# THE EFFECTIVENESS OF DESIGN GUIDELINE REGULATIONS FOR IMPROVING STREETSCAPES

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***Abstract***

*Municipal governments or developers make design guidelines to create harmonious streetscapes in new towns. The regulations, however, are often based on arbitrary decisions without any empirical research. The present study employed a visual simulation system to test the effects of such physical features of the buildings as color, height, flatness of the building façade and its recess from the street on pedestrians' impressions of the place. Thirty subjects were asked to rate their impressions of "order", "simple", and to evaluate the atmosphere after experiencing the simulated scenes. The results revealed some relations between the physical features and the pedestrians' responses.*

## 1. Introduction

In recent years, many municipal governments in Japan have developed various design guidelines to regulate the physical features of buildings in order to maintain and/or create the aesthetic qualities of streetscapes. There are two types of design guidelines: one is called "preservation type" which aims to preserve existing historical and cultural landscapes, and the other is called "development type" which aims to create a harmonious streetscape in a newly developed town. The latter type of guidelines has been developed by several municipal governments and developers prior to starting large projects. They employed many architects and assigned each of them to design buildings in each block. By doing this, they attempted to give some different characteristics for each block. At the same time, they tried to maintain a harmonious streetscape by regulating such physical features of the building façade as color and height within a certain range. These regulations were, however, not based on any scientific and empirical researches.
The present study, therefore, examines how those design regulations can effect pedestrians' evaluation of the streetscape. A visual simulation system was employed to test how such physical features of the buildings as color and height effect the pedestrians' impressions of the street.

(a) Makuhari Bay Town (b)Seaside Momochi (c) Imai New Town

*Figure 1: Some examples of projects developed under design guidelines*

**2. Experiment**

*2-1. Psychological scales and controlled physical features*

Based on a survey of existing design guidelines, items of subjects' response in the experiment were decided: "order vs. disorder", "simple vs. diverse", and "good atmosphere vs. bad atmosphere".

As for the physical features controlled in the experiment, the following aspects of buildings along the street were selected because they were often specified in the existing guidelines: 1) color, 2) height, 3) dimension of recess from the street, and 4) flatness of the façade.

*2-2. Generation of the image of simulated streets*

A scale model street that consists of seven blocks, each block 34m in length, was created with the reference of Makuhari Bay Town near Tokyo, which was built under a design guideline (see Figure 1-a). In the experiment, a subject observed a sequence of scenes recorded by a CCD camera moving through the model space. The visual angles of the camera were 112deg (horizontal) and 88 deg (vertical). With this movie, CG generated animations of pedestrians, cars and trees were overlaid on the scenes of the scale-model street (see Figure 2).

*2-3. Variation of the stimuli*

The physical features of the buildings along the street were systematically changed as shown in Figure 3. A building that has a medium range of variation was defined as a "standard type" building: brown color, smooth surface façade, recessed 2m from the street, five story high. Other types of

