

## Relationship between Beauty and Shape/Force Factors in Japanese Art, Bonsai

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### Abstract

Cognitive structure of beauty of Bonsai in brain of human is modeled in three layers. First layer is the beauty itself. Second layer consists of sensory factors of beauty that are obtained as a result of factor analysis using semantic differential method for fifteen objects of Bonsai conducted for nineteen subjects. Third layer consists of statistically calculated shape/force numerical factors including stress of trunk, area of trunk and leaves and thickness of trunk. Stress of the trunk is calculated by Finite Element analysis.

Relationship between the second and third layer is obtained by analysis of correlation. As a result, test subjects are divided into two groups. One group is a "simple" group which cognize beauty of Bonsai by symmetry. Other group is a "complex" group which cognize beauty of Bonsai by symmetry, size and internal force. In conclusion, cognitive structure of beauty of Bonsai is modeled as a three-layer structure and test subjects are divided into two groups by their nature.

### Keywords

Cognitive structure, Factor analysis, Correlation, Multiple regression analysis, Beauty, Bonsai

## Effects of Shading Directions on Perceptions of Alphabets

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### Abstract

Shading is one of the typical depth cues generally used in letter illustrations and designs. Among the various kinds of shading directions, we humans are most familiar with shading in the right-bottom direction (i.e., the left-top illumination). In the present study, we investigated the perceptual effects of the shading directions using letters of the alphabet as stimuli. In Experiment 1, we used 26 capital letters and 4 geometric figures in the six shading directions (top: T, bottom: B, right top: RT, right bottom: RB, left top: LT, left bottom: LB), which means that there were 180 conditions (i.e., (26 letters + 4 figures) × 6 shading directions). For each condition, we measured the reaction times for perceiving the stimulus. The results indicated that it takes longer for subjects to recognize simple letters and figures. In Experiment 2, we focused on preferences and readabilities of the stimuli (e.g., which shading is beautiful, easy to read, and so on), using eight capital letters (C, I, L, H, E, B, R, and G) in four shading conditions (RT, RB, LT, and LB). As the results, we found that the right bottom shading was evaluated as the highest (i.e., the most beautiful, positive, and readable). It is plausible that the results are related to our familiarities with the right bottom shading.

### Keywords

Depth cues, Shading direction, Illusory contour, Visual perception