

MUSIC: A COGNITIVE DEVELOPING ACTIVITY

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This paper considers the theories of Vygotsky, Luria and Leont'ev, the 'troika', which offer a different perspective to learning from that of Western theorists. In considering music as a cognitive developing activity, a theoretical model can be constructed from components of the 'troika' theories to illustrate how music as an activity can develop memory and other cognitive processes. Vygotsky's developmental hierarchy of conceptual thought processes, Luria's brain functional system and Leont'ev's theory of activity can be integrated into a model wherein music as an activity can be examined either in its entirety or in a series of associative relationships. Such a model could provide a new means for investigating music and its associated cognitive activity and thus have significant implications for children's learning.

The 'Troika' and a theoretical model

Cognitive learning theories emanating from the Eastern world of research are becoming increasingly available through a series of English translations. In particular, the research of three Soviet theorists concerned with cognitive processes, L.S. Vygotsky, A.R. Luria and A.N. Leont'ev, referred to as the 'troika' (Wertsch, 1985), offers further possibilities for investigations into learning capacities and learning potential. Music educators and researchers in the English-speaking world already have begun to examine Western world cognitive learning theories in relation to music and education (Aronoff, 1988; Comte, 1981; Heller & Campbell, 1982; Moog, 1982; Zimmerman, 1984). By examining components of the theories of Vygotsky, Luria and Leont'ev, a theoretical framework can be formulated which could justify music as a cognitive developing activity. It is not intended here to initiate a comparison of Western and Eastern research or to discuss Eastern and Western ideologies. However, it is necessary to identify different ideas and approaches to see how these might influence the development of any theory. In this respect the approach to learning by Vygotsky, Luria and Leont'ev provides a different perspective to Western thinking, in relation to consciousness, memory, learning and cognition.

The "troika" regarded:

- consciousness as not being absolute but socially and culturally shaped; it varied with the individual;
- long term memory as being emphasised in relation to simultaneous processing;
- there being two conditions of learning: consideration of how children learn in a social context and a child's perception of the task; and

- a cognitive process as having social origins; it also has functional links which are interchangeable.

These points need to be considered at the same time as the theories of Vygotsky, Luria and Leont'ev are discussed.

Vygotsky's theory of conceptual thought processes, and the relationship of language to these, suggests a possibility for music activity to be contemplated in a similar way. Other pertinent aspects of his theory are the recognition that knowledge continuously evolves in a social context, and that the internalisation of knowledge and meaning can be examined through a 'tool' or 'sign'. Vygotsky's theory, together with Luria's brain functional system, and the structure of activity designed by Leont'ev has led to the development of a theoretical model (see Figure 1) focussing on music as an activity (Bygrave, 1985). Although the research of the 'troika' was concerned primarily with language, some relevant features of the theories of Vygotsky, Luria and Leont'ev can be outlined and considered from the viewpoint of music as an activity.

Vygotsky - A Developmental Hierarchy

Vygotsky (1962) investigated conscious thought processes in developing his theory of conceptual thought, and considered the relationship between thought and language. These he viewed as having separate functions. From his studies Vygotsky concluded that a 'word' or 'speech' proceeded through a developmental hierarchy of four stages governed by the same principles as those relating to other mental operations that employ a 'tool' or a 'sign'. Vygotsky also outlined similar stages in conceptual thought development. In brief, his theory illustrated the development of thinking through the use of language as a 'tool' or 'sign'. He envisaged a 'sign', mediating internal activity of consciousness, as an extension of a 'tool' which mediated information processing in external activity. Vygotsky also applied his developmental hierarchy model to learning processes outside language, specifically the development of operations or behaviours in memory and mathematics. For the purposes of the theoretical model presented here it is suggested that the development of memory, through using Vygotsky's developmental hierarchy based on intellectual response processes, can be illustrated by employing music as the 'tool' or 'sign' in the following way:

1. **Primitive Stage:** *the response to a complex structure with primitive means.* Vygotsky (1981) states that in this stage a child's behaviour is determined by the immediate appearance of the resources. If a young child is given for the first time, for example, a notated music sheet and musical instruments such as chime bars, the child would probably ignore the music sheet and play at random on the chime bars. This is because he/she has no knowledge of a relationship between the notes on the music sheet and the notes of the chime bars and playing the chime bars would be the more interesting thing to do.

