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To cite this article: Keqi Wang *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **310** 022014

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# Research on the Defense Safety Design of Building's Outer Environment Based on Weaken the Spatial Blind Area——Take Gated Residential Communities in Changchun as an Example

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**Abstract.** Rapid urbanization and planning idea of huge block lead to the special urban space structure in most China city. Combined with the construction of urban connotation lags behind, serious results in the highlight problem of pathological environmental issues that predispose crime, such as the spatial blind area. Buildings' outer environment is significant for some kinds of crime. Spatial blind areas are adverse to crime prevention and control which is a key issue of the defense safety design. A favorable buildings' outer environment (abbr: BOE) provides an entertainment and communication place for residents. However, the unfavorable BOE might bring about spatial blind areas. The author puts forward three kinds of spatial blind areas, which are the position-based spatial blind area, the morphology-based spatial blind area and the atmosphere-based spatial blind area. Taking Changchun gated residential communities as an example, the author analyzes the components of residential BOE, such as building element, landscape element and the path elements. Ultimately, the author proposes the strategies of defense safety about how to reduce spatial blind area.

## 1. Introduction

In the book city and crime, Ito zi put forward the concept of "physical dead zone": there are a lot of pedestrians at daytime, but the view of sight is blocked by walls, buildings or the absence of managers sometimes<sup>[1]</sup>. The author named the term "physical dead zone" as "spatial blind area". In this paper, "spatial blind area" refers to the space where sight is blocked or lack of activities.

The unfavorable BOE may bring about spatial blind areas that cause crime, increase the crime rate and worsen fear of crime of residents. According to the physical factors that affect the defense safety, the BOE could be classified into three kinds: the architectural factor, the landscape factor and the path factor. The Architectural factor mainly include buildings and structures. The Landscape factors primarily include greening and lighting system. The Path factor basically include pedestrian and motor roads.

Scholar Rui Ma summarized "city space" where is is vulnerable to crime as "position of space", "morphology of space" and "atmosphere of space" at the macroscopic material level<sup>[2]</sup> in his doctoral dissertation "Research on the Urban Physical Environment Vulnerable to Crime". The author classified the spatial blind area of residential BOE into three types by reference from this



classification, namely, the position-based spatial blind area, the morphology-based spatial blind area and the atmosphere-based spatial blind area.

## 2. Defense safety problems and design strategies of position-based spatial blind area

The spatial position reflects the geometric location of objects in a particular space. The Spatial position influences the crime behavior by affecting crime demands and incentives. In this paper, the position-based spatial blind area refers to those areas lack of visibility due to improper layout of architectural factors, landscape factors and path factors. Based on the investigation, we found some problems in two gated residential communities, Fulinjiayuan and Shijixinyuan communities in Changchun city.

### 2.1. Defense safety problems about position-based spatial blind area

**2.1.1. Deficiencies of building's layout.** Through the investigation to Fulinjiayuan community, we found building's layout deficiencies were as follows:

- 1) Lack of supervision long time between the gable wall of buildings because of the contraction of visual field due to row layout of buildings;
- 2) The natural surveillance between buildings is relatively weak due to building's same access direction.

**2.1.2. Visibility problems of landscape factors.** Based on the investigation of Fulinjiayuan and Shijixinyuan communities, we found visibility problems of landscape factors were as follows:

- 1) The natural surveillance is weakened by the tall plants close to buildings;
- 2) The dark space caused by the lack of lighting near building's entrances, underground garage entrances /exits and fire fighting accesses, which could enhance the fear of crime of residents.

**2.1.3. Problems of path factors.** Through the field research of Fulinjiayuan and Shijixinyuan communities in Changchun, we find problems of path factors are as follows:

- 1) The Traffic path between the gable walls are dangerous owing to the lack of natural surveillance;

