CREATING A TRADITIONAL ORCHESTRA FOR THE NEEDS OF SPECIAL EDUCATION

Tradicionālā orķestra izveide speciālās izglītības kontekstā

Joannis Makris ***(Ioannis Makris)***
High School of Pedagogical & Technical Education (ASPETE)
e-mail: makrisconductor@yahoo.gr

Abstract. *The creation and teaching of a musical ensemble constitutes a complex process. The process becomes all the more complex when it entails the needs of Special Education. The goal of the present study is to present the teaching of a traditional orchestra to individuals suffering from intellectual deficits. Our methodological framework is anchored on: (a) Applied Behavior Analysis (Miller, 1962; Krumboltz & Krumboltz, 1972; Gibbs & Luyben, 1985; Kazdin, 1984) with the help of technology (Makris, 2015); and (b) the analysis of the mathematical law governing musical pleasure (Makris, Mullet, 2003). More specifically, we will be analyzing the manner in which we can create and teach a traditional orchestra to mentally disabled individuals through the application of the model "visual stimulus" – "psychophysical reaction". The gradual shaping of behavior entails progressive reinforcement and not anticipation of perfection, the motive of the mentally disabled individuals to participate and be included. The results presented in the graphs confirm in practice the success of the present endeavor.*
Keywords: *Traditional orchestra, musical enjoyment, intellectual deficit, applies behavior analysis.*

Introduction

We become aware of the world around us (shapes, forms, sounds, etc), in other words, we receive information for the existence of stimuli emitted by an environment through a sensory organ which conveys the stimulus to the brain where the stimulus is processed further on the basis of the experiences we are in possession of. Our sensory receptors (eyes, ears, etc) are linked to corresponding neural pathways which are parts of the brain involved in sensory perception and form sensory systems: vision, the auditory (hearing) system, olfaction (smell), somatic sensation (touch), the gustatory system (taste), and the vestibular one (this last one entails how we sense the extent of our muscles and the movements of all parts of our body). The brain perceives the stimuli with the help of cognitive processes (Anderson 1981a, 1991, 1996). Still, our sensory receptors are limited when it comes to environmental stimuli. In operant conditioning, antecedents (events preceding the manifestation of a behavior) provide us with information as to which behaviors have positive results and which ones lead to negative results. Applied behavior analysis is the application of the principles of the theory of Behiaviorism (Miller, 1962; Krumboltz & Krumboltz, 1972; Gibbs & Luyben, 1985; Kazdin, 1984; Gibbs, J. W., & Luyben, P. D. 1985) on learning with a view to modifying behavior. An indispensable requisite for such an application is the clear and explicit definition of the behavior we wish to change, the thorough evaluation of the behavior we wish to change, and the analysis of the antecedents and the reinforcers which may be contributing to the perpetuation of the inappropriate or undesirable behavior. On a theoretical level, that means that researchers must employ an initial measurement of behavior (A). Next researchers apply the intervention (B) which they must interrupt in order to verify whether the behavior returns to its initial level (A). Last researchers proceed to restoring the intervention (B). However, application of the above approach is difficult to carry out word for word. For that reason, in practice, researchers operate as follows:

(1) define clearly the behavior they wish to change and pinpoint that behavior's current level;
(2) Design / Plan a specific intervention based on the antecedents, on consequences, or both;
(3) Monitor the results and proceed to amending the intervention when necessary.

One way of avoiding problems is by gradually shaping behavior, a practice known as the successive approximations strategy. It entails gradual reinforcement and not anticipation of perfection. One approach to the definition of those "baby" steps is the project analysis first applied by R. B. Miller (1962). The Miller system begins by defining the final result ultimately desired. In essence, the definition entails that which the trainee must be in a position to carry out by the end of the program. Next, the steps that will lead the trainee to the final goal must be defined. That process simply "breaks down" skills and processes into sub-skills and sub-processes. Krumboltz & Krumboltz (1972) describe the following three methods that can be employed in the gradual shaping of behavior: (1) trainers reinforce each sub-skill; (2) trainers reinforce improvements in terms of correctness; and (3) trainers reinforce longer and longer periods of performance and participation. Many are the forms of behavior which can be improved through gradual shaping and that holds especially true of skills which can be learned by an individual by means of perseverance, patience, increased correctness, and further practicing (Lee Heward, 2011; Woolfolk, A. 2005).

Aim

The aim of the present study is to create a traditional orchestra. To do so, we came up with a behavioral model which, schematically, can be expressed as follows:

Appropriate stimulus → Reaction or Appropriate (codified) Optical Stimulus → Specific psycho-physical reaction to a certain musical instrument.

