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## **Effects of Soundpainting Training on Attention**

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### **Abstract**

In particular, the relationship between music and brain, which is the subject of research by neurologists and neuropsychologists, has started to attract the attention of musicians and educators in recent years. Musicians try to make sense of the music they do instinctively, while educators try to clarify how the relationship between music and brain reflects on education. In this study, the effects of *Soundpainting* education, which is a multi-disciplinary, live composing sign language for musicians, dancers, actors and visual artists, has been investigated. The study is an experimental study based on pretest-posttest model with experimental-control group. The study group is comprised of 3rd grade students studying in the Department of Music at the University of Norway Applied Science (Bergen). Sentences consisting of soundpainting syntax can be short and sometimes long. The long sentences pointed out by the Soundpainter require the performers to receive a high level of visual attention. As the visual attention was measured in this study, Victoria Stroop Attention Test was applied as a data collection tool. In the light of the data obtained in the study, it was concluded that there was no significant difference between the post-test results of the experimental and control groups, but that there was a significant difference between the results of the pre-test and post-tests of the experimental group.

**Keywords:** Soundpainting, Attention, Cognitive development, Stroop attention test

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## **Introduction**

### **Cognitive development**

More than a century of such neuropsychological investigation has allowed us to make maps of the brain's areas of function, and to localize particular cognitive operations. The prevailing view of the brain is that it is a computational system, and we think of the brain as a type of computer. Networks of interconnected neurons perform computations on information and combine their computations in ways that lead to thoughts, decisions, perceptions, and ultimately consciousness. Different subsystems are responsible for different aspects of cognition (Levitin, 2006: 84).

Musical activity involves nearly every region of the brain that we know about, and nearly every neural subsystem. Different aspects of the music are handled by different neural regions- the brain uses functional segregation for music processing, and employs a system of feature detectors whose job it is to analyze specific aspects of the musical signal, such as pitch, tempo, timbre and so on (Levitin, 2006: 85-86).

### **Attention**

One of our cognitive mechanisms is attention. According to Goldstein (2013: 158) attention is the ability to focus on specific stimuli or positions. This focusing idea is often associated with selective attention, ie focusing attention on a particular location, object or message. According to Tanrıdağ (1994), attention is directed towards certain targets in a situation where consciousness is fully open and can be concentrated there for a certain period of time (Cited: Can ve Karataş, 2005: 40).

According to Postner and Peterson (1990), in the light of the approaches of neurological models related to the concept of attention, it is possible to consider attention, selective attention, continuous attention and divided attention. According to Sternberg (1996), selective attention is the case when other stimuli are ignored and attention is directed to a specific stimulus. Scanning, focusing on certain faces in the crowd, shifting attention between different stimuli, or listening to a special conversation at a cocktail party are examples of selective attention. According to Allport (1989), continuous attention is maintained by stimulation or vigilance. Continuous attention can also be defined as the ability to focus attention without interruption on a particular task (Cited. Can ve Karakaş, 2005: 40).

Divided attention refers to taking care of two or more things at the same time. Divided attention can be open, hidden or both together. The two attention is paid to look at each other from one object to another (both to be open); while paying attention to something that is looked at (open) while paying attention to something on the side (hidden) (Goldstein, 2013: 159).

### **Soundpainting and Attention**

Soundpainting is the multidisciplinary live composing sign language for Musicians, Dancers, Actors and Visual Artists. Presently the language comprises more than 1750 gestures that are signed by the Soundpainter to indicate the type of material desired of the performers. The Soundpainter (the composer) standing in front (usually) of the group communicates a series of signs using hand and body gestures indicating specific and/or aleatoric material to be performed by the group. The Soundpainter develops the responses of the performers, molding and shaping them into the composition (Thompson, 2015: 4).

In general, soundpainting performance begins with a series of phrases that describe the basic elements of music such as loudness, pitch, tempo and sound material in the direction of a equipped Soundpainter's composition. A Soundpainting collective in time, they can interpret more complex signs as they learn the language and gain fluency (Coşkuner, 2018: 142).

