# Reweaving the Fabric: A Theoretical Framework for the Study of the Social and Spatial Networks in the Traditional Neighborhoods in Beijing, China

Baoshan Han
Georgia Institute of Technology, USA
335 Windsor Chase Trail
Duluth, Georgia 30097
USA
tel. +1 404 579 1668
baoshan@aol.com

## Abstract

This paper proposes a research framework to look at the traditional neighborhoods in Beijing both as geographical places and as setting of social relationships. It calls for a more comprehensive approach to investigate the socio-spatial relationships. It aims at a better understanding of the variables of urban fabric. It promotes an approach that is based on adaptation rather than complete replacement of the old urban structure. The properties of the traditional street systems that are most supportive of a variety of social living conditions, and which are most able to accommodate changing ways of life should be taken into consideration in the planning and design of new communities, especially those in or adjacent to the historical neighborhoods.

## 1. Introduction

Beijing as a city has a history of more than 3,000 years, and has functioned as capital for more than 800 years (Wu, 1994). Throughout history, Beijing's urban fabric has accommodated a rich variety of social conditions and neighborhood life within a cohesive and legible overall structure. The historical areas in Beijing rank among our most valued built environments. At the same time, they are the most likely to be the scenes of intense conflicts between new and old.

Currently there are about two million people living in the residential areas of old Beijing in an area of about 40 square kilometers. The current practices of clean sweeping of the traditional neighborhoods, and plugging in large-scale modern housing estates, especially those gated communities, are dramatically altering the spatial continuity of the environment. They are also having a damaging effect to the long-standing social fabric in the historical residential areas.

Today, the co-existence of both old and new urban typologies in Beijing represents a unique opportunity to study the relations between different spatial organizations and their impacts on the socio-cultural values of the residents and their behavior patterns.

Street pattern is the primary framework that defines the physical sitting of the city. It contributes to the quality and character of the urban structure. Streets in Beijing's traditional neighborhoods have created a fine grained, well connected, and diverse urban fabric. They are more than just pathways. They have provided the dwellers with public spaces right outside their houses. These neighborhoods have an enduring power to attract and a tendency to inspire new interpretations of their value in each generation. It is proposed that the street system and its important role in

supporting and strengthening social relations of the neighborhoods is an integral part of the dynamic and changing organism of the city (figures 1 and 2).

What makes older neighborhoods possess qualities not to be found in the newly constructed housing estates? This study will identify key spatial features that affect residents' social network. Results of this study can furnish Chinese urban planners and architects with a base on the problems they are confronting, to facilitate planning and design decisions for both new residential area and the renovation of old neighborhoods.

The pattern of human interaction in a neighborhood – who interacts with whom and how much – is not just a matter of individual choice on the part of those involved. The spatial context of the neighborhood is one the most important conditions that have the potential to facilitate or inhibit interactions among people. This paper presents a theoretical and methodological framework to investigate the effects of spatial environment on the local social networks in the traditional neighborhoods in Beijing. It calls for a more comprehensive approach to investigate the relationships between spatial and social fabrics of the neighborhood.


## 2. Characters of local social network (LSON) in Chinese traditional neighborhood

The quality of urban life depends heavily on the quality of social relations in neighborhoods. Traditionally, the Chinese relied on the neighborhood social ties much more than their western counterparts. This is partly because in China, until very recently, most people did not have the freedom to choose where to live. Today, China, like much of the world, is experiencing a paradigm shift, not only in the way people perceive society, but also in the way in which people interact with each other in their neighborhood. The contemporary milieu of frequent residential mobility, spatially-dispersed relationships and activities, instantaneous distance-free communication, and the movement of interactions from public spaces to private homes have all limited the amount of observable interactions in neighborhoods. This does not mean that community has been lost but that it is much less likely to be locally based. Still, neighborhood ties remain important, but only as a minority of relationships in personal networks. This is especially true among younger generations.

In spite of data and theory supporting the conception of community as extending beyond a geographical locale, I believe that neighbors and neighborhood still have a very important place in people's lives. The close spatial locations of neighbors enable them to perform functions that more distant network members might find difficult to accomplish. Physical proximity continues to affect the frequency with which people see one another and provide emotional as well as material aids.