More specifically, we proceeded as follows:

(1) The music was broken down into components that could be worked on independently of each other (tempo, chords, melody, bass).

(2) The components were then codified using a specific color code which gives the orders for certain psycho-physical functions to take place.

(3) Certain musical instruments were modified and adapted so that the participants playing them could use them with greater ease.

(4) An apparatus generating visual signals (stimuli) was constructed in such a way as to be functional and effective. It was named the "Makris" Pedal Switch Visual Signal Generator (Makris, 2015).

Materials

From birth to death, music is everywhere around us at any given moment of our daily life. To some, music is the means towards emotional expression while, to others it brings entertainment and aesthetic pleasure. However, music fulfills other functions as well especially where Special Education is concerned (Makris, Macri, 2009):

Music (1) is a psycho-somatic reaction; (2) is a means of communication; (3) carries emblematic significance; (4) reinforces compliance to social norms; (5) validates social institutions and religious rituals; (6) contributes to the continuity and stability of a culture; and, last, (7) contributes to social cohesion.

Music is comprised of a series of components which are independent of each other. Research has proved that law under which musical pleasure function in tandem with tempo, melody, tonality, and timbre (tone color) is cumulative (Makris, Mullet, 2003). In the case of the present study, it helps us select the musical instruments which, in turn, will be chosen by the handicapable individuals participating in the study.

The materials we employed in the present project were: (a) a pedal switch generator of visual signals; and (b) a number of traditional musical instruments adapted to the handicapable participants' needs. In essence, the pedal switch generator is a tool through which we send visual signals in real time to the orchestra members active in performing a song. The apparatus comprises (a) a Controller which is a series of pedal switches. Every time they are pressed by

foot, the switches activate their corresponding Responders, a series of colored light bulbs. The color assigned to each light bulb on the basis of a predetermined color code represents a specific chord such as the Tonic Chord, the Dominant Chord, etc.

The following musical instruments were chosen on the basis of their capacity to interpret Greek traditional music: Guitar, Baglama, Bouzouk, Ukelele, Santur, Electric Piano, Accordion, Plan Flute, and several types of percussion instruments. The fact that some of the handicapable children were also mobility challenged led us towards making certain modifications to the instruments. For instance, tuning the guitar to the usual E-B-G-D-A-E was modified to G minor-C-G-C-G-C. Tuning the Ukelele to the classic A-E-C-G was modified to G-E minor-C-G. The direct result of such tuning modifications was that the player could strum the strings free without having to apply any pressure with the left hand in order to obtain the Cm Chord. We also placed stickers on each musical instrument whose colors fully conformed to the color code we had determined.

Method

A musical work can be broken down into the following structural elements (Amarantidis, 1990): (1) melody; (2) chord; (3) bass; and (4) tempo. Out of those four structural elements, chord, basso, and tempo can be rendered by visual signals. Among those three, tempo requires the simplest handling: all it needs is a visual Led metronome readily available in the market. The Led light's ON and OFF functions taking place at a specific tempo can lead individuals with diminished learning functions to follow the tempo while playing at the same time a percussion instrument (tambourine, goblet drum).

At this point, attention should be drawn to the following issue concerning the structural elements "chords" and "bass": The basic chords can be modified to correspond to a certain color. For example, the Tonic chord could correspond to red, the Dominant chord to yellow, and the Subdominant one to green. The alternation of the visual signals corresponding to specific chords can be accomplished in real time by the Controller mentioned earlier which, in essence, is a system of pedal switches. Thus, when pressed, the "red" pedal would transmit a command to a Responder which, in our case, is the red light bulb which prompts us to play the Tonic chord. More specifically, if we are at the Do-major scale, we need to play the Do-major chord at the very moment the light bulb goes red. By pressing the yellow pedal switch, the yellow light bulb responds by lighting up. According to that stimulus we must in turn respond by playing the Dominant chord which, on the Do-major scale, is the Sol-major chord. In a similar manner, when the green light is on we should play the Fa-major chord. When we are in the Re-major scale, the Tonic chord (the Re-major chord) will have been modified to correspond to the red light, the Subdominant chord (the Sol-major chord) to the green light, and the Dominant Chord (the La-major chord) to the yellow light. In that way, we succeed in having specific chords correspond to specific visual stimuli. Additionally, the method makes it possible to set a predetermined tempo interpreted by those playing the percussion instruments.