In other words, Soundpainting is a dialogue between Soundpainter and the group. Performers perform according to the gestures of Soundpainter. With regard to the answer, Soundpainter shows

a new set of signs or the sentence. The sentences that Soundpainter display can sometimes be short and sometimes long. As an example; Soundpainter may also display a very short sentence like *Strings- Minimalism- Play*, and can also point to a long sentence such as *Brass- Pointillism- Duration Fader-Go on to- Minimalism- With- Long Tone*. At this point, where the element of attention comes into play, it is advisable to establish the Soundpainting relationship with the three sub-dimensions of attention.

As an example for selective attention; Soundpainter may indicate the *Strings- Pointillism- Volume fader- Woodwinds- Minimalism- Clasical feel- Play* at the beginning of the performance or while the performance continues. In this phrase, while the strings pay attention to the gestures that concern them, the woodwinds pay attention to the gestures that concern them. Both groups see the whole phrases but pay attention to the phrase that concerns them. They do not consider the phrase that does not concern them.

As an example for continious attention; Soundpainter may indicate fairly long phrase such as *Vocals- Pointillism- Volume fader- Duration fader- Go on to- Improvise- With- Long tone- Play* in which 4 content gestures are in it. Herein, the performers should be able to focus their attention on the phrase without any breaks in order to remember and perform the long phrase correctly.

As an example, for divided attention; Soundpainter may indicate *Actors- Face fader- Speak- Play* and asks to the actors to turn their faces to each other and speak. As this performance continues, Soundpainter can display new phrases to other disciplines as well as actors. At this point, the actors watch and talk to each other and follow Soundpainter with the corner of the eye. As in another example; If a conditional sentence is given, such as *Brass-Hit-If-Dancers-jump*, the brass must follow the dancers for perform. Brass performers follow the dancers while following the Soundpainter. In this case it is possible to mention about the divided attention.

### **Problem of the research**

What are the effects of Soundpainting training on attention?

### **Sub- problems of the research**

- 1- Is there a significant difference in the pre-test results of the experimental and control groups?
- 2- Is there a significant difference in the post-test results of the experimental and control groups?
- 3- Is there a significant difference in the pretest-posttest results of the experimental group?
- 4- Is there a significant difference in the pretest-posttest results of the control group?

## **METHOD**

### **Design of the research**

Research is an experimental study. The effect of the independent variable on the dependent variable is the variable being examined. It is the problem that the researcher has examined the variability of individuals or groups and focuses on solving (Büyüköztürk et al., 2014: 59). Based on the number of factors on the dependent variable, this study is a single-factor experimental design.

The design of the study is a random design which is one of the experimental design used in education and psychology. In order to analyze the effect of the experimental process, the measurement results of the dependent variable of the experimental and control groups were compared using appropriate techniques.

### **Working process**

The researchers randomly assigned students to the control group and experimental group. Before the training period the researchers administered Victoria *Stroop Attention Test* to all student participants.

The experimental group received 3 hours of Soundpainting training 1 day a week and the control group did not receive any training. Stroop Attention Test was administered to the experimental and control groups twice as pre-test and post-test.

*Week 1:* Definition of SP, basic philosophy, imaginary regions, phrases outlines and 1st level Sp gestures was taught. As an example: *Whole group- Pointillism- Play- Whole group- Off*. Walter Thompson's 1st level SP Youtube video was watched.

Gestures: Whole group, groups, brass, woodwinds, strings, vocal, rest of the group, long tone, hit, scanning, minimalism, this, memory, pointillism, pitch up/down, change, speak, air sounds, whistle, laugh, volume fader, tempo fader, enter/exit slowly, play, off.

*Week 2:* 1st level Soundpainting gestures were taught.

New gestures: Point to point, relate to, open/close mouth, with, improvise, synchronize, shapeline and extended technique.

*Week 3:* All first level Soundpainting gestures were reinforced. Two content gestures were studied. As an example: *Minimalism with Air sounds*. Students did Soundpainting respectively.