As people develop extensive social networks in the wider community beyond the neighborhood, they live more with social relations that they have established in earlier periods or other spheres of their lives. Residents' individual social networks may transgress the area of the neighborhood and develop in different directions for people with different social characteristics. One of the goals of the study is to investigate the nature of social networks in a local neighborhood and the significance of neighborhood as geographical setting. By using the social network approach, we

will find out whether the social networks are still dependent upon residents' interaction since community in Chinese cities has become more embedded in social networks than in local groups.

**2.1 Social network analysis**
The sample neighborhood selected for this study is called *"Nan Luo Gu Xiang" (NLGX)\*,* which is one of the earliest neighborhoods located on the north side of the Forbidden City. Most of the houses in the neighborhood were built during the Yuan (1206-1341) dynasty. It is also one of the most stable neighborhoods in Beijing. Many residents have lived there most of their life. The total area of NLGX is about 84 ha.

One straightforward approach to studying the pattern of social network is to find out who in the population is directly connected with whom, and what are the patterns of the connections. Social network analysis looks beyond the specific attributes of individuals to consider relations and exchanges among social actors. It reflects a shift from the individualism common in the social sciences towards a structural analysis. This method suggests a redefinition of the fundamental units of analysis and the development of new analytic method.

In the network analysis phase a series of interviews, surveys, and on-site observations will be conducted. For the purpose of this study, only locally defined networks will be considered and only a small set of core network members will be investigated in details. The first step is the "social network survey", which aimed at developing patterns of social ties among local residents and within the bigger community. The second step focuses on the structure of the social fabric of a neighborhood. This will reveal the less visible strengths and weaknesses of that area as a residential community. The intention for these investigations is to gain insight on the following issues:

1. Network characteristics and the interaction pattern in the neighborhood. Some of our basic assumptions about social behavior and social network in the US may not be valid in an overcrowded Chinese neighborhood. For instance, we take it for granted that interactive activities on streets are welcome signs of well-used streets, whereas in Beijing, the residents who live in the "interaction overloaded environment" may seek a more simplified relationship. People may be satisfied with a rather superficial form of interaction, and depend on only a few individual neighbor oriented relations for support and comfort. In addition, we need to probe into many other aspects of the local social relationships:

   a. The source of friendship: that is the social context, or pool of acquaintance, from which the friendship was formed. We will attribute most of the friendship sources into the following categories: neighborhood, work, childhood and juvenile friends, kinship, voluntary associations, and etc. Even those who maintain an intimate social network outside of the neighborhood still actively participate in neighborhood activities.
   b. Two distinct relationships between people in a neighborhood should be identified: one is the primary tie, the intimate bonds between people; the other is the more superficial form of interaction between neighbors.

c. The strength of a tie. Old ties can be replaced with new ones. My initial observations reveal that in the traditional areas more neighbor-turned-friends maintained close contact after they moved out of the neighborhood than people in new housing estates (compared with similar length of residence status).

d. Density: which is measured by comparing the number of actual relations among a set of people to the number of possible relations. For example, in a set of five people there are ten possible relations (5x4)/2=10. If they report only 4 actual friendships in total, density is 40 percent.

e. Multiplicity: the more relations in a tie, the more multiplex is the tie. Social network analysts have found that multiplex ties are more intimate, voluntary, and supportive and durable (Wellman 1990).

f. Frequency was measured as how often the two people/families visit each other or get together. The key to understanding frequency of interaction is ease of access. Living close by generally promotes contact regardless of the source of the friendship.

2. What is the structural element of the local social network? Is it the strength, or rather the breadth, of social ties that local residents rely on to fulfill their social needs? For instance, we need to find out what stand out as the features of social network, e.g., whether most local interactions occur close to home or throughout the neighborhood; and whether the active interpersonal relationships are with neighbors.

3. What are the costs involved in maintaining social relationships among residents? People actively choose among alternative social relations, and the social environment determines the relative costs and values of these alternatives. People seek, consciously or not, to maximize their rewards relative to their costs, and they therefore pick the most "profitable" and "rational" alternative.

4. What are the influences of the characteristics of the residents on various dimensions of the social fabric, for instance, income levels, age, education background, household composition, and length of residence in neighborhood, etc? Generally speaking, the longer a resident has lived in the neighborhood the higher the probability that he or she displays a feeling of belonging to it (and maybe the harder for him or her to accommodate changes in the social relationships).

5. Range: whether the majority of "most intimate relationships" cross the borderline (Such as on the other side of main street)?

6. To what extent a social system rests on informal interactions? Intimacy, frequency of contact, and duration are concepts that appear often in the network literature. Each presumably indicates the depth, intensity or quality of a relation. The duration of a bond reflects the amount of experience shared by two people and how well their tie has endured disruption and competition from alternative relations.

