

Sustainability | Poster

PP - (21020) - EVALUATION OF VIEW THROUGH WINDOWS WITH ROLL SCREENS BY APPLYING AN EARLY VISION ALGORITHM

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Research or practical problem and objectives

View through windows is one of the important elements for achieving well-being in residential and office spaces. In a previous work, it became clear that the visibility of view outside windows(hereafter referred to as "Clarity")had a great influence on the occupants' evaluation of view out. Since human vision recognizes objects by edge detection, we can evaluate the "Clarity" quantitatively by mathematically predicting the intensity of edges in the view. Authors have developed an edge detection program which reproduces human visual information processing and made it possible to predict the visibility of view out by applying this tool to luminance distribution images of view through windows without window equipment like screens and shoji with fine texture. The aim of this research is to develop a new algorithm for predicting the "Clarity" of view through windows with roll screens by introducing the texture detection mechanism, specifically feedback from V2(secondary visual cortex), to the existing program.

Methods and process (for empirical research)

To verify the validity of the new program, we conducted a subjective experiment using a space model. 18 subjects observed simple figures through roll screen and evaluated the visibility of them. Experimental factors are the shape of the figures (3 levels), the transmittance of figures (4 levels), background luminance (3 levels), and roll screen with different physical properties (5 types).

Main results preview and importance (or main arguments in the case of critical reviews)

As a result of regression analysis using the subject's evaluation as the objective variable and the value calculated by the developed algorithm as the explanatory variable, the explanatory power was 0.82, increased from 0.58 in case of the original algorithm. In conclusion, we were able to confirm the validity of the developed algorithm. By applying this algorithm to luminance distribution images obtained from the simulation, we can quantitatively predict the effect of view through windows with roll screens in the architectural design process.

Palavras-chave : view, edge detection, neural mechanism, window, texture perception, roll screen