New gestures: Language and layer

*Week 4:* Three content gestures were studied. As an example: *Scanning with hit with ringover*. In addition that, palettes are used in compositions. Some Norwegian folksongs used as palettes. Students did Soundpainting respectively.

*Week 5:* Three content gestures were studied. Circle game was played. Students did Soundpainting respectively.

New gestures: Who, density, stick, silence and break

*Week 6:* Four content gestures were studied. As an example: *Pointillism- duration fader go on to Speak with Close mouth*. Students did Soundpainting respectively. New gestures: Sprinkle, initiate, more space fader, open, only, feel, intent, rock, funk, classical, swing, techno, march and play can't play.

*Week 7:* Four content gestures were studied (continue). Two groups (in experimental group) were Soundpainted by the Soundpainter simultaneously in lounch mode. Students did Soundpainting respectively.

New gestures: Backround and lounch mode.

*Week 8:* Five content gestures were studied. As an example: *Hit Go on to Pointillism Sprinkle Long tone Duration fader Whistle*. Students did Soundpainting respectively.

*Week 9:* Five content gestures were studied (continue). Students did Soundpainting respectively.

*Week 10:* All the gestures were remembered. Students did Soundpainting respectively. Soundpainting attitude scale was filled by the students. After all Stroop post-test was administered to both control and experimental groups.

### **Data colletion tools**

Before the tests were administered, all students were informed about the purpose of the study and Stroop Attention test to be administered and the administration of the test was explained in detail.

### Strop attention test

The Stroop Color-Word Test was initially developed by John Ridley Stroop in 1935 for the evaluation of interference effect in sequential verbal reactions (Mitrushina and others, 2005: 391). The Stroop test is a classic instrument for the assessment of selective attention and it evaluates a construction of executive function that is named "inhibition control", an item which is also considered in the Wisconsin Card Sorting Test and the Verbal Fluency Test (Kosmidis and others, 2006: 235).

The feasibility and diagnostic importance of Stroop test, especially in the assessment of selective attention and inhibition control, has made this test to be a highly utilized instrument in diagnostic and research aspects of executive functions (Mitrushina and others, 2005: 391).

According to Troyer and others, The Stroop Color-Word Test, the Victoria version called Victoria Stroop Test (VST) developed by Spreen and Strauss (1998), is a brief version of the Stroop task. VST has a short administration time (around five minutes), and is a brief, easily administered, and psychometrically sound version of Stroop's original task (Cited. Malek and others, 2013: 380).

### Analysis of data

Mann Whitney U test and Wilcoxon test were used to compare the data that did not conform to normal distribution. The significance level was taken as  $p < 0,05$ .

### Study group

Western University of Norway Applied Sciences (HVL) housed both a control group and an experimental group. The study group of this research consists of 12 students studying in the 3rd grade of HVL music department. Of the 12 students, 7 were in the experimental group (n=4 female, n=3 male) and 5 were in the control group (n=3 female, n=2 male). None of the students in the experimental and control groups had previously received Soundpainting training. A written consent form was obtained from all students.

### RESULTS

Findings related to first sub-problem "Is there a significant difference in the pre-test results of the experimental and control groups?"

**Table 1. Pre-test results of experimental and control groups**

Group	Card	Median	Mann –Whitney U Test statistic	p
experiment	1	10.20	7,0	<,088
control	1	12.00		
experiment	2	18.50	13,0	<,463
control	2	19.40		
experiment	3	11.40	12,0	<,370
control	3	13.20		
experiment	4	11.90	15,0	<,684
control	4	13.00		
experiment	5	17.80	14,0	<,570
control	5	24.10		

According to table 1, there was no statistically significant difference between the median response time (10.20) of the subjects in the experimental group and the median duration (12.00) of the participants in the control group ( $U = 7.0, p < .088$ ). In other words, it can be said that the change applied by the researcher did not have a significant effect on the response time of the subjects to the pre-test 1st card.

