, and nose). Saussure, the founder of structural linguistics, calls them "opposing, relative, and negative entities" (Chanan, 1994, p. 82).

This poses the question whether such a double articulated system can be identified in music? *Henri Lefebvre* writes that some authors have tried to identify so called "melemes" – molecules or carriers of musical signification which, similar to morphemes, are minimal units consisting of secondary elements which, considered separately, are meaningless.

But what is the equivalent of a morpheme in music? Could it be the interval, the chord or a group of sounds? And moreover, what is the correspondent of a phoneme in music? Is it the sound, the note itself? Is it a pure sound or the sound along with its entire series of harmonics? These questions arise when comparing verbal language with musical language.

Nicholas Ruwet argues that music and language can be mutually compared if we consider language in light of Chomsky's and Miller's definition as being "a set (finite or infinite) of sentences, each finite in length and constructed by concatenation out of a finite set of elements" (Chanan, 1994, p.83). According to Ruwet, this definition can be also extended to include music if the whole musical work is considered as a sentence and the notion of concatenation comprises both the vertical relation – harmony and the horizontal one – counterpoint.

Synthetically, the comparison between verbal language and musical language can be illustrated as shown below.

In order to apply syntactic analysis to music, the elements of verbal languages must be equated with the corresponding elements of musical language. *Bernstein* proposes in his lecture series „The Unanswered Question" following correspondences:

Table 2

Correspondences between elements of verbal languages and elements of musical language

MUSIC	LANGUAGE
Note/Sound	Phoneme
Motif	Morpheme
Phrase	Word
Section	Clause
Movement	Sentence
Piece/work	Piece/work

In his lecture series delivered at Harvard in 1973 (Bernstein, 1973), *Leonard Bernstein* denies Ruwet's theory as being unconvincing. Although the German word "Satz" means both *clause* and *symphonic work*, as he

observes, comparing the whole piece with a clause does not hold, whereas if we equate a musical note or sound with a phoneme, then a musical motif would be a morpheme. In this case, “a musical phrase would correspond to a word, a musical section would correspond to a clause, and the whole work to a phrase.”

Bernstein reaches the conclusion that music is formed of interdependent clauses connected by conjunctions and relative pronouns (Chanan, 1994, p.84).

Pursuing the three categories of linguistics phonology, syntax, and semantics, Bernstein studies the same three dimensions in music. He outlines the most exact analogies between the linguistic categories and music due to his moderate comparison of the two systems by considering the ambiguity of the musical language.

2.3. Language Acquisition – the Music of Verbal Language

Music and language are frequently compared as they are considered universal communication systems based on hierarchically organized systems and grammar rules. It was found that music and language activate the same brain areas therefore linguists and musicologists have focused their attention on the question whether children acquire verbal language as a musical system.

New-born babies use “primary” sounds - phonemes to communicate with their external surroundings. Young children are extremely capable to differentiate between the phonemes of all languages. They have a special sensitivity for timbre as well as for rhythmic components. At the age of 3 – 4 years the child becomes competent in his native language. Although linguistic abilities continue to evolve, the whole set of competencies for language processing and producing has been acquired. (Kuhl, 2004)

In order to acquire the language of the community the child must become familiar with several lexical and phonological elements and their complex relationship which constitutes the grammar of a language. Moreover, the child must adapt his language in accord with its own needs but also with the norms of the community to which he belongs. (Ferguson & Farwell, 1975)

Language is often defined as symbolic means of communication with a lexicon of the meaning and a syntax of organization. Speech is not an end in itself but a way of expressing the individual experiences. Although speech is symbolic, the sound is the carrier of the message. (Brandt, Gebrian, & Slevc, 2012)

Depending on the manner of listening, the same stimuli can be perceived as language or as music. The repetitive listening of a recorded spoken sequence can be perceived as music. Speech is sound. Its acoustic

attributes – height, timbre, and rhythm are intended mainly for musical purposes. In order to acquire language, a child is alert to every element of speech (Deutsch, Henthorn & Lapidis, 2011).

The vast capabilities of new born babies as regards the perception of the different speech aspects were often mentioned as proof of innate language (Vouloumanos & Werker, 2007). These capabilities depend on the most musical aspect of speech, differentiation among language sounds. Without the ability of musical hearing we wouldn't be able to learn a language (Deutsch, Henthorn & Lapidis, 2011).

Certain universal aspects of the musical structure, like the preference for consonance to the detriment of dissonance occur during the first stages of child development. They probable originate in the properties of the basilar membrane and the auditory nerve, in association with exposure to temporally organized sounds (Hannon & Trainor, 2007).

Table 3

A parallel between music and language features - perceptive variations in young children

Age	MUSIC	LANGUAGE
6 months	**1)** Ability to distinguish sounds in any musical system	**a)** Ability to distinguish sounds in any language
6 – 8 months	**2)** Partial distinction among harmonic contrasts	**b)** Partial distinction among phonetic contrasts
8 months	**3)** Ability to identify rhythms as tempo and pitch vary	**c)** Ability to identify rhythmic elements in native language
8 months – 10 months	**4)** Acoustic perception declines for non-native musical sounds but increases for native musical sounds	**d)** Acoustic perception declines for non-native sounds but increases for native language sounds
10 months – 12 months		**e)** Differentiation among non-native speech sounds becomes impossible
12 months	**5)** Differentiation among non-native musical sounds becomes difficult	

Source: Brandt, Gebrian & Slevc, 2012

In conclusion, verbal language is perceived by young children as a musical mini-system. As individuals grow, their understanding of music deepens in accordance with cultural standards and personal preferences.

3. Conclusion

Music and language have several points of convergence of which the most relevant one is determined by the feature shared by both – human communication. The field of bio linguistics opens new perspectives on how language is generated and acquired. The core argument herein is the common neurophysiological network which is responsible for language processing and includes the main language-specialized areas – Broca and Wernicke along with the mechanisms of auditory perception. Both music and language are phonologic communication systems, organized hierarchically in accordance with precise structural rules.

Structural convergences are especially frequent in the field of syntax Harmonic syntax is obvious in tonal music, where every sound is assigned to a harmonic function allowing to discriminate between two main functions: tonic and dominant. Schenker systematized the musical structures by differentiating between three structural levels and introduced the concept of prolongation.

Language is mainly aimed at expressing inner experiences and conveying meanings. Music and language are coded systems that contain the symbols of the mental representations. Every sound feature carries a specific significance. Height, timbre, and rhythm are means of expression which are associated with particular psychological states. Spoken language symbols are largely used in poetry where words are metamorphosed into metaphors. Music can be described as a chain of metaphors.

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