The neighborhood's quality of life will be described by several indexes that capture the extent to which residents used neighborhood facilities, reported satisfaction with housing, and described

their satisfaction with public services in the neighborhood. One of them will be the "Neighborhood activity index".

2.2 Neighborhood activity index

Activities are shaped by material conditions, but not solely so. They depend more on the social system of a city, and on social relations determined by this system. Within a social system, there is room for ways of interaction not entirely determined by it. The pattern of activities in a neighborhood is a good measure to how well an open space system is adopted by its users. They are more accurate indicators of the interactive patterns of the neighborhood. It will be argued that the activity pattern is strongly affected by the spatial properties of the urban areas. It is hoped that a better understanding of the effects of layout upon residents' activity pattern may assist in the preservation of the spatial character of the traditional neighborhoods while taking current needs and behavioral patterns into account.

Activities are observable behaviors that are engaged in by more than one person, which implies both co-presence and meaningful communication between agents. Some key elements and dimensions of the activity patterns will be taken into consideration.

Key descriptions of the activities:
1. What types of activities are in action?
2. Who is engaged in the activities (agents)?
3. Physical conditions: climate, distance, covered or exposed, landscaping, etc.
4. Spatial conditions: the measures concern the shape and conditions of the open space.
5. What are the geometric features of the activity space?

Cultural dimensions: street forms are culturally determined, they prioritise certain activities and persons, and obscure others, according to class, race and gender. Whether a setting will be used or not depends on the cultural rules, e.g., the unwritten norms, customs and habits, the prevailing lifestyle, and the definition of which activities are appropriate to given settings. Whether some behaviors were acceptable depends on the contextual conditions. For instance, it is commonplace for people who live in Hutong areas to have their meals by the entrance gates, whilst in newer and nicer neighborhoods eating in public will be considered inappropriate.

The presence of certain groups in given settings, and their activities, may attract others – or lead to avoidance by others; it influences space use. Separations may occur in space, i.e. different groups use different settings for the same activities. If a space is taken for certain activities, does it become more attractive than when it was vacant?

2.3 The investigation of social network variables in relation to their spatial dimensions

The socio-spatial structure of the city can be read like a map recording the structure of society. Urban space is always socially defined space. We know that social networks are partly determined by the spatial environment through casual contacts. Opportunities for social contacts are either facilitated or inhabited by the spatial features of the neighborhood. Social contacts arise from the locations where activities take place. Activity pattern provides us with a window to look into the pattern of human interaction.

Space use survey: Mapping connections: Area network density (measured with different tie strengths). The in-person survey will ask respondents to mark the locations of their socially closest, intimate ties within the neighborhood up to a maximum of 6 ties.

1. To identify over-used and under-used area in the neighborhood
2. To identify where the most domesticated public spaces located
3. The degree of flexibility of the space
4. To link visibility and space use
5. To identify any antisocial use of space

2.4 It all comes to social contact

It is conjectured that it is the selected interaction among residents that builds the fabric of the social life. This facet of the community has an important influence on people's commitment toward it. The modern way of living should encourage both localized and global scaled communications. The residential environment should support a community's localized communication through its spatial layout, or its access system should be preserved.

Establishing and keeping a relationship require different spatial and social environments. Repeated encounter is critical to the maintenance of social ties. People seek to sustain a network structure that provides rewarding relations at relatively low costs.

We need to keep in mind that social networks and spatial networks interact with each other. It is time to stop trying to view present community network through the lens of past neighborhood groups. Community ties continue to be pervasive, but they now link people across both social and spatial expanses.

