

Reactions to stimulation on paintings

-Comparing use of color by two different stimuli and aged groups-

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Abstract: This study focused on the changes of expression by coloring an outline picture of a famous art work is better before and after being shown a full-color picture taken from an original painting. The difference between two stimuli was observed and the cause of the changes was clarified based on number of colors, color amount and the composition of colors. Two original paintings were used as stimuli: 'Composition with Red Blue Yellow' by Piet Mondrian, and 'Viale Del Giardino' by Claude Monet. Results based on difference between numbers of colors used showed that, the number of colors increased for children, while it decreased in adults. When coloring in their images after being shown the original works, children tended to add their impression from their own experience, whereas adults tended to consolidate their re-working of the works and their experience.

Key words: Color, Color stimulation, Outline Picture, Color analysis, Color distribution

1. Introduction

This study was conducted to identify the changes of color sensations by stimuli and focused on the sources which the subjects got influenced and have changed their expressions. The purpose of this research is to determine factors involved in color changes by varying stimuli and different objects, and to consider the development and possibilities of color sensory input.

In this study images were presented to test subjects and the disparity between the colored in line drawings and the original images before after exposure to the stimuli was considered. In addition, after presenting two different stimuli, the changes in the number of colors, the amount of color in the colors area painted, and the composition were observed, and the factors were analysis. In order to clarify the import of these results, additional experiments with achromatic stimulus and without stimuli were conducted. That is, we tested achromatic stimulus tests and non stimulus tests. And compare the results to see how level of education and experience affect the subject's use of color after the stimulus (Mondrian and Monet picture stimulus). The differences in coloring patterns were observed in two separate subject groups, children and adults.

2. Methodology

2.1 Subjects

Total subjects: 30 (15 children and 15 adults).

Out of 14 subjects, there were 7 design majors (3men, 4 women) and the other 7 were non-design majors (4men, 3 women). This group division is based on the criteria specialties in college/university majors. (e.g. Design major group are people from the Department of Design Department of the University and Non-design major group is from major fields other than the Department of Design Department of the University.)

2.2 Main experiment

- 1) The experiment was conducted by questionnaire and visual stimulus followed by subject participation.
- 2) Subjects were exposed to two pictures which utilize color in significantly different ways ('Composition with Red Blue Yellow' by Piet Mondrian, 'Viale Del Giardino' by Claude Monet.) Two experiments were conducted with a one week gap in order not to influence each other, and subjects were exposed to the stimuli for 5 minutes.
- 3) Outline versions of the images were given to subjects, before and after the stimuli and 24 color crayons were used as the drawing medium. We have focused on the selection of colors, the amount of colors in the area painted, and the number of colors selected by the test subjects.
- 4) In order to observe changes in test subject's coloring procedure, in reaction to the stimuli, we compared pictures produced before and after exposure to the stimuli. In addition, in order to examine the coloring styles by two different stimuli, we compared pictures after stimuli.
- 5) For additional experiments, an achromatic stimulus experiment and an experiment without stimulus were conducted, and 5 people were randomly selected as subjects.



Figure.1 Stimuli of the experiment.

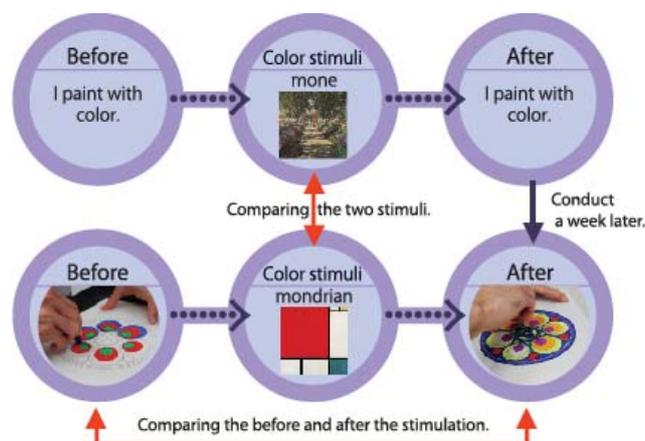


Figure.2 Flow experiments.

3. Results

3.1 Comparison of number of colors used: before and after exposure to the stimuli

In the younger test group, the numbers of colors selected by subjects increased by 60% for the Monet picture and by 80% for the Mondrian picture. Thus the numbers of colors did not significantly change in response to the Monet picture, but there was a significant increase in the number of colors with the Mondrian picture. While in the adults test group, the number of colors selected by subjects decreased by 53% for the Monet picture and by 47% for the Mondrian picture, and 13% for the Monet picture and 40% for the Mondrian picture did not change the numbers of colors. Though the difference was not considered significant, most of the subjects tended to decrease the numbers of colors.

3.2 Compositional changes of selected colors before and after exposure to the stimuli.

With the younger test group, there were no significant changes to the color composition for the Monet picture. However, there was a tendency to imitate the colors in the original picture with an increase in black, white, and yellow by 40% for the Mondrian picture. In the adults test group, light pink increased by 45% and blue and violet which are included in the cool color system decreased by 88% for the Monet picture. Red, black, and white increased by 60% and blue and violet included in the cool color system decreased by 45% for the Mondrian picture. In other words, the colors selected from the cool color system decreased in both cases, and children tended to imitate colors from the original Mondrian picture.

3.3 Changes in the amount of colors before and after by stimuli.

There was no significant change in the amount of colors in the case of the younger test group. White increased and light blue decreased in the Monet picture, and light green and dark blue increased and light violet and pink decreased in the Mondrian picture, however, there was no relationship between selected colors and the amount.

In the adults test groups, it was not able that colors of cool colors system decreased in both cases, and red and black increased in the Mondrian picture. Unlike the younger test group, there was a relationship between the increase and decrease in the selection on of colors and the amount of color in the adult test group.