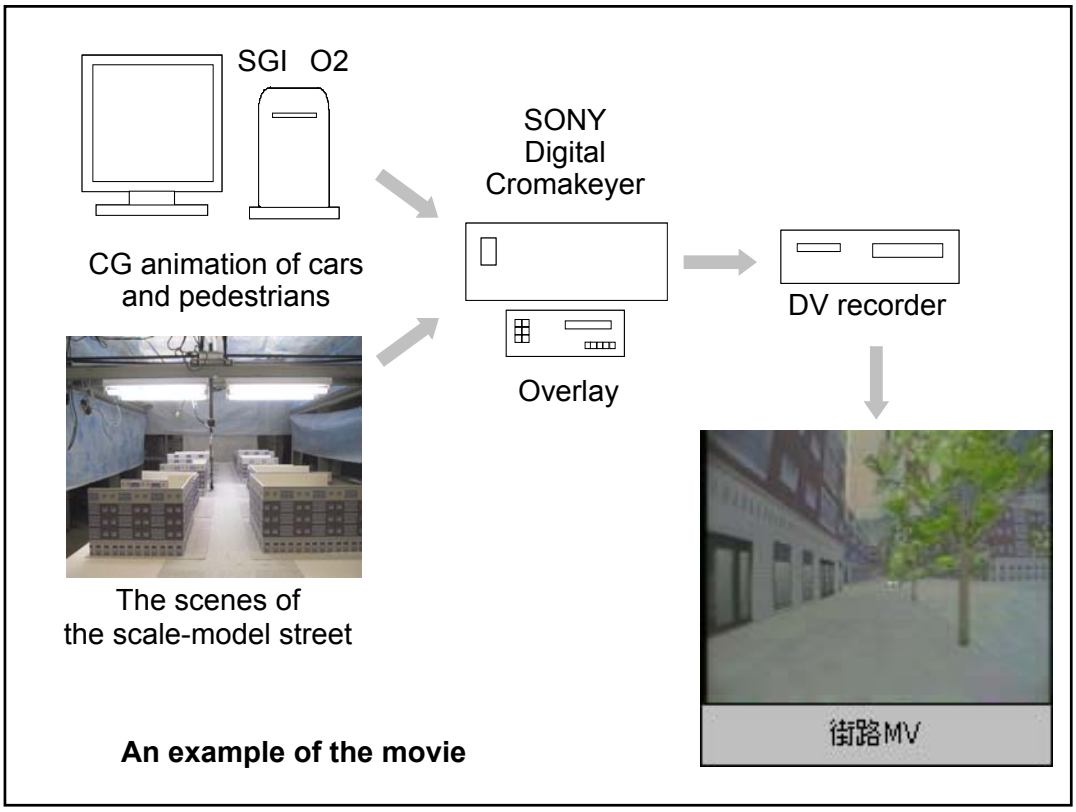


*Figure 2: Generation of the image of the simulated street*

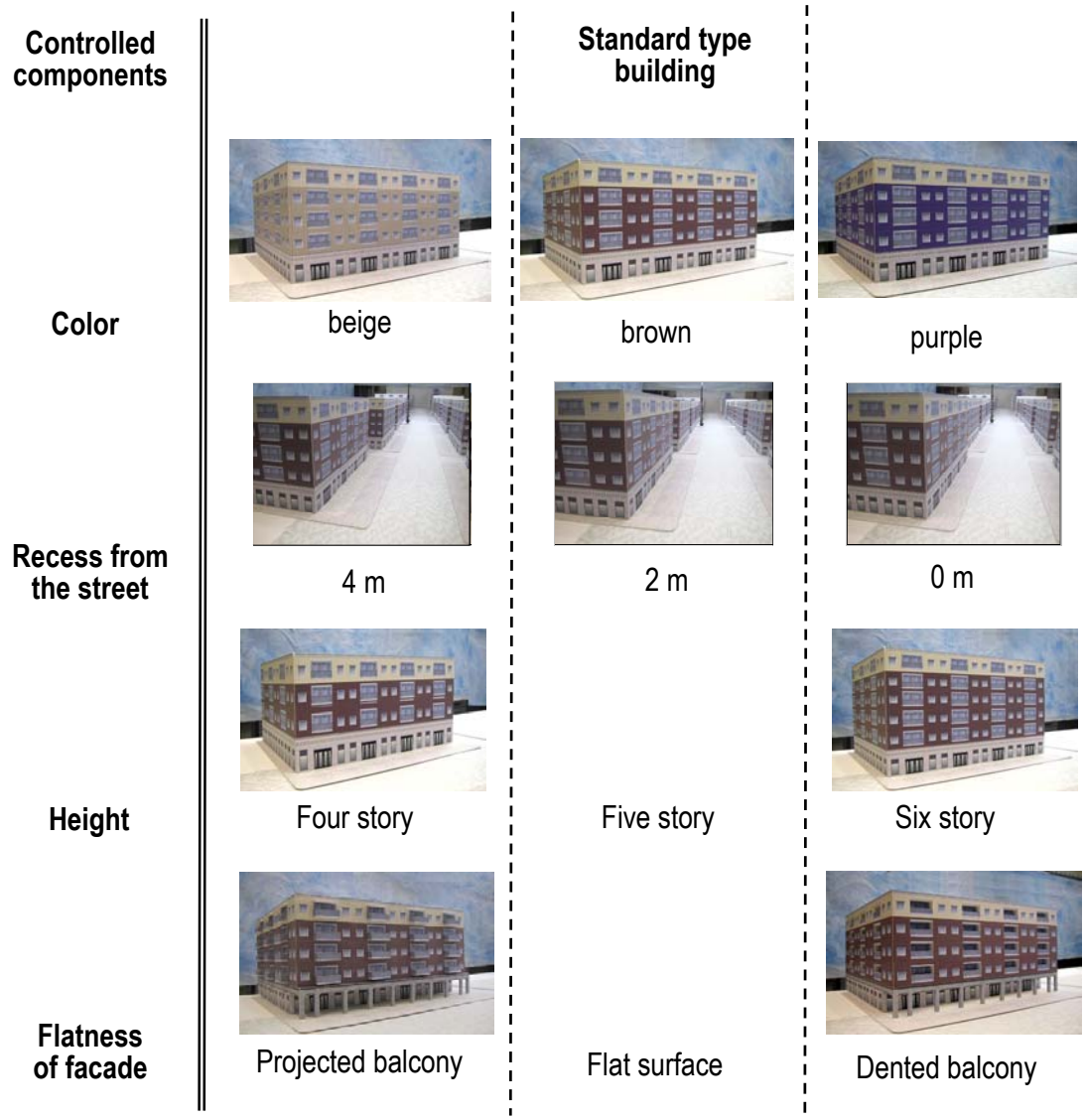


*Figure 3 Variations of the model buildings*

buildings were created by changing one of the four variables. Using these buildings, seven types of streets were made as shown in Figure 4. A street that has some variations in building types was defined as “standard type” street (ST). A street in which all buildings are of the standard type was defined as “monotonous type” street (MT). The following four types of streets have been made by fixing one of the four features of the buildings, i.e.: “color controlled” (CC), “recess controlled” (RC), “height controlled” (HC) and “flatness controlled (FC)” streets. In addition to these, a street in which neighboring buildings were quite different in physical features to each other has been defined as a “varied type” street (VT).

**“standard type” street (ST)**

**“monotonous type” street (MT)**

**“varied type” street (VT)**

**“color controlled” street (CC)**

**“ recess controlled” streets (RC)**

**“height controlled” streets (HC)**

**“flatness controlled” streets (FC)**

*Figure 4: Variation of the streets*

*2-4 Procedures*

Each of the 30 subjects viewed a series of movies of the virtual street scenes projected on a wide screen (2040mm x 1500mm) (see Figure 5). After moving 140m in the model space at a walking speed, the subject rated the impression of each street using the bi-polar adjective pair scales such as "order vs. disorder". Seven different types obtained by combinations of buildings along the street and three different situations made by adding CG trees and CG movable elements as pedestrians and cars, totally 21 different virtual street scenes were rated by the subjects.

## 3. Results and discussion

*3-1. Impressions of "order vs. disorder" and "simple vs. diverse"*

As shown in Figure 6, it is clear that "monotonous type" street (MT) was rated as most ordered and "varied type" street (VT) was rated as the most disordered in every situation. However, the ratings by the scale of "simple vs. diverse" were different according to the situations as shown in Figure 7.