A traditional orchestra is composed of more instruments which belong to different techniques. The piano, harmonium (pump organ), and accordion are all in the keyboard instrument category. The guitar and the ukelele are in the string instrument category, while the fipple flute belongs to the wind instruments. The modifications we made to the musical instruments involved placing color stickers on them. In that way, the children with special needs participating in the orchestra and playing a keyboard instrument, for example, would know that when the red light goes on they must press the keys marked with red stickers. The same applies to yellow and green. Similar color stickers were placed on the string instruments and the fipple flute. Melody was a component handled by having the song assisted by a solo instrument which is normally played by us, the trainers. The absence of light meant that a new song was about to begin while commencement of the orchestra's repertory was signaled by a light going on. A blue

light signified that all orchestra members had to stop playing their instruments at that very moment.

Results

The methodology so far described aims at teaching individuals with intellectual deficits how to play musical instruments and form a light orchestra through the help of technology. On the basis of the above:

(1) The animateur, assisted by technology, can easily create a visual repetitive signal that guides the tempo. That repetitive signal will be used in steering the individuals who will be involved in keeping the tempo to accompany the specific work or song they have undertaken to perform.

(2) In real time, the animateur can create with the same ease alternating visual signals based on the color code previously developed that will help in the alternation of the chords and of the basso. Those alternations will need to be followed by the individuals who will accompany the musical work or song.

(3) It is paramount that the component Melody be assisted by a solo instrument usually played by the musician or animateur. That is the musical instrument that the individuals or choir singing will be called upon to follow.

It is thus evident that, assisted by technology, we create a methodology on the basis of which, at a behavioral level, we prompt an instant reaction by the individuals and their direct participation in a music group. At the same time, participants acquire appropriate training and gain in socialization skills. In other words, the approach is both innovative and greatly benefits program participants.

A year ago, the present methodology began being clinically implemented at the “Lilian Voudouri Workshop”, a Day Care & Activity Center that is part of the Lilian Voudouri Foundation in Athens. It has been hugely successful as proven by the children’s response and increased functionality, socialization, and coordination within the group and by the ultimate musical result. The clinical implementation and development off the present methodology has helped us draw series of conclusions. Apart from its innovative nature, the methodology also shows strong evidence of increased functionality. However, as methodologies go, it does have one drawback: The individual manning the “Makris” Pedal Switch Visual Signal Generator must be a musician and be thoroughly familiar with the works to be performed by the orchestra.

Summary

The children with special needs that were the subjects of the present methodology were greatly reinforced in terms of the knowledge they acquired. In fact, the speed at which the children learned the color code was impressive.

The following graph displays certain measurements that were carried out and entail the children’s reaction and focused attention times (rehearsals).

Those graphs revealed that the children, in their pursuit of following the music, increased the time during which they could focus and pay attention to the visual signals. What is more, many were the cases of children whose memory improved especially when it came to their skills. More specifically:

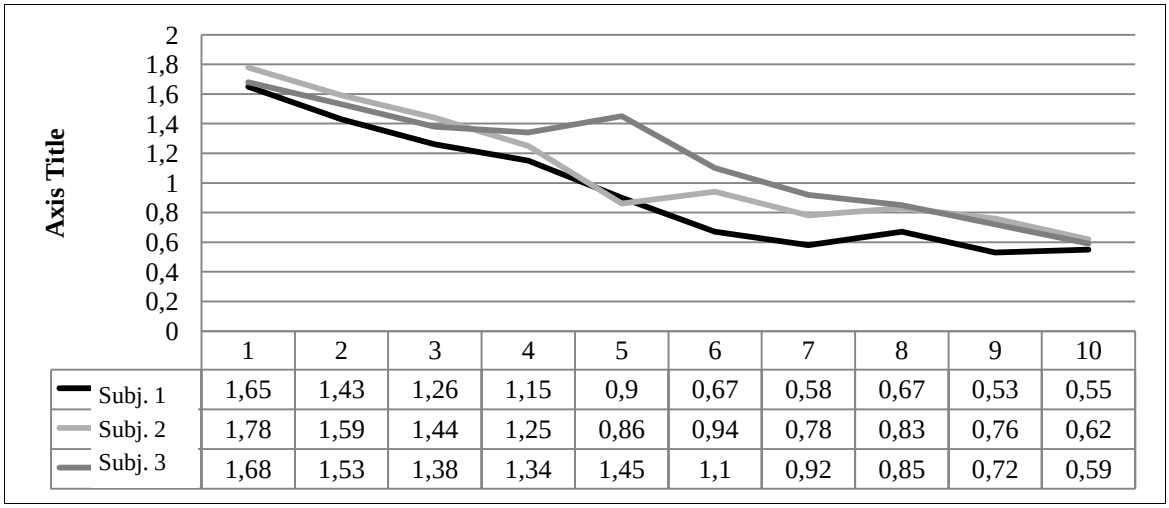
1. By participating in the orchestra, the children with special needs at the “Lilian Voudouri Workshop” greatly increased their socialization skills through their active participation and involvement. To a great extent, the children were able to demonstrate their self-expression skills within a group and improve their self-control.
2. The children’s degree of movement also increased through their participation in the orchestra and through their playing one of the musical instruments. It should be noted that musical instruments were selected on the basis of how much pleasure they

gave to each one of the handicapable children. Some of the children even went so far as to try and play two instruments so as to improve their mobility.