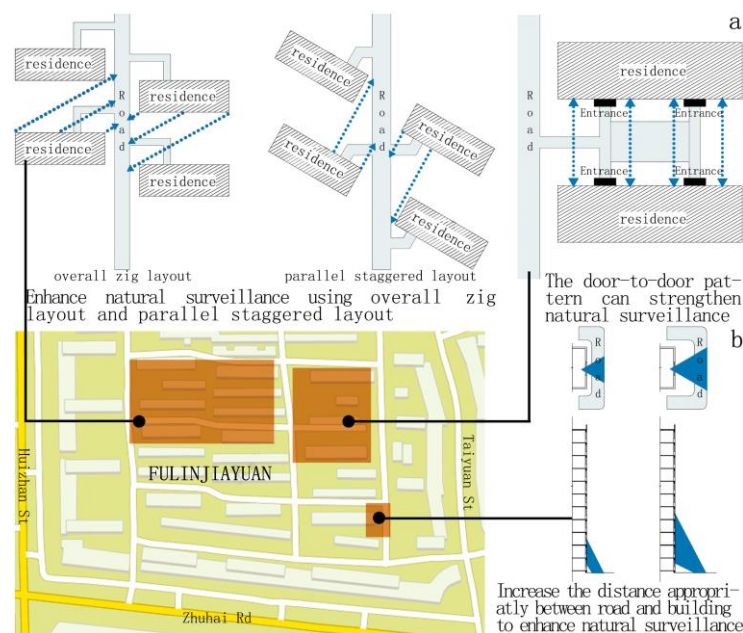


Figure 1. Design strategies of defense safety of position-based spatial blind area.

2) The natural surveillance is weakened on account of the sight occlusion caused by roads which are too close to buildings and transport space at the corner of buildings.

## *2.2. Design strategies of defense safety with regard to position-based spatial blind area*

### *2.2.1. Design strategies of defense*

*safety about architectural layout.* The study of Crowe argued that the layout of physical space has a great impact on committing<sup>[3]</sup>. Therefore, a good architectural layout can help reduce the incidence of crime. The research results mentioned above suggest that the following design strategies can be used when we are planning and designing buildings:

1) The overall zig layout or parallel staggered layout can be applied in planning to strengthen the natural surveillance between gables and enlarge the possibilities of crime behavior being found or prevented;

2) By adopting a door to door pattern for building's entrances, we can add rest seats and entertainment equipments between buildings, which can meet the needs of various groups, facilitate the interaction and communication of neighbors, as well as enhance the informal surveillance and crime risks (see the Figure 1-a).

*2.2.2. Design strategies of defense safety about landscape factors.* According to the study of Rui Ma, The Spatial blind area is easy to come into being along with the growth or improper design of landscape factors such as vegetation and plants. The research of Painter and Farrington, both are English scholars, also come to the same conclusion that communities which are short of illumination had a high crime rate<sup>[4]</sup>. The previous studies showed that a favorable landscape design and sufficient illumination are critical to the communities' safety. Therefore, the following physical changes can be implemented on landscape factors, which are mentioned above:

1) Prune or transplant tall plants which are fairly close to buildings, improving transparency of space, restricting and eliminating conditions which are vulnerable to crime at the same time;

2) Add lamps at building's entrances, underground garage entrances/exits, fire fighting accesses to enhance the illumination, improving visibility of surrounding environment and reducing to conceal ability of criminals and the crime opportunity.

*2.2.3. Design strategies of defense safety about path factors.* The American architect Oscar Newman put forward the natural surveillance strategy in his book defensible space<sup>[5]</sup>. Therefore, the following tactics can be used for problems of path factors mentioned above:

1) Appropriately increase windows between gable walls according to the building's function or adding technical supervision properly to improve the formal and the informal surveillance between gables while the architectural design and the residential community planning;

2) Enlarge the distance between roads and buildings appropriately in communities which could be reconstructed to enhance natural surveillance, as well as crime risks (see the Figure 1-b).

## **3. Defense safety problems and design strategies of morphology-based spatial blind area**

The Spatial morphology refers to the form and status expressed by physical space. The Spatial morphology influences crime behavior by affecting the difficulty degree of committing. The Morphology-based spatial blind area refers to the blind area caused by alteration of form and status of architectural factors, landscape factors and path factors. Through the investigation of two gated residential communities, Fulinjiayuan and Shijixinyuan communities, we can find several defense safety problems, such as too many concave-convexes in buildings' facades which can be easily used by criminals as hide spots, tall plants that block sight line and disordered traffic space that offer conveniences for criminals to escape. All of the problems mentioned above go against the defense safety.

### *3.1. Defense safety problems as for morphology-based spatial blind area*

*3.1.1. Unreasonable design of architectural morphology.* Based on the investigation of Fulinjiayuan community in Changchun, we found the buildings' outline had too much concave and convex which provide hidden place convenient for criminals to commit a crime.

*3.1.2. Visual permeability problems of landscape factors.* Through the investigation of Fulinjiayuan community, we found that the tall and flourishing trees and hedges weakened the transparency of space, and provided the hidden place for criminals as well.