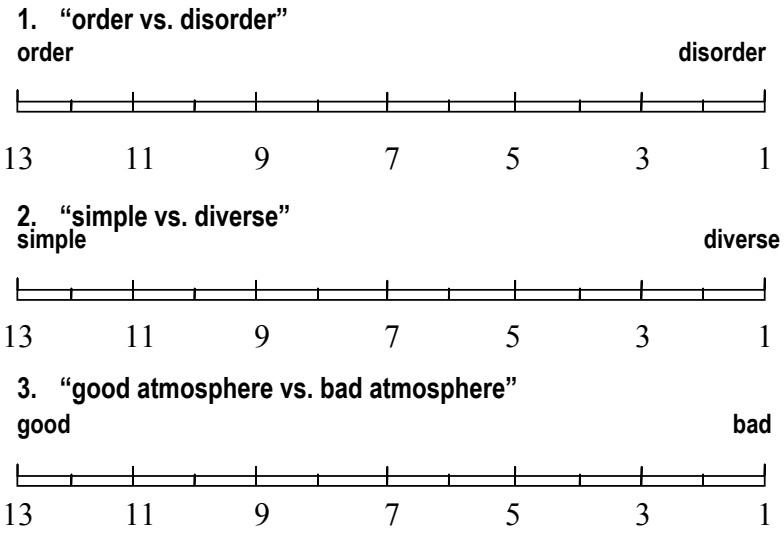


*Figure 5: Experimental setting and the psychological scales*

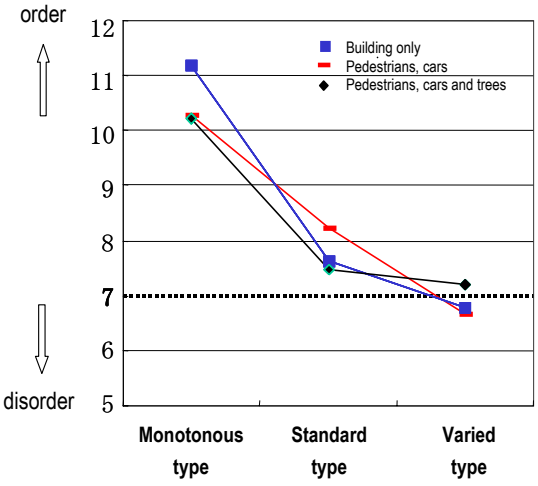


*Figure 6: Impression of "order vs. disorder"*

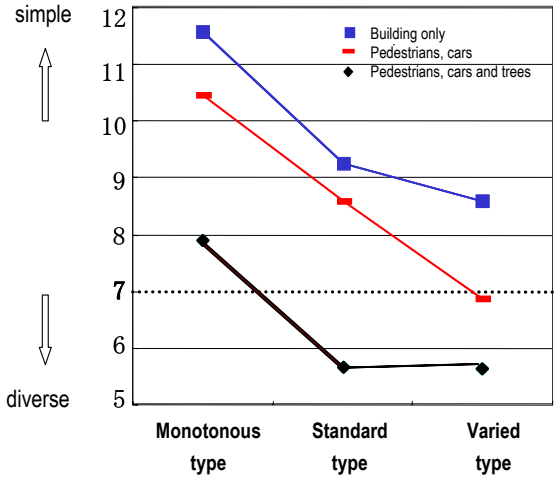


*Figure 7: Impression of "simple vs. diverse"*

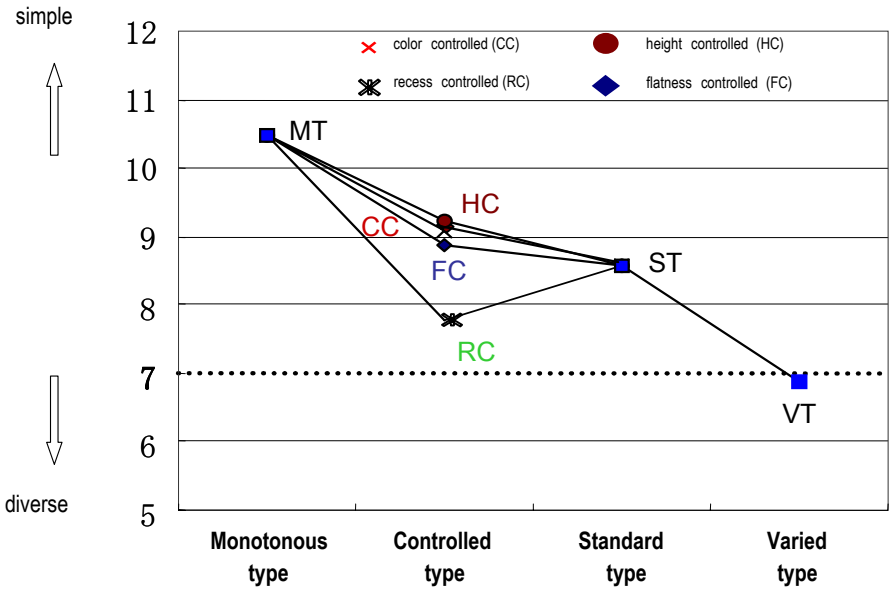


*Figure 8: Impression of "simple vs. diverse"*

Compared with the street scenes composed only with the buildings, the street scenes with people and cars were rated as more diverse, and the street scenes with trees were rated even more diverse. It was also noticed that the "varied type" street with trees received the same rating as the "standard street". This indicates that trees in the streets often have a similar impact on the streetscape as caused by both too monotonous and too varied building design.

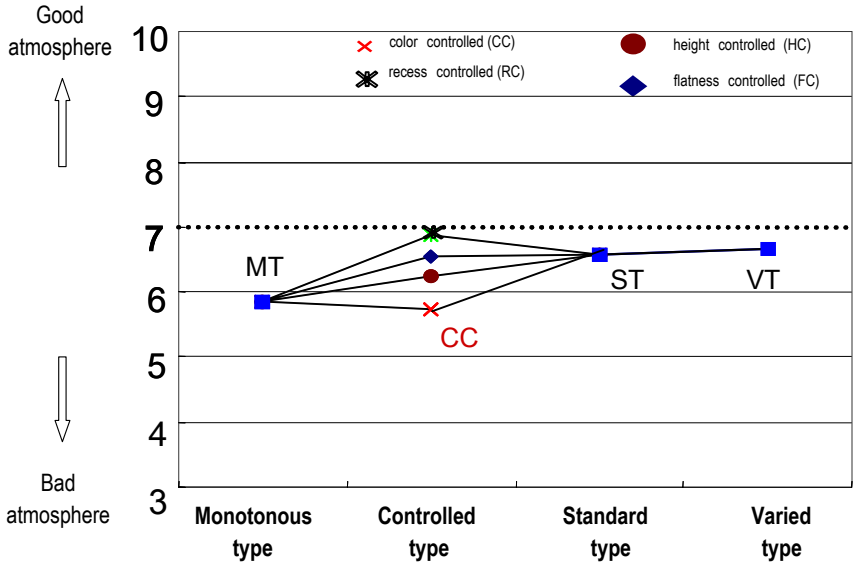


*Fig. 9: Impression of "good atmosphere vs. bad atmosphere"*

*3-1. Evaluation of the controlled streetscape*

Regarding the controlled streets, the following results were obtained in situations without trees (see Figure 8 and Figure 9).

(1) The "color controlled" street (CC) was rated as simpler than the "standard type" street, but it was evaluated significantly lower on the scale of atmosphere preference.

(2) The "recess controlled" street (RC) was unexpectedly rated as more varied than the "standard type" street (ST). The reason for this result may be because other variables' variations became more evident by aligning the buildings.

(3) The "height controlled" street (HC) was rated almost the same as the "standard type" street (ST). The range of variation of the height, from 14m to 21m, may not be sufficient to evoke visual impact to the observer viewed from eye-level on the street.

(4) The "flatness' controlled" streets (FC) were rated almost same as the "standard type" street (ST). The differences in configuration of the façade surface may not be noticed by a person walking next to the building.

## 4. Conclusion

As an initial attempt to examine the design guidelines for streetscapes, a simulation system was applied to test the effectiveness of the control over the building features along the street. The results indicated that the impacts of the building design and layout differ according to the existence of such movable elements as cars and pedestrians as well as trees in the street. It was also suggested that the impression of the streetscape is not independently affected by each component of building design but by a combination of more of them. This implies that regulation of building elements based on arbitrary selections has no value as a design guideline.