2. **Naive Psychological Stage:** *children accumulate and master certain experiences by using a 'tool' in an external way.* The previous example can be extended to include the naming of various notes on the music sheet and the naming of various chime bars. A relationship thus is introduced whereby a note on the music sheet has the same name as that of a chime bar. This relationship is an external association between two objects. The child does not understand the true nature of the relationship but through practical associations like that described, gains experience in a naive psychological way.
3. **Stage of Using External Signs:** *a child knows that the presence of a 'tool' assists in carrying out an operation.* The note on the music sheet for instance, is connected with that of the chime bar. By establishing this connection the child can then begin to make new associations. This is an important point in Vygotsky's model wherein children can organise stimuli in order to achieve a response. In other words, new connections are created by appropriate reasoning. Thus, in music the child begins to form an association of the written note with a given sound. A number of these written notes then can be organised as a number of sounds, for example, to construct a tune. Gradually these written notes and associated sounds can be extended into a variety of sound combinations and tunes.
4. **External Reactions are Internalised:** *a child no longer needs external stimuli because an external operation has its internal representation.* In a musical learning process a child reaches a stage when he/she knows how a written musical note sounds internally, that is, he/she knows the concept ('sign') of the acoustics of a sound. The child can then create, improvise, play or sing a tune knowing how that tune will sound.

Luria - A Brain Functional System

Luria (1973) developed his brain functional system from a concept that functional criteria can be considered either as an entirety, or in a relationship. By viewing memory as a functional system, Luria (1976) was able to identify the many links in a cognitive process. His concept allowed for a damaged neurological link or a non-functional link in the cognitive process, to be replaced in some instances by another functionally equivalent link. In his research on the cerebral cortex, Luria distinguished two basic forms of integrative cognitive activity, simultaneous processes and successive processes.

The following possibilities for learning by relating musical associations, cognitive processing and memory can be incorporated into the theoretical model:

1. **Simultaneous Processes:** these integrate individual stimuli arriving into the brain as a single entirety related in space and allow for a system of relationships, or the knowing of how three, four or more elements integrate to make a whole. These processes can provide a semantic form of organisation useful in the acquisition of long-term memory. In the

music context, the components of beat, timbre, pitch, tempo and dynamics, for example, can all be integrated with a series of sounds which can be clumped together to form a meaningful, surveyable musical 'whole' such as a tune or a musical composition.

2. **Successive Processes:** these integrate individual stimuli which arrive sequentially, one after the other, into the brain and are useful in the organisational processes of short-term memory. The processes allow for a compact idea like a musical theme, or a tune to be expressed in detail. For instance, musical notes organised in a sequence can be readily imitated and identified.

This can have implications for music education experiences with children whose short-term memory functioning is low.

A musical composition which can serve as a possible example to illustrate how successive processes and simultaneous processes can be integrated for music learning is Prokofiev's "Peter and the Wolf". In "Peter and the Wolf", simultaneous processes are involved in relating to and understanding the composition in its entirety. Successive processing also can be involved in understanding the composition. Through the sequential presentation of particular themes in the composition associated for instance with Peter, his grandfather, the cat, the duck and the wolf etc., each of these characters can be identified within the context of the whole composition. A child with short-term memory difficulties often can identify such a musical sequence within a composition but would have experienced problems if the composition was to be considered in its entirety.

Luria's system also provides for an extension of the learning processes by the replacing of a damaged or of a non-functional link by another functional link. He has demonstrated empirically that while either damaged links or non-functioning links can cause blocks in memory and learning, functional systems work together with a degree of interchangeability (Wertsch, 1981). This has considerable implications. For instance, in music learning by deaf children, a damaged link concerned with sound perception can be replaced by visual cues, such as the visual action of someone beating a drum, to prompt auditory skills. Similarly, a non-functional link in learning such as a deficiency in the sequencing process, can be interchanged with a simultaneous process, and vice-versa, to provide more effective memory skills.