There was no statistically significant difference between the median response time of the subjects in the experimental group (18.50) and the median duration (19.40) of the participants in the control group ( $U = 13.0, p < .463$ ). In other words, it can be said that the change applied by the researcher did not have a significant effect on the response times of the subjects to the pre-test 2nd card.

There was no statistically significant difference between the median response time (11.40) of the subjects in the experimental group and the median time (13.20) of the participants in the control group ( $U = 12.0, p < .370$ ). In other words, it can be said that the change applied by the researcher has no significant effect on the response time of the subjects to the pre-test 3rd card.

There was no statistically significant difference between the median response time median (12.90) in the experimental group and the median duration (13.00) of the participants in the control group ( $U = 15.0, p < .684$ ). In other words, it can be said that the change applied by the researcher did not have a significant effect on the response time of the subjects to the pre-test 4rd card.

There was no statistically significant difference between the median response time median (17.80) in the experimental group and the median duration (24.10) of the participants in the control group ( $U = 14.0, p < .570$ ). In other words, it can be said that the change applied by the researcher has no significant effect on the response times of the subjects to the pre-test 5th card.

Findings related to second sub-problem “Is there a significant difference in the post-test results of the experimental and control groups?”

**Table 2. Post-test results of experimental and control groups**

Group	Card	Median	Mann –Whitney U Test statistic	p
experiment	1	8.70	6,0	<,061
control	1	9.80		
experiment	2	15.20	17,0	<,935
control	2	17.60		
experiment	3	10.10	13,0	<,464
control	3	10.90		
experiment	4	11.20	15,0	<,685
control	4	13.00		
experiment	5	10.90	14,0	<,570
control	5	13.40		

According to table 2, a statistically significant difference was not found between the median response time median (8.70) of the subjects in the experimental group and the median duration

(9.80) of the participants in the control group ( $U = 6.0, p <, 061$ ). In other words, it can be said that the change applied by the researcher did not have a significant effect on the response times of post-test 1st card.

There was no statistically significant difference between the median response time of the subjects in the experimental group (15.20) and the median time of the participants in the control group ( $U. 17.0, p <, 935$ ). In other words, it can be said that the change applied by the researcher did not have a significant effect on the response times of post-test 2nd card.

There was no statistically significant difference between the median response time (10.10) of the subjects in the experimental group and the median duration of the participants in the control group ( $U. 13.0, p <, 464$ ). In other words, it can be said that the change applied by the researcher did not have a significant effect on the response times of post-test 3rd card.

There was no statistically significant difference between the median response time (11.20) of the subjects in the experimental group and the median duration (13.00) of the participants ( $U = 15.0, p <, 685$ ). In other words, it can be said that the change applied by the researcher did not have a significant effect on the response times of the participants to post-test 4rd card.

There was no statistically significant difference between the median response time median (10.90) in the experimental group and the median duration (13.40) of the participants in the control group ( $U = 14.0, p <, 570$ ). In other words, it can be said that the change applied by the researcher did not have a significant effect on the response times of the subjects to the post-test 5th card.

Findings related to third sub-problem “Is there a significant difference in the pretest-posttest results of the experimental group?”

**Table 3. Pre-test post-test results of experimental group**

Test	Card	z	p
Pre-test	1	2.028	<,05
Post-test	1		
Pre-test	2	2.201	<,05
Post-test	2		
Pre-test	3	1,859	<,063
Post-test	3		
Pre-test	4	2,366	<,05
Post-test	4		
Pre-test	5	2,366	<,05
Post-test	5		

According to table 3, a statistically significant difference was found between the pre-test scores and the post-test time scores of the subjects related 1st card ( $Z = -2,028, p <, 05$ ). The fact that the difference scores are in favor of negative sequences indicates that the change in effect has a positive effect on the response time of the subjects.

A statistically significant difference was found between the pre-test scores and the post-test time scores of subjects related 2nd card ( $Z = -2,201$ ,  $p < ,05$ ). The fact that the difference scores are in favor of negative sequences indicates that the change in effect has a positive effect on the response time of the subjects.