## 3. The local spatial networks (LSPN) of traditional neighborhood in Beijing

The physical and spatial structure of traditional neighborhood in Beijing is the outcome of a long history of small-scale, incremental changes, which accumulated over time to produce street patterns with neither geometrical nor functional simplicity. The original street system in Beijing was laid out in a net-like pattern. That is, most streets in the old part of Beijing run both horizontally and vertically through the city and serve as links between different communities. They became the
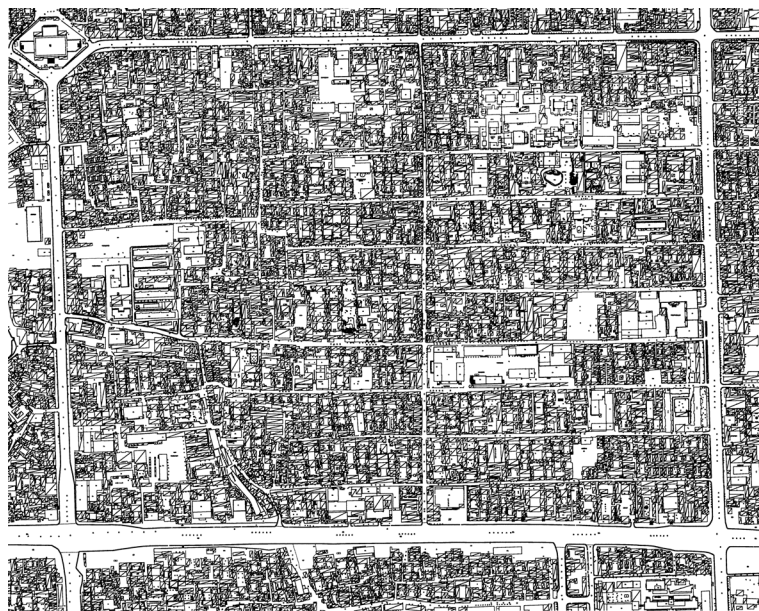


Figure 1: Map of NLGX Neighborhood*
* NLGX Neighborhood: Population: 22,000. Population density: 260 /ha.

commercial spines of development and were also a space for chance encounters and interaction between social classes. My hypothesis is that the unique street layout in traditional neighborhoods in Beijing has certain hidden principles that support a much closer social relationship than many modern housing estates.

From the map of the sample neighborhood NLGX (figure 1) and its corresponding axial map (figure 2), we see that the streets are the only public spaces in the old part of Beijing. There is no urban square that is common in many cities in the west. There are three different types of urban spaces corresponding to different types of use and patterns of movement: the main roads, which constitute a continuous system that connect directly with city road system and are mainly for vehicular access; the local roads (figure 3), which reach deeper into the heart of the neighborhoods, also allow vehicular traffic but connect with both main roads and



Figure 2: Axial Map of NLGX Neighborhood

small allies (hutongs**); and Hutongs (figure 4), which are the alleys connected directly to the courtyard houses. The network formed by hutongs and the local roads will be the focus of this study.
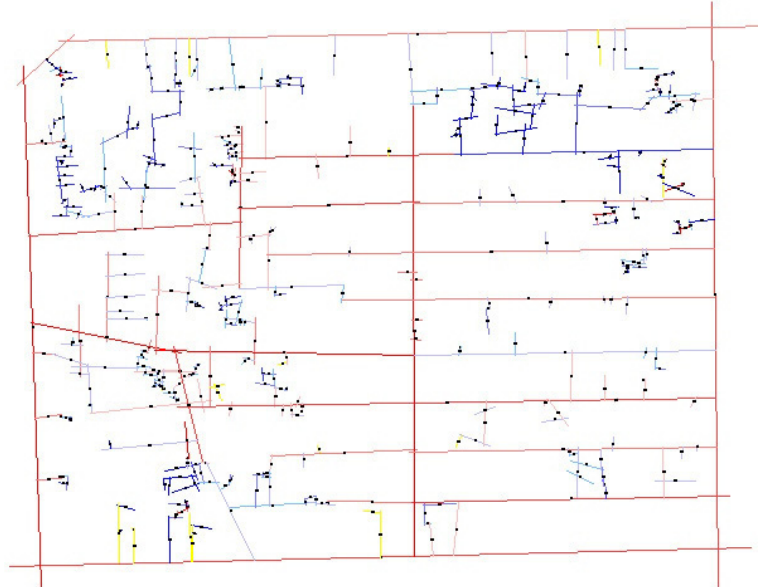


Figure 3: Photo shows "local street"

The notion of supportive spatial environments can be elaborated in various ways. Here we are going to ask two basic questions: 1, what aspects of the social network are being supported by the local spatial network? And 2. by what spatial features are they being supported (what are the mechanisms involved in the process)?

Figure 4: Photo shows "Hutong"**

** Hutong: A *hutong* is an ancient city alley or lane typical in Beijing, where *hutongs* run into the several thousand. Surrounding the Forbidden City, many were built during the Yuan (1206-1341), Ming (1368-1628) and Qing (1644-1908) dynasties. The main buildings in the *hutong* were almost all quadrangles--a building complex formed by four houses around a quadrangular courtyard. The quadrangles varied in size and design according to the social status of the residents. *hutongs* are passageways formed by many closely arranged quadrangles of different sizes. The specially built quadrangles all face the south for better lighting; as a result, a lot of *hutongs* run from east to west. Between the big *hutongs* many small ones went north and south for convenient passage.