*3.1.3. Accessibility problems of path factors.* Through the field research of Fulinjiayuan and Shijixinyuan communities, we found problems of path factors were as follows:

- 1) The potential criminals are provided more routes to run away because of the random trails in the community trod by the residents who are chasing quickness and convenience;
- 2) It is convenient for potential criminals to quickly enter and flee away from crime scene due to the motor roads extend in all directions;
- 3) There is so much undesirable guidance for crime, for instance, the excess entrances, which can be easily used by potential criminals to get in and out of the community.

### *3.2. Design strategies of defense safety with respect to morphology-based spatial blind area*

*3.2.1. Design strategies of defense safety aim at solving architectural morphology problems.* The study of English scholar Stollard argued that turns and concave and convex of the single building's morphology can produce spatial blind area, which are helpful for criminals to hide in<sup>[5]</sup>. Therefore, the strategies can be applied to solve the problems of architectural morphology factors mentioned above, which should be focused on how to improve the spatial visibility by cleaning up surrounding obstacles nearby. They are caused by overmuch turns and large scale concave and convexes to restrain and eliminate conditions which are vulnerable to crime when we are designing buildings and planning residential communities.

*3.2.2. Design strategies of defense safety aim at solving landscape factors problems.* The study of English scholar Stollard argued that the growth of landscapes could be unexpected shelters, barriers and hidden places for criminals, such as, dense shrubs and fences<sup>[6]</sup>. Therefore, we can use the following strategy to reduce the problems of landscape factors mentioned above:

- 1) Clip over-flourishing trees and other greenings regularly to keep the transparency of space, reduce criminal's concealment ability and increase crime difficulty (see the Figure 2-a).

*3.2.3. Design strategies of defense safety aim at solving path factors problems.* The study of Japanese scholar Ito zi argued that Road network density would increase the trafficability of criminal subject, and the impact on the crime<sup>[1]</sup>. Therefore, the following strategies can be taken advantage of to decrease problems of path factors mentioned above:

- 1) For the random trod trails, it is acceptable to cover the original trails with low hedges, add rest seats at the same time to clarify boundary, and assure the visual permeability of the space as well (see the Figure 2-b);
- 2) Cul-de-sac can be utilized properly to lower the accessibility of roadways;
- 3) It is essential to set a reasonable quantity of entrances to decrease misguidance and enhance the control to potential criminals. All of the strategies mentioned above aim at restricting and eliminating conditions vulnerable to crime, increasing the crime difficulty and diminishing the crime stimulations.

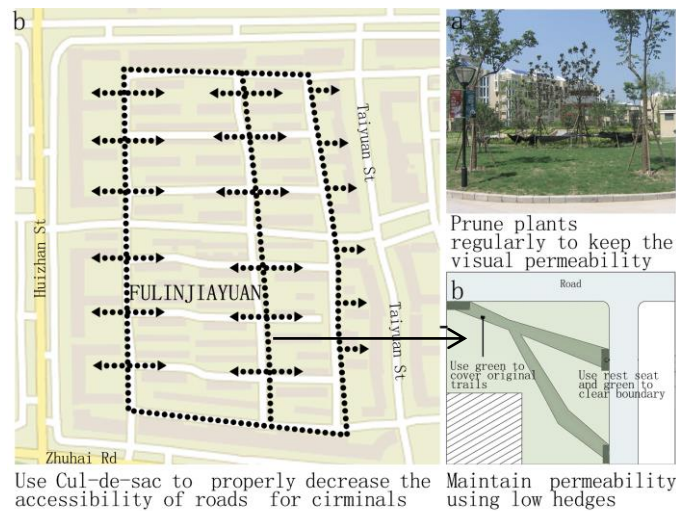


Figure 2. Design strategies of defense safety of morphology-based spatial blind area.

#### 4. Defense safety problems and design strategies of atmosphere-based space blind area

The Spatial atmosphere refers to the atmosphere and the mood of the space, which reflect people's subject feeling therein. The Spatial atmosphere can affect criminals' behavior by influencing people who are potentially involved in committing in the space. The Atmosphere-based spatial blind area refers to the space lack of vitality, attractiveness and control power due to the undesirable image or improper design of architectural factors, landscape factors and path factors. Several problems are found based on the investigation of two gated communities, Fulinjiayuan community and Shijixinyuan communities in Changchun city.

##### 4.1. Problems of defense safety concerning atmosphere-based spatial blind area

*4.1.1. Atmosphere problems of landscape factors.* Based on the investigation of Fulinjiayuan and Shijixinyuan communities, we found atmosphere problems of landscape factors were as follows:

- 1) The spatial vitality is not sufficient for the lack of communal facilities in the community;
- 2) The lack of attractiveness and vitality of space due to the ruined and disordered greenings;
- 3) The attractiveness is decreasing and the fear of crime is increasing for residents' insufficient lighting and those destroyed road lamps.