Leont'ev - A Theory of Activity

Leont'ev's (1981) theory of activity considers activity as a fundamental concept related to external behaviour and linked to the consciousness. His theory provides a structure of six concepts, the analysis, the goal direction, the mediation, the development, the social interaction and the internalisation of

knowledge in association with activity. Such a structure allows for each concept to be examined as a separate functional unit within the whole activity. One of these concepts, the analysis of activity, now will be considered first as a concept and then related to music activity.

Three separate levels of activity, actions, goals, and operations, are analysed by Leont'ev (1981). Leont'ev says that before any activity can take place there has to be a perceived need recognised by an individual. It is through this need that a goal is defined, the object of an activity. Intermediate goals however can be identified in the course of the activity before the final goal is realised. A motive for an activity is also identified by Leont'ev. He considers an activity's goal as the real motive for activity saying that although there is always some need, there can be no activity without a motive. Thus, once a need and a motive have been identified it is in the actions, the intellectual working out for one's self of new ideas, and in the operations, the behaviours associated with the activity of the individual, that the goal of the activity is finally attained.

A musical activity, such as the recognition of different concepts of sound, is illustrated in Figure 2. The need perceived by the individual in this example of a musical activity, is to express sound. Through this expression of sound the goal of recognising and knowing the different concepts of sound - for instance, fast and slow sounds associated with the musical component of tempo - motivates the individual to achieve this goal. Intermediate goals, such as obtaining and learning to play a musical instrument, will be combined with the activity of actions and operations in the actual realisation of this goal.

Such an analysis of music as an activity offers possibilities for music to be investigated in many ways. This structure allows for the following considerations: How does a motive arise? How can a goal be defined? How can the intellectual process of an action be viewed? How are the conditions of the operation carried out? These may be answered, for example, through investigations of the learner's environment and/or investigations of the behaviour associated with the segments or relationships which occur within a musical activity.

Implications of a theoretical framework

Social and cultural interactions lie behind the development of the theories of Vygotsky, Luria and Leont'ev and are directly related to a child's cognitive processes. The view of the 'troika' is that society and culture produce activity for an individual and that is through social interaction that a child develops knowledge, thoughts and cognitive processes. Vygotsky (1981) and Leont'ev (1981) discuss two levels of social foundation in connection with the internalisation of knowledge, the interpsychological level where a child needs help in an activity, and the intrapsychological level when a child is able to carry out an activity from his/her own thinking. With reference to the music activity model (Figure 2), the intrapsychological level would be attained when a child eventually plays a musical instrument knowing what the different concepts of