There was no statistically significant difference between the pre-test scores and the post-test period scores of the subjects' response times to the 3rd card ( $Z = -1,859$ ,  $p < ,063$ ). In other words, it can be said that the change applied by the researcher has no effect on the response times of the 3rd card.

A statistically significant difference was found between the pre-test scores of the participants and the post-test time scores for the response time to the 4th card ( $Z = -2,366$ ,  $p < ,05$ ). The fact that the difference scores are in favor of negative sequences indicates that the change in effect has a positive effect on the response time of the subjects.

A statistically significant difference was found between the pre-test scores and the post-test time scores of the participants' response time to the 5th card ( $Z = -2,366$ ,  $p < ,05$ ). The fact that the difference scores are in favor of negative sequences indicates that the change in effect has a positive effect on the response time of the subjects.

When the results were evaluated as a whole, a statistically significant difference was found between the pre-test measurements and post-test measurements of the subjects in four of the five cards. It can be said that the change applied by the researcher in the experimental group has a positive effect on the decrease of the response times due to the fact that the difference scores in all four cards are in favor of negative sequences.

Findings related to fourth sub-problem "Is there a significant difference in the pretest-posttest results of the control group?"

**Table 4. Pre-test post-test results of control group**

Test	Card	z	p
Pre-test	1	1,483	<,138
Post-test	1		
Pre-test	2	2,023	<,043
Post-test	2		
Pre-test	3	2,023	<,043
Post-test	3		
Pre-test	4	1,826	<,068
Post-test	4		
Pre-test	5	1,753	<,08
Post-test	5		

According to table 4, There was no statistically significant difference between the pre-test scores and the post-test time scores of the participants' response time to the 1st card ( $Z = -1,483$ ,  $p < ,138$ ). In other words, it can be said that the change applied by the researcher has no effect on the response times of the 1st card.



There was a statistically significant difference between the pre-test scores of post-test time scores of the participants' for the 2nd card ( $Z = -2,023$ ,  $p <, 043$ ). The fact that the difference scores are in favor of negative sequences indicates that the change in effect has a positive effect on the response time of the subjects.

There was no statistically significant difference between the pre-test scores and the post-test period scores of the participants' response times to the 3rd card ( $Z = -1,859$ ,  $p <, 063$ ). In other words, it can be said that the change applied by the researcher has no effect on the response times of the 3rd card.

There was no statistically significant difference between the pre-test scores and the post-test time scores for the 4th card response times ( $Z = -1,826$ ,  $p <, 068$ ). In other words, it can be said that the change applied by the researcher did not have any effect on the response time to the 4th card.

There was no statistically significant difference between the pre-test and post-test time scores of the participants' response time to the 5th card ( $Z = -1,753$ ,  $p <, 08$ ). In other words, it can be said that the change applied by the researcher has no effect on the response times of the 5th card.

When the results were evaluated as a whole, there was no statistically significant difference between the pre-test measurements and post-test measurements of the subjects in three of the five cards. Since there is no statistically significant difference between the response times before the change and the post-change response times in the majority of the cards, it can be said that the change applied by the researcher has no effect on the response time of the subjects.

## **CONCLUSION**

According to the results for the first sub-problem; although the experimental and control groups were not equal in number at the beginning of the study (7-5), it was observed that the readiness was homogeneous. Pre-test results were similar in both groups.

According to the results for the second sub-problem; post-test results of both groups showed improvement. However, although there was no statistically significant difference, the scores of the experimental group were more successful than the control group. At this point, it will be possible to talk about the effect of Soundpainting education. We can think that other music lessons that require attention for the positive results of the control group scores have an effect.

According to the results for the third sub-problem; it is possible to say that soundpainting education positively affects the attention skills of the students in the experimental group. According to the findings, there is a significant difference in the results for the 1st, 2nd, 4th and 5th cards. According to these results, it is possible to say that Soundpainting training improves the attention skills of experimental group students.

According to the results for the fourth sub-problem; It can be said that the change does not have an effect on the attention skills of the students in the control group.

## **RECOMMENDATIONS**

This research; it can be repeated in groups with a higher number of subjects and in longer periods.

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