3. Participation of the children in a light orchestra constitutes a means of indirect training and cultural sophistication.
4. The interpretation of songs contributed greatly to the development of the children's emotional world. It is worth noting that in this manner we were able to lead the children to the fourth (and marginally the fifth) level of Maslow's hierarchy of needs pyramid (Maslow, 1954).
5. Communication between and among orchestra members grew and developed to a great extent given that the children acted as a group focused on a specific goal.
6. Participation of the children in the orchestra was instrumental in creating an atmosphere of fun and relaxation.

Table 1

Time of reaction in optical stimulus (3 subjects – 10 rehearsals)



	1	2	3	4	5	6	7	8	9	10
Subj. 1	1,65	1,43	1,26	1,15	0,9	0,67	0,58	0,67	0,53	0,55
Subj. 2	1,78	1,59	1,44	1,25	0,86	0,94	0,78	0,83	0,76	0,62
Subj. 3	1,68	1,53	1,38	1,34	1,45	1,1	0,92	0,85	0,72	0,59

At present, we are in the process of improving the "Makris" Pedal Switch Visual Signal Generator and further evolve the method by means of computer and MIDI technology so that we may bring about the appropriate modifications and make the apparatus' use more accessible to other scientific groups (psychologists, work therapists, special education teachers, etc), without musical knowledge being a requisite for the apparatus' user. Last, use of the "Makris" Pedal Switch Visual Signal Generator can apply to other arts other than music such as dance and drama by a corresponding codification of movements or expressions, respectively.

Kopsavilkums. *Muzikālo ansambļu izveide un mācīšana ir sarežģīts process. Šis process kļūst vēl komplicētāks speciālās izglītības kontekstā. Šī pētījuma mērķis ir nodemonstrēt, kā notiek tradicionāla orķestra izveide un sagatvošana, ja orķestri veido dalībnieki ar garīga rakstura traucējumiem, izmantojot „vizuālā stimula” - „psihofiziskās reakcijas” modeli. Metodoloģija ir balstīta uz pakāpenisku dalībnieku uzvedības veidošanu un nostiprināšanu. Diagrammā atklātie rezultāti apliecina, ka pūles nodrošina praktiskus panākumus.*

List of Literature and Bibliography

1. Amarantidis, A. (1990). *The tonal music system.* Text in Greek, Athens: ed. Papagrigoriou - Nakas.
2. Anderson, N. H. (1981a). *Foundations of information integration theory.* San Diego, CA: Academic Press.
3. Anderson, N. H. (1991). *Contributions to information integration theory (vols. 1, 2, 3).* Hillsdale, NJ: Erlbaum.
4. Anderson, N. H. (1996). *A functional theory of cognition*. Hillsdale, NJ: Erlbaum.
5. Gibbs, J. W., & Luyben, P. D. (1985). Treatment of self-injurious behavior: Contingent versus noncontingent possible practice over – correction. *Behavior Modification*, 9, 3-21.
6. Lee Heward, W. (2011). *Childrens with Special needs, an introduction to the special education*, text in Greek, Athens: Topos.

7. Kazdin, A. E. (1984). *Behavior modification in applied settings.* Homewood, IL.: Dorsey Press.
8. Krumboltz, J. D. & Krumboltz, H. B. (1972). *Changing children's behavior.* Englewood Cliffs, N.J: Prentice - Hall.
9. Maslow, A. (1954). *Motivation and personality*. New York: Harper.
10. Makris I., (2015). Innovation and use of technology in Special Education, *Erkyna*, Athens: Panhellenic Scientific and Educational Association of secondary Education PA.P.E.D.E.
11. Makris, I., Macri, D. (2009). *Introduction to Music Therapy*, text in Greek, Athens: ed. Grigoris.
12. Makris, I., Mullet, E. (2003). Judging the pleasantness of contour – rhythm – pitch – timbre. *American Journal of Psychology*, vol 116(4), p. 581-611.
13. Miller, R. B. (1962). Analysis and specification of behaviorfor training. In R. Glaser (Ed.), *Trainning reasearch and education: Science edition*, New York: Wiliey.
14. Woolfolk, A. (2005). *Educational Psychology*, text in Greek, Athens: ed. Ellin.