

How Graffiti and Surroundings Shape Visitor's Perceived Safety: A Multiple Conjunctural Causation Analysis

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Abstract

Prior research has reported divergent findings regarding the relationship between the presence of graffiti and visitors' perceived safety in public open spaces. Subsequent research has re-examined this relationship by considering graffiti classification and perceivers' characteristics. Nevertheless, exploration of the conjunctural effects of graffiti's aesthetic and surrounding environmental signals on perceived safety remains limited. To address this gap, this research draws on Signalling theory and Gestalt perspectives to investigate how graffiti's visual elements and surrounding environmental conditions jointly influence perceived safety. Using 160 graffiti sites in Macau as case studies, a Rough Set Approach (RSA) was employed to establish five decision rules. The findings reveal that visual cues of graffiti and surrounding environmental cues interact conjuncturally to shape visitors' perceived safety. These results not only deepened understanding of the complex mechanisms linking graffiti and perceived safety, but also provided practical guidance for urban public space management particularly regarding rational resource allocation and the enhancement of safe and inclusive environments.

Key words: Graffiti Visual elements Environmental elements Perceived safety Signalling theory

Study design and methodology

First, this study identified the visual elements of graffiti and the environmental elements that influence perceived safety through a literature review, forming a preliminary assessment framework.

Based on preliminary investigations and expert experience, this framework was refined into the final assessment framework, which was used to audit 160 graffiti sites in Macau.

Next, the study collected pedestrians' perceptions of graffiti-related perceived safety at each graffiti site as decision attributes.

Finally, the study employed RSA to extract decision rules from the combination of conditional attributes and decision attributes in the attribute value table, presenting the causal relationships between graffiti, its surrounding environment, and perceived safety in the form of if-then rules.

Fig. 1. Research flowchart.

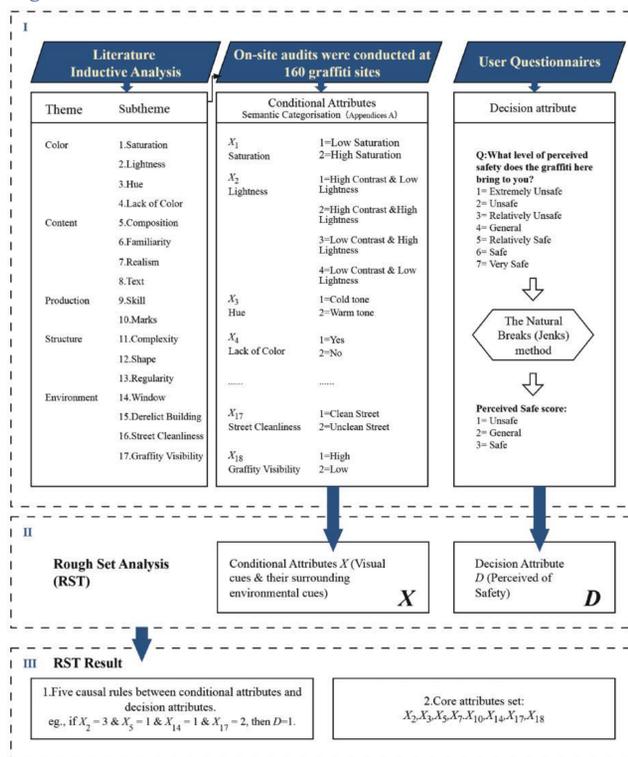


Fig. 2. Spatial distribution map of graffiti in Macau.



Result

Graffiti murals are perceived as safer for people than graffiti tags.

There is a significant difference between males and females when it comes to perceived safety from graffiti.

According to the network diagram, a total of 3 decision rules supporting 'safety perception' were identified, indicating that environmental characteristics that meet these rules are helpful to improve people's safety perception. At the same time, a total of 2 decision rules supporting 'perceived unsafe' were generated, suggesting that if the graffiti cues and environmental cues corresponding to these rules are presented during the graffiti creation process, people may perceive the environment as unsafe.

With the data percentage threshold set at 10%, four rules met the criteria. Among these, 1 rule met $S=1$ (Females reported significantly higher perceived safety than males), 2 rules met $S=2$ (Perceived safety did not differ significantly between genders), and 1 rule met $S=3$ (Males reported significantly higher perceived safety than females). Similarly,

Fig. 5. Decision rule flowchart.

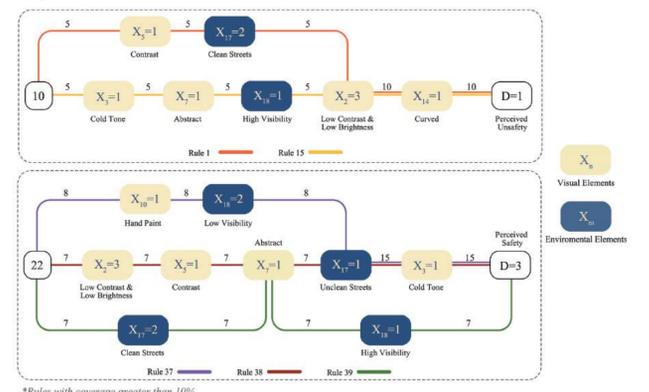
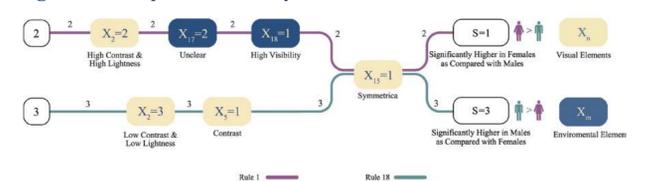


Fig. 6. Gender perceived safety decision rule flowchart.



Conclusion

This study empirically shows that the combined effect of graffiti's visual and environmental cues on perceived safety is a comprehensive one, not independent. It supports the use of Signalling Theory to explain how multiple environmental signals interact to shape perceived safety, offering a new theoretical perspective for urban public art research.

The causal rules derived from RSA provide urban managers with quantitative evidence to identify which visual and environmental cues influence public safety perception. This helps in planning graffiti and surrounding facilities, optimizing safety signals, resource allocation, and minimizing management inefficiencies in urban spaces.