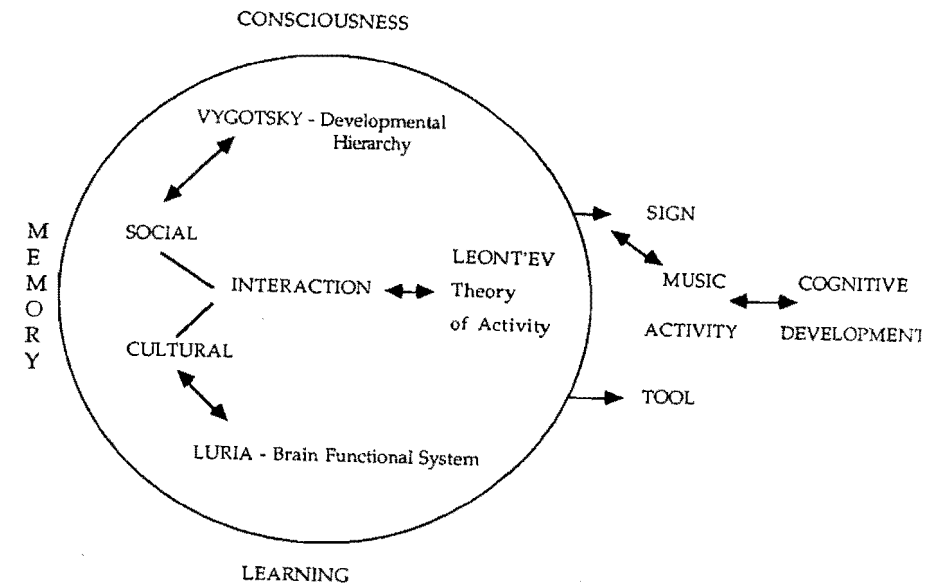


Figure 1. A Theoretical Model

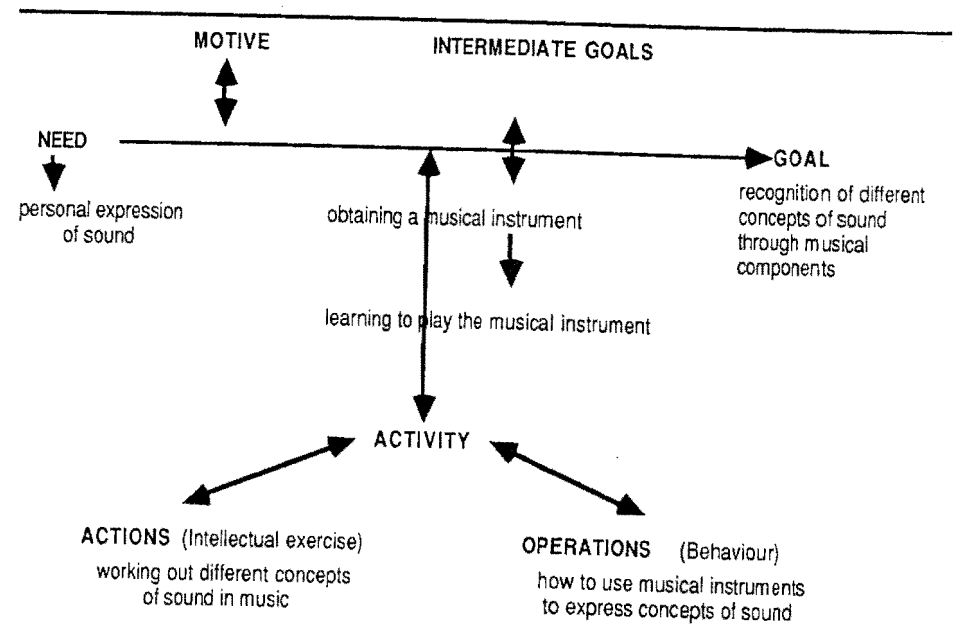


Figure 2. Music related to the analysis of activity

sound are. Both the interpsychological level and the intrapsychological level have in their turn implications for music and learning. Firstly, the environment in which a child interacts with music will have considerable influence on how a child perceives music. An example would be the positive and negative interactions and associations with other people the child will experience in relation to music activity. Secondly, the way in which a child learns to listen, to comprehend, to recall, to memorise and to analyse through participating in music activity will have undeniable implications for the association of music with knowledge and learning.

Summary

The confluence of elements of the theories of Vygotsky, Luria and Leont'ev into a theoretical model allows for a plan of associated relationships linking music activity with cognitive development. The developmental hierarchy of Vygotsky suggests a way in which memory processes can be investigated and developed through music activity. On an empirical basis Luria's brain-functional system recognises the interchangeability of learning processes which gives credence to the implementation of alternative possibilities for learning. Finally, the theory of activity developed by Leont'ev provides a structure through which activity can be analysed. The emphasis on social interaction associated with the theories of Vygotsky, Luria and Leont'ev also is a necessary component to be considered in an educative and learning environment. A theoretical framework which links music with cognitive activity in a social context could have implications for a child's learning by providing a new means and a different perspective for investigating knowledge acquisition, learning and development, with the focus on music and its associated activity.

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