

Spatial Anisotropy in Aesthetic Impression of Simple Color Arrangement Patterns

Toshihiro Bando
Department of Intelligent Information Engineering and Sciences
Doshisha University
Tatara Miyakodani 1-3, Kyotanabe, Kyoto 610-0321, Japan
tbando@mail.doshisha.ac.jp

Introduction

Impressions conveyed by paintings or photos sometimes change when they are mirrored left to right; but the effect is naturally much less than that of an upside-down reversal.[1][2]. Anisotropy of aesthetic evaluation in color arrangement seems to significantly influence on visual arts especially in the case of simple abstract arts. In order to make it clear psychologically, we analyzed impression of simple color arrangement patterns with red, yellow, and blue on white background.

Methods

Aesthetics preference of Mondrian-like color arrangement patterns were measured under simultaneous presentation of two square patterns with different color arrangement in following procedure. Square patterns were composed of four small color squares of equal size. Diagonal two of four small squares are white and another two are filled with different two colors from red, yellow, and blue. There are four arrangements of color in each one of three pairs of colors, and there are six combinations of square patterns in each color pairs (Figure. 1). Eighteen pairs of diagonal arrangement of red-blue, blue-yellow, and yellow-red were made to use as stimulus patterns. RGB values of red, blue and yellow were determined by averaging those of the Mondrian's paintings on the web.



Figure 1: Six pairs of diagonal arrangement of red-blue.

Subjects (n=58) are asked to judge “naturalness”, “brightness”, and “preference” under the simultaneous presentation of two square patterns with different color position on the LCD display monitor and to choose one of the patterns which was suited to each question. Size of each square is 1° visual angle at 57cm viewing distance. In order to eliminate the effects of the order of stimulus presentation, presentation order of 18 pairs of color arrangement were randomized. Position of 2 patterns on the screen (left and right) was also randomized to eliminate the effects of presentation position to the results of choice.

Results and Discussion

In the results of the preference for the question “Which do you feel more natural?” there is one case the subjects prefer one of two color arrangements statistically more than another (binomial test (two-tailed)). In this case the arrangement of “upper right is blue and lower left is yellow” is judged more natural compare to “upper left is yellow and lower right is blue” (Figure 2(a)).

To the question “Which pattern appears brighter?” there are 13 cases the subjects prefer one of two color arrangements statistically more than another (Figure 2(b)). In 11 cases out of 13 cases dominant choice is the arrangement in which upper color is brighter than lower. In these 11 cases we chose “upper brighter

arrangements” as brighter color arrangements regardless of the left/right arrangements. In the case of pattern No. 2 and No. 14, however, subjects chose one arrangement significantly more than another though upper/lower color distribution is the same within each case.

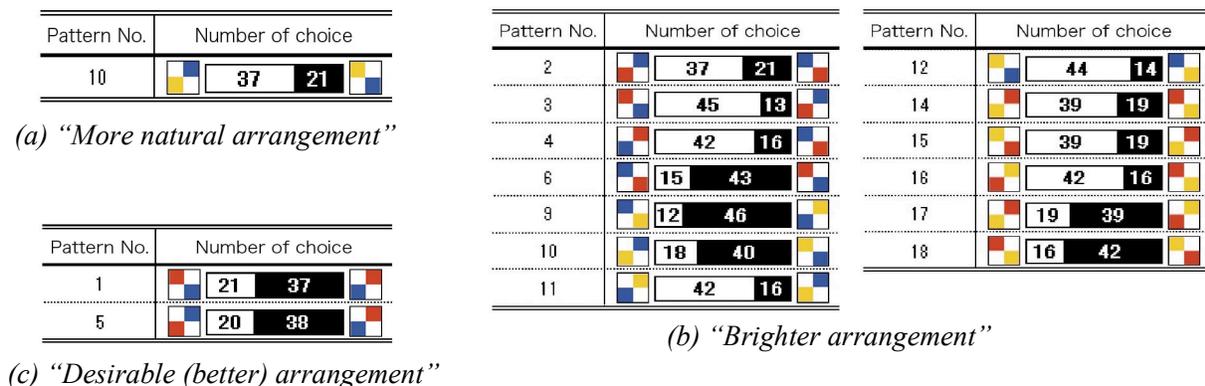


Figure 2: Combination of patterns in which there is statistically significant difference in the choice of “more natural arrangement”(a), “brighter arrangement”(b) and “desirable (better) arrangement”(c).

To the question “Which do you think better?” there are two cases the subjects prefer one of two color arrangements statistically more than another (Figure 2(c)). In these two cases subjects chose the same color arrangement that is upper right is red and lower-left is blue. In the case of pattern No. 1, only one difference of two color arrangements within combination is left/right arrangement, that is, they are mirror images of each other.

As we are living on the earth where there is gravity, it is relatively easy for us to understand the reason why upper/lower arrangement affects our evaluation of visual patterns. The result that subjects chose the arrangement in which upper color is brighter than lower as a brighter arrangement seems to be explained by the fact that light sources are generally in upper region in our everyday life. On the contrary, it is difficult to explain horizontal anisotropy because there is no critical reason for the difference in visual evaluation of left and right arrangements. There are three cases in which only horizontal anisotropy can be seen in color arrangement (pattern No.1 as desirable (better) arrangement, No.2 and No.14 as bright arrangement). In all three cases, subjects chose the arrangements that lower- left and upper-right are colored by red, green, yellow and upper-left and lower-right are white. These results can be explained by a theory of the “glance curve” by Gaffron, who suggested that when we look at a picture, we study it from bottom left of the image and then look up to the top centre and then to the right hand side of the image [3]. In our Mondrian-like color arrangements, a region of diagonal two white squares seems to be regarded as a background and two colored squares seem to be regarded as figures. The figure / ground idea was developed as one of the concepts of Gestalt psychology, and the figure is what appears structured, as the foreground and whereas ground appears as unstructured and background. If the figure parts of the patterns are on the trajectory of “glance curve” we can promptly and easily grasp important part of the image, and it makes us comfortable and lead us to make relatively positive judgment. Within diagonal arrangement of two chromatic squares on the glance curve we tend to prefer the arrangements in which blue on the lower-left square and yellow or red on the upper-right square. All these results show that there is anisotropy in aesthetic evaluation of Mondrian-like simple color arrangement patterns.

References

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