

Reading reflections

USP 570

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Week 7

- The ‘Diamond of Design’

Levinson and Krizek (2018 Chapter.11) introduced a new ‘Diamond’, a structure of four key design tenets-hierarchy, morphology, layers, and architectural content. Here author define the term ‘design’ as “how elements of place and plexus arrange their parts into a whole on a variety of scales, from the neighborhood to the metropolis.” This framework even covers the cities system as a high-level hierarchy place. This perspective is more from engineering or computer science. The author compare the layers of place and plexus with the OSI (Open Systems Interconnection) Model, a computer networking framework. This view point is different with the planner who have design background but it provide a powerful tools to explain the complexity of urban land use and transportation.

- Objectively measure subjective qualities

The study by Ewing et al. (2006) attempts to quantitatively measure five urban design qualities in terms of physical characteristics of street. This reaserch try to answer two questions: 1. Which urban design qualities have significant effects on the average value of walkability and how much are the effects ? 2. Which physical features have significant effects on the average scores of urban design qulities and how much are the effects?

The research team select nine from 51 perceptual qualities, 48 from more than video clips, and select 10 urban design and planning experts. The expert panel are invloved in defining the ‘operational’ and give the walkability ratings for each clips and assign a score for each quality on a scale from 1 (low) to 5 (high).

This study used the fractional factorial design, the crossed multilevel Design, random effects models, and linear regression models to built up the relationship among physical teatures, urban design qulities ad overall walkability.

At the end the team dropped four qualities and choose imageability, enclosure, human scale, and transparency as the measurement of walkability. This study found that 38 of more than 130 physical features have significant effects on one or more perceptual qualities. In a later paper, Ewing and Handy (2009) gave all the consensus qualitaitive definiations and operational definitions for each qualities and identify detailed physical features associated with each qualitty

- Discussion: predetermined or prior information.

In the part of experiment design, research team define their purpose are “trying to operationalize design concepts, not assess public preferences”. They believe “average person”

cannot rate streetscapes as to their “legibility,” “transparency,” and so on. The selection of video clips is also to match the perceptual qualities. At the end, this study use five criteria to examine which urban design qualities are more amenable and would be defined operationally in the field survey instrument. The criteria include the significant level in regression models, the ICC (Intraclass Correlation Coefficient reflects the proportion of the variance of an observation that is the result of differences between treatments) and Variance Components in random effects models. Technically, this reaserch is for comparing which qualities are more operational rather than proving the relationship between walkability and physical features.

The part of the fractional factorial design (FFD) is puzzling. FFD is for simplify and improve experiment.¹ The 2^{8-4} FFD means $k=8$ factors, $p=4$ independent generators and 48 observations can assign each of 16 runs with 3 replication. Properly choosing the generators make the effects of potential interest are not aliased with each other. The result of FFD should tell us which factors and interactions are improtant and negligible. However, the papar don’t provide the list of generators and alias, don’t clarify which factors are confounded and which factors and interaction have significant effects.

On the contrary, this reaserch use FFD as a method of sample selection. “The 2^{8-4} sample allowed us to capture the main effects of each urban design quality on overall walkability, . . . to maximize geographic diversity.” (Clemente and Ewing 2005) Actually, what this step do is not sample selection, is treatment selecection. The 48 clips are be rated by viewer in the next step. Moreover, a significant interaction will often mask the significance of main effects. In the presence of significant interaction, the experimenter must usually examine the levels of one factor, say A, with levels of the other factors fixed to draw conclusions about the main effect of A.

The 48 clips are selceted to match the selection of qualities. The raters have simular opinions on them, and highly consistent with previous literatures. Both of the viewers and the scenes are not randomly selected. The relationship about qualities and walkability are predetermined. It just prove some qualities are more measurable than others.

It is not strange that “eight of the nine qualities were collinear. Tolerance values were unacceptably low when all variables were included in a regression at once.” In this situation, we cannont extend the conclusions to all treatments in the population.

To examine the true relationship

“The Bayesian paradigm prescribes that the sample information $f(\vec{x}|\theta)$ be combined with the prior information $\pi(\theta)$ using Bayes’ Theorem to obtain the posterior distribution $\pi(\theta|\vec{x})$. All inferences about θ are now based on the posterior distribution.”

¹“A major use of fractional factorials is in screening experiments—experiments in which many factors are considered and the objective is to identify those factors that have large effects. Screening experiments are usually performed in the early stages of a project when many of the factors initially considered likely have little or no effect on the response. The factors identified as important are then investigated more thoroughly in subsequent experiments.”

References

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