*4.1.2. Vitality problems of path factors.* Through the field research of Fulinjiayuan community, we found vitality problems of path factors were as follows:

- 1) The interpenetration of space and the spatial cohesiveness are undermined because of the disordered and random roadside parking;
- 2) The vitality of roadside space and the control of potential criminals are weakened which are caused by the monotonous overlong linear roadways with few infrastructures to support people's activities.

##### 4.2. Design strategies of defense safety in relation to atmosphere-based spatial blind area

*4.2.1. Design strategies of defense safety direct at landscape factors problems.* In the classic architectural book "Exterior space design", the Japanese scholar Yoshinobu Ashihara argued that the exterior space built up a centripetal order from frame to the inner space in which it has a positive



space to satisfy human's intentions and functions. Therefore, the following strategies can be applied to lessen the problems of landscape factors as mentioned above:

1) Reasonably add communal facilities like rest seats and fitness equipments in key parts of outer space, such as building's entrances, to create the positive activity space where people can get together and do various kinds of activities(see the Figure3-a);

2) Improve environmental quality of the space by means of replanting the degraded plants and integrating the messy landscape to intensify spatial attractiveness;

3) Maintain the damaged lamps and lanterns to improve the overall environmental image. All of the strategies mentioned above aim at enhancing the spatial vitality, decreasing the crime stimulations, avoiding the occurrence of Broken Windows phenomenon.

*4.2.2. Design strategies of defense safety direct at path factors problems.* Ito Zi mentioned the defensible road in his book *City and Crime* which mentioned that "a daily life road could help pedestrians to get rid of crime and use it at their will"<sup>[1]</sup>. It shows that a daily life road certainly has a positive influence on crime prevention. Therefore, the following strategies can be applied to reduce problems of path factors mentioned above:

1) It is practicable to specifically designate the parking area combined with roadways and improve the management of parking spot in order to reduce interventions to roadside space;

2) To turn the tedious roadside space into a positive place where it can gather neighbors to hold activities and communicate with each other, it is necessary to properly arrange communal facilities like rest seats and fitness equipments beside the road. All of the strategies put forward above aiming at enhancing crime difficulty, improving spatial cohesiveness and controlling the power of criminals (see the Figure 3-b).

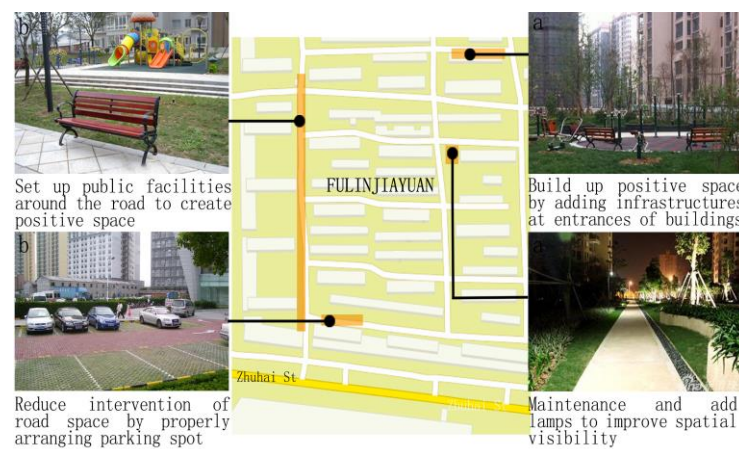


Figure 3. Design strategies of defense safety of atmosphere-based spatial blind area.

## 5. Conclusion

The BOE nowadays is becoming more and more complicated along with the increasing amount of varied gated residential communities. Meanwhile, as the value of the defense safety design on community is not taken seriously by designers, so the complicated BOE may increase the spatial blind area and crime rate. This article puts forward three kinds of spatial blind area, finds out defense safety problems of spatial blind area based on the investigation of BOE's factors of two gated residential communities, and correspondingly brings forward the design strategies for different types of spatial blind area by means of adjusting layout of architectural factors and maintenance of image, integrating and promoting landscape factors, optimizing and reconstructing path factors. Finally, the author achieves the goals of decreasing negative space in the community's BOE and crime rate, creates a

favorable and positive defensible space for community members.

### **Acknowledgement**

This paper was Supported by National Natural Science Foundation of China, 51778266

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