Figure.3 Result of the selected color(Adults)

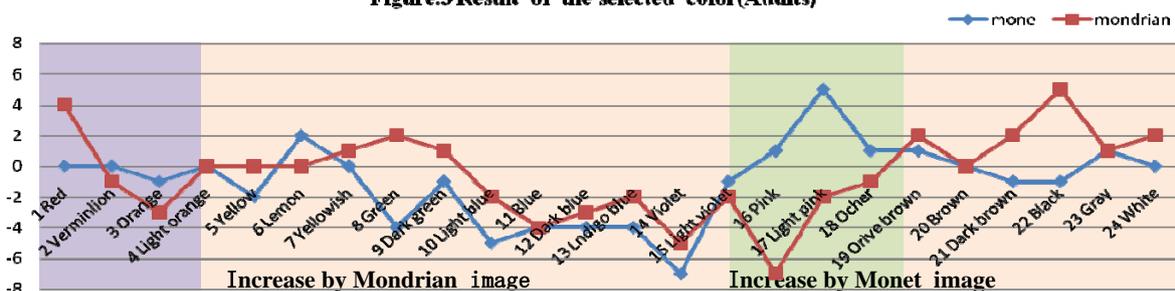
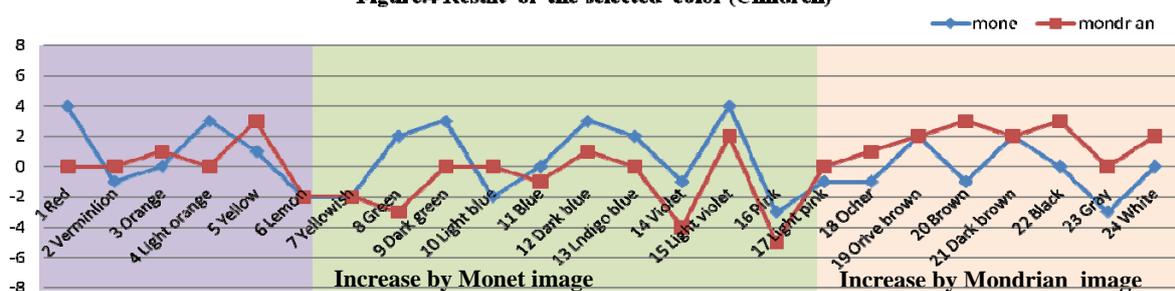


Figure.4 Result of the selected color (Children)



3.4 Additional experiments

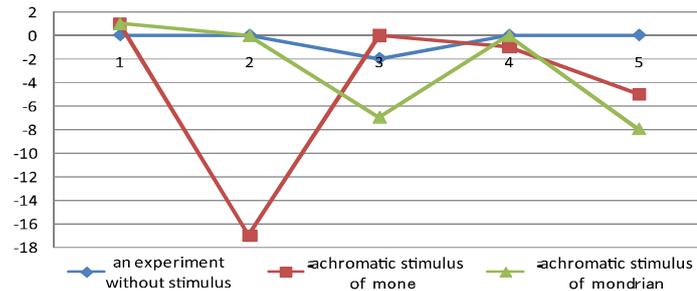
3.4.1 The result of achromatic stimulus experiment

In order to observe changes in test subject's coloring procedure, in reaction to the stimuli, the experiment was conducted with monochrome images. As a result, many subjects either reduced the number of colors they used in response to both stimuli or did not change the number of colors used. However, it is noticeable that the composition and the amount of color only for monochrome images increased significantly. It is considered that subjects were influenced by visual stimuli.

Table.1 Difference in the number of color

an experiment without stimulus	achromatic stimulus of mone	achromatic stimulus of mondrian
0	1	1
0	-17	0
-2	0	-7
0	-1	0
0	-5	-8

Figure.5 Decrese in the number of colors



3.4.2 Experiment without visual stimulus

From the result of an experiment without stimulus, it is not be able to find out the changes of number of colors, composition of colors, and the amount of color. It is a very important result which can verify the changes of numbers, composition, and an amount of colors were influenced by stimuli.

4. Analysis

Children tended to increase the number of colors after exposure to the stimulus of the Mondrian picture, while adults tended to decrease the number of colors in both cases. So we found that the numbers of selected colors are also changed by subjects even with the same stimuli.

In terms of composition, with the younger group there was a general change in the use of color after the viewing the Monet picture, while the use of monochrome color and low saturation color increased and the use of light violet and pink decreased after the stimulus of the Mondrian picture. With the adults, the decrease in the use of the blue spectrum was especially conspicuous. The use of pink increased after the stimulus of viewing the Monet picture and the use of red and monochrome colors, such as black, increased after the stimulus of viewing the Mondrian picture. The amount of colors in the blue spectrum decreased after exposure to the Monet picture, and the amount of red and black used increased after the stimulus of the Mondrian picture. In this case there were more significant changes in the adults test group.

Furthermore, changes were not noticeable in all aspects of number of colors, composition, and the amount of color in the experiment without visual stimulus. In the experiment with monochrome stimulus, the monochrome colors increased in terms of selected colors and the amount of color. Consequently, it can be verified that test results corresponded to changes in the visual stimuli.

5. Conclusions

With the result of the experiments, we noted that when adults are stimulated, they interpret the stimulus based on their knowledge and experience, and this can be seen in a consolidation of subjective expression with the color elements of the original visual stimulus. On the other hand, in the case of children who have fewer experiences, they fully accept the stimuli itself and try to present all of it by including it into their knowledge and experiences. Finally, we observed that two different stimuli influenced the changes in the number of colors, composition, and the amount of color, but more importantly the experiences of subjects influenced the results.

6. References

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