3.1 What are the physical features of the traditional neighborhood?

The physical environment, as part of the material setting people live in, is both a condition and a consequence of the pattern of social relations in an area.
1. Physical dimensions:
    1. Length of street: the length of the section of street that is intersected by two cross streets
    2. Entrance distribution pattern.
    3. The presence and absence of boundaries: In Beijing's traditional neighborhood, there are no clearly defined neighborhood boundaries.
    4. Distance and relationships: physical proximity alone does not necessarily enhance social relationships.
    5. The quality of neighborhood services

3.2  What are the morphological features of the traditional neighborhood?
    1. The degree of "enclosure". Sometimes enclosure is needed. When most of the efforts in the west are to bring people back into the inner city, thereby recreating the rich street life and urban culture of a bygone era, residents in many Chinese cities are struggling to

screen out the pedestrians that fill every street of their neighborhood. Many residents, especially those live on the edge of the community, want to isolate themselves, thus reducing overloaded contacts, at the same time facilitating interaction if and when it is desired.

2. Road network features
    a. Ring roads: encircle the whole estate defining its borders, and outline the perimeter of the neighborhood units. They also make up the principal link among penetration and local access roads.
    b. Penetration roads: orthogonal axes that intersect in the central space and subdivide the settlement into neighborhood units.
    c. Inner access roads: "Hutongs"
    d. Accessibility: both perceived and actual accessibilities. The availability of the alternative route

3.3 What are the hidden spatial principles that support a closer social relationship? Spatial layout plays a very strong role in determine whether people are available as resources to be noticed, observed, approached or addressed by other people. This mostly occurs through the way in which space modulates and distributes boundaries, visual field and volumes of movement (Peponis, 2001).

1. Degree of flexibility: the ability to support different types of activities.
2. Territoriality: Easily domesticated? Degree of control?
3. Neutrality: to allow change and adaptation to occur easily in response to changes over time – both short-term and long term.
4. Spatial hierarchies?

What are the social network features that can be found in the most integrated (or segregated) areas of the neighborhood? Will conventional syntactic analysis help to formulate alternative scenarios so that damages to the social networks by street layout changes can be minimized? It seems that we need a more inclusive syntactical analysis approach to address questions like these.

So far we do not have an overall technique that is capable of describing space-behavior interaction at a very fundamental level. The socio-spatial relationships are too complicated and too situation dependent, so that any method of inquiry will only satisfy our need for understanding certain aspects of the issue.

Current syntactical analysis approaches that are mainly concerned with pure configurational properties can only tackle certain aspects of the issues. The syntactical interpretation of Chinese urban phenomena needs to be based on a very different set of assumptions and scopes than that of the West. The methods of inquiry need to be expanded to a more inclusive one. Here are a few examples:

1. Space syntax studies claim that the way urban forms affects the way people move and interact is through the recognizable presence of connectivity and integration both locally and globally. This study suggests that the distribution of the activities in urban areas is

not only influenced by the configuration of the access system, in terms of varied pedestrian densities, but also by the non-spatial conditions of the residential area. This study will show that people do not necessarily interact with each other simply because they have been put together in the same street. In other words, co-presences do not automatically lead to meaningful interaction. Only desirable co-presences can contribute to relationship buildings.

2.  Most current space syntax studies only consider the "connecting" function of urban streets. This thesis recognizes that streets not only "connect" but also "divide" the individual parts of a city. Streets sometimes serve as barriers. This is especially true when streets are widened to accommodate heavier traffic.

3.  Many syntactical studies do not take the metric properties of space into account, or the effects of metric properties have been reduced to a minimum. This study believes that metric dimensions are key factors in modeling activity patterns. For instance, sometimes the increased depth (morphological distance) does not have as much influence on activity pattern as increased metric distance. Most children's activities are found to be within two street blocks' range.

Many space syntax studies disregard its geometric regularity. The "structure" of the access system is the pattern brought to light by expressing the streets as an axial map and analyzing it configurationally (Hillier, 2001). Axial map captures essential properties of the urban system. This study will take the shape of the space into account. Activities can occur both in the more integrated spaces and segregated ones. Many of the well-integrated streets have a high average number of activity participants, but so do some of the more segregated streets. However, some activities will only take place in certain shapes of spaces that meet their particular needs. They do not always use the spaces designed for them.

3.4 How much spatial constraint will be imposed on interactive patterns by changing the spatial configuration of a neighborhood?

It is very common for residents in traditional neighborhoods to exert control over the amount of interaction with other residents or outsiders by domesticating public spaces. Many new addition/renovations in existing neighborhood did just the opposite: the newer, taller and larger housing groups plugged into the traditional residential areas also brought in wider streets. These streets which once served as connectors now function more as dividers. These streets also changed the configurational balance the traditional residential area had before (many streets are shallower in depth). The small alleyways that connected with the widened streets are flooded with additional traffic. Those alleys are no longer used by the residents as "extended living areas" for daily contacts with neighbors. In addition, these widened streets broke the entire neighborhoods into smaller pieces with fewer pedestrian connections.

Another example is the many recently built gated communities, which had gone to the other end of the extreme. These communities have completely separated themselves from the existing urban context. They have caused the most damage to the street pattern, and the kind of interactions it allowed. The relation between new and old spatial environments and the social life

they were designed to support is a very dedicated one. Simply opening up the boundaries of an enclosed neighborhood will not automatically build the connections between new and old communities, rather, a diversity of spatial cultures – regardless of whether they are new or traditional - must be connected in a manner that is better suited to the transformation of lifestyle.

Damaged urban fabrics are not completely lost. They can be rewoven through residents' re-adoption behavior and design professionals' sensitive selection of renewing strategies for the future. The goal of re-connecting the access system of the new housing estates to the traditional residential areas should be to regenerate the spatial structures that promote meaningful social contacts, the contacts between different classes of residents, while guaranteeing a network of public spaces that serve the needs of both residents and visitors. This requires that we link old and new neighborhoods in such a way that their access systems support each other in terms of providing needed social contacts and minimizing unwanted random encounters. Obviously the combined system needs to achieve a balance between two extremes: the deep labyrinths, which use to be the case with traditional neighborhoods, prevent the stranger from naturally penetrating the inner parts of the place, maximizing local control at the expense of the control of strangers; at the other extreme, if we eliminate completely the existence of relatively segregated spaces, it maximizes the control of the stranger at the expense of the local inhabitant. From a social function point of view, the more open this combined system is to different uses and different symbolic interpretations, the more easily it can accommodate different types of community and especially communities that are changing in nature. Again, the only reliable indicator as to how successful is the "fix" made to the urban fabric is the activity pattern. As long as the local residents enjoy the neighborhood as a whole system, whatever the action taken is should be judged as an improvement to the urban environment.

## 4. Conclusions:

The central theme of this study is that certain aspects of the old urban structure have lasting value. The research framework presented here calls for a more integral approach for future urban renewal practices, which is aimed at preserving and regenerating the spatial links between old and new neighborhoods. Healthy urban fabrics are always in the process of change. A particular dwelling culture cannot be preserved in static form nor can it be regenerated by formal imitation. There is no one-size-fits-all "blueprint" to the development in historical neighborhood. It is the particular attributes of each locality - spatial, social, economic, and political - that need to be considered in deciding the appropriateness of similar developments in the future. Beijing needs a forward looking approach to the historic lessons. Its urban renewal policies should be switched to a softer, more socially-oriented approach. Exploring and testing future alternatives can be thought of as one way of maintaining our ability to respond to the changing social needs.

**References:**

Das, R., J. (2001). "The spatiality of social relations: an Indian case study". *Journal of rural studies*, Vol. 17, Issue 3, July 2001

Hillier, B. (2001) "Society seen through the prism of space". *Proceedings of the Third Space Syntax Symposium*, Atlanta, 2001.

Peponis, J. (2001) "Interacting questions and descriptions". *Proceedings of the Third Space Syntax Symposium*, Atlanta, 2001.

Wellman, B (1990)., "What is social network analysis?". http://www.ascus.org/jcmc/vol3/issue1

Whyte, M., and William, P. (1984). *Urban Life in contemporary China.* Chicago: University of Chicago Press.

Wu, L. (1992). "A New Model for Integrated Rehabilitation: The Inner City Neighborhood of Ju'er Hutong, Beijing East City District." *Paper presented at Asian Urban Research Network Seminar/Workshop on Neighborhood Redevelopment in Inner Cities*. Beijing: